Writing a Patent Application in LaTeX and LyX

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Contents

License

Foreword

I am indebted to several people who contributed by reviewing this document, teaching me some LaTeX tricks and especially teaching me about patents. Let me say ahead of time that if I ignored or incorrectly dealt with their review comments, or have any remaining errors in documentation or LaTeX code, the errors are solely my responsibility:

I have worked with Gordon Kessler, previously our in-house patent counsel, for over ten years. He taught me almost everything I know about patents and is the patent attorney of record on many of my patents. Since I've worked with Gordon for so long, the style I use mostly reflects his.

Andrew Dommer of Fish & Richardson P. C. reviewed this document and provided lots of comments. I've incorporated or accommodated most of his input and because of his input added certain flexibility to these tools.

Tracey Kinsella, the in-house paralegal at my company Teledyne LeCroy, proof-read this document and, as usual, found most of the errors that no one else did.

Amy Hendrickson of TeXnology Inc. taught me how to implement the macros responsible for dealing with figures and annotations during a lecture she gave at the TeX Users Group (TUG) conference in Boston, 2012.

Boris Veytsman reviewed the original document, provided some comments, and encouraged the production of a TUGboat article and the submission of this work to CTAN.

1 Background

About twenty years ago, I had my first opportunity to file a patent on an invention. At the time, I was asked by our in-house patent attorney for various information on the invention (usually referred to as a disclosure document) so that the patent application could be generated and filed. During the process from invention to filing, I was able to make several observations:

- For complicated inventions, as mine tend to be, it is very difficult to communicate the technical information to the patent attorney. In my case, the first application draft created by the attorney was so far off that we basically had to start over.

- While it was easy to articulate the design of an instrument using my invention, it was very difficult to articulate the invention itself. In order to understand what I mean by this very important statement, consider the fact that an instance of a fully designed instrument is easy to describe through engineering documentation, drawings, software source code, etc. but the difficult and absolutely necessary information to provide for a patent application is really something different. A patent application requires a description that distinguishes a design from an invention or more specifically, highlights the inventive portion of the design.

- When the application was filed and when a patent was granted, I was unclear about the level of protection that was actually obtained.

Because of my experiences, I determined to become more involved in the patenting process. In many cases, especially at large companies, the inventor provides a patent attorney with some level of information that allows the attorney to extract the rest of the information. In some cases, the attorney essentially interviews

the inventor while trying to uncover the actual invention. I have found patent attorneys to be helpful in uncovering the invention, but overall too expensive to be used for that task; and in the end, I often had to teach so many technical details that I thought that it might be easier to develop some better understanding of the system so that the information provided to the patent attorneys was already in the right form. So, after my first invention I began to write clearer documents that described my invention in a form that more closely fit the information required by the patent office. This made life easier for me and the patent attorney and theoretically saved some money. But then I found some other problems (more minor than the problems already outlined):

- I use a lot of equations and these were sometimes difficult for the patent attorneys to accurately copy.

- Drawings I created were often rejected by the patent office.

- Sometimes, through weird actions within my company, things I wrote got rewritten in a different way than I intended without my permission or notification.

To solve these problems and in continuing with the vector I was on, I decided to actually write the patent application myself. To be clear, the application I write is always vetted and modified in the end by a qualified attorney. I generally only take a first cut at claims just to clarify things in my mind. I found that once I had a better understanding of the organization of information required for an application, it was not a large step in properly formatting the information. This led to a new set of problems:

- The document editing tools have several issues that go against proper patent application formatting. Often, they offer the user too much flexibility in editing section styles, spacing, font sizes, etc. that allow for a large amount of inconsistency. On the reverse side, they were missing certain key features.

- Some patent application software solved some of the formatting and inconsistency issues, but did not solve certain issues and were not flexible enough in the area of general document editing such as equation entry and cross referencing.

About five years ago I discovered LaTeX. LaTeX is a document typesetting program that converts text documents with markup language into final PDF format for filing. LaTeX is software popular in academia and is required by most universities for doctoral dissertations. It is based on a language called TeX created by Donald Knuth, a Stanford professor and author of many seminal books on computer programming. His aim in creating TeX is to beautifully typeset technical documents especially those containing a lot of mathematics. Knuth's goals were very similar to mine in many ways:

- He was trying to eliminate the middleman in publishing his books. He discovered that reviewing proofs of his book and marking up these proofs was unsatisfying, especially if he could typeset the book himself. This problem is somewhat analogous with marking up patent attorney drafts.

- Being a programmer, he believed in essentially programming the layout so that the result followed certain predetermined rules.

- Many rules governing the layout can be handled, again programmatically, by the creation of macros written in TeX which leads to much more consistent layouts. Taken to an extreme, the writer can be limited to access to only a handful of macros thereby reducing the capability to mess up the formatting while simultaneously freeing up the writer to concentrate on the content.

LaTeX has so many capabilities and produces such impressive output (especially in the area of handling of drawings and equations) that I set to work creating patent applications followed by sets of macros that I reused. This work finally culminated in a patent *class* file which, when referenced by a patent application document allows me to write beautiful, perfectly and consistently formatted patent applications with less effort. This class file also automates many aspects of the application.

Having a programming and engineering background, I enjoy writing in LaTeX. But LaTeX can be intimidating to many people and I looked for a solution that could expose a broader set of people to the outcome provided by LaTeX without exposing them too much to LaTeX itself. This is when I found LyX. LyX is a document editor that can produce many different kinds of output but is mostly used as a front-end for LaTeX.

It follows a WYSIWYM philosophy which stands for "What You See Is What You Mean" as opposed to the more familiar WYSIWYG philosophy. WYSIWYM is a balance. With LaTeX, you write in text using macros but you don't see what you are going to get until you *compile* the document. Many LaTeX fans say that this is liberating because the writer does not constantly fuss with the exact way that the document looks, but I don't see it that way. Many equations and such written in LaTeX require so much complication that I find myself repeatedly compiling the document to see if I got it right. This is not liberating. WYSIWYM is a balance in that equations are shown as they are written *mostly* looking like they will when typeset. What this means is that you get to see the structure of the equations and the document to see what it roughly looks like, which is enough to break the repeated compilation loop, but you don't fuss over the exact layout. LyX is very approachable and easily usable and is the best environment in which to write a patent application.

2 Introduction

If you are reading this document, you probably fall into one the following categories:

1. You are an inventor and want to try writing your own patent application.

2. You are an attorney who wants a better tool for writing a consistent and properly formatted application.

If you are in category 2, then you've come to the right place. This document will enable you to accomplish this objective in either LyX or LaTeX. If you are in category 1 I need to provide a warning upfront:

> **I am not an attorney. I am not qualified to give legal advice. A patent application is a legal document. Any information provided regarding patent applications are only my opinions and are based on my experience. You should consult with a qualified attorney for legal advice and with the U.S. Patent and Trademark Office for definitive information.**

Mostly, I have to provide this warning because people in category 2 also sue people. I don't want to get sued. But seriously, I need to provide this warning because in my discussions with category 2 people that I've come in contact with, I've found their reaction to some of my opinions like I share in this article to be varied. Sometimes they disagree with what I do and therefore with some of the advice that I give. Some tell me I'm a fool to draft my own applications (I'm not sure why since I always advise that the application be vetted, reviewed and improved by someone trained and licensed in patent law). Most of the smaller disagreements are based on how much of or the type of information I choose to provide in patent applications.

Regardless of your category, I will assume that you are intending to write a patent application using either LyX or LaTeX. Otherwise, stop reading now.

If you don't know anything about LyX or LaTeX, I suggest you familiarize yourself with the features of both. If you are already a LaTeX user, then I recommend that you do the following and make the following decisions:

1. If you are already a LaTeX user, you are in good shape. When I say LaTeX user, I don't mean LaTeX expert. If you know your way around LaTeX and know the basic idea, then you will do fine. I assume also that if you are a LaTeX user that you don't need to install it. If you don't need to install it, skip to step 3. Otherwise, see LaTeX Primer for more information and for a tutorial on LaTeX. Unless you are not entering equations in your application, you should not need to know much about the specifics of LaTeX.

2. If you don't have LaTeX installed, then you'll want to install it now. You can find some basic installation instructions in section 3.1.

3. Now that you have LaTeX installed, you'll want to figure out what editor you will use. Even if you plan to use LyX, I recommend you install a LaTeX editor. I recommend the TeXworks editor because it shows your PDF output side by side with your LaTeX source and you can jump back and forth between the source and output easily. Some basic directions are found in section 3.2.

4. Now you need to decide whether you want to use LaTeX or LyX. If you are a grizzled LaTeX veteran, then you will scoff at the idea of entering your patent application in anything other than raw LaTeX. I really encourage you to try LyX. If you are inexperienced with LaTeX, then you really ought to use LyX but I warn you that knowledge of LyX is not entirely a substitute for knowledge of LaTeX. If you are on the fence, let me give you some added encouragement: if you start by using LyX and you change your mind, you can always export your document in plain LaTeX and the exported document is very good LaTeX. Give LyX a try. To install it, follow the directions in 3.3.

5. You will probably need some kind of drawing editor. To test the suitability of your drawing editor, review its capability of producing high quality, properly sized PDF files. I supply some instructions for using the most popular Windows®[1] based drawing editor Visio®[2] in section 14.1. But I recommend TpX which is how I make all of my patent drawings. It is open source software that produces the best patent drawings of any package I know. It will even output in LaTeX readable code (called TikZ- but you don't really need to know this detail). Instructions for installing and working with TpX can be found in section 14.2.

6. At some point, all of the additional files you need will come in a standard LaTeX and LyX installation (after I submit all of this stuff, that is). Until then, you will need to get these additional files presumably from the same place you got this document. These additional files are, at a minimum, the U.S. patent class file for use in LaTeX and the U.S. patent layout file for use in LyX. Remember, LyX is just a front-end for LaTeX which produces and compiles LaTeX code so if you are using LyX, you will need both files. These files should be put in the same directory where you intend to write your patent application.

7. Finally, you need a way to get started. I recommend that you always start by editing one of the example files. Follow the directions in section §6 for LaTeX, which includes the setup and a short navigational tutorial that you can ignore when you get proficient. Similarly, for LyX, follow the directions in section §7 which contains similar setup and a navigational tutorial.

8. Read this entire document to familiarize yourself with the macros used and follow the instructions to get started in section §4.

Also, please remember to proof-read your entire document prior to filing with the patent office. These tools are provided as an aid and I am not responsible for the final output. I, of course, expect these tools to work fine - I use them all the time. This is basically a disclaimer to tell you that regardless of any errors that I or LaTeX or LyX makes in formatting your document, you alone are responsible for it. I'm sorry to have to make statements like this, but you know how things are.

3   Tool Installation

In order to write your patent application, you will first need to install some tools. These are:

- LaTeX - A document typesetting program that converts text documents into final PDF format for filing. See LaTeX Primer for more information and for a tutorial on LaTeX. Unless you are entering equations in your application, you should not need to know much about the specifics of LaTeX.

- TeXworks - An editor that allows you to view and edit your LaTeX document side-by-side with your PDF application. Since LaTeX is not WYSIWYG, you must *compile* your document to produce the final output. TeXworks helps with this.

- TpX - (optional) - an open-source drawing package that produces beautiful drawings and is well linked with LaTeX. Drawings maybe imported directly in TpX format (PDF or TikZ), otherwise you may use any drawing package as long as you can produce final drawings for inclusion in PDF format.

- LyX - A WYSIWYM editor for producing LaTeX documents without extreme exposure to LaTeX.

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[1] Windows is a trademark of Microsoft Corporation
[2] Visio is a trademark of Microsoft Corporation

3.1 Installing LaTeX

LaTeX can be obtained from http://www.latex-project.org/ftp.html which is the TeX Users Group (TUG). The LaTeX language can be compiled with a number of compilers such as pdfLaTeX, LuaTeX, XeTeX, etc. We will be using pdfLaTeX. On Windows machines, follow the directions for ProTeXt installation.

Here are the sources for various TeX installations:

- http://tug.org/texlive/ - TeX Live Installation.

- http://tug.org/mactex/ - MacTeX installation.

- http://tug.org/protext/ - proTeXt installation.

- http://www.miktex.org/ - MiKTeX installation.

I use proTeXt (based on MiKTeX) on Windows and GNU/Linux machines. MacTeX is the preferred installation for the Mac®[3].

3.2 Installing TeXworks

In most cases, TeXworks comes automatically with a ProTeXt installation. Search for the file texworks.exe in the directories containing your LaTeX installation and create a shortcut for easy access. Otherwise, download it from http://www.tug.org/texworks/.

3.3 Installing LyX

LyX can be found here: http://www.lyx.org. For Windows, click "LyX-2.02-2-Installer.exe" or whichever is the latest version. When prompted to select a typesetting system, select the "...\miktex\bin" extension of your MiKTeX folder. If an error occurs then a file search can reveal the proper location.

3.4 Patent Application Specific Files

To get started with writing your patent application, you will need the class, layout and example files. They should all have been included with this documentation. The files include:

- uspatent.cls - The class file used by LaTeX that provides basic typesetting information and all of the special macros that get called in the LaTeX document.

- uspatent.layout - The layout file used by LyX to translate environment and inset settings in a LyX patent application into LaTeX macro commands in the uspatent.cls file.

- PatentApplication.tex - the example, skeleton LaTeX file that should be used as the basis for your LaTeX based application.

- PatentApplication.LyX - the example, skeleton file that should be used as the basis for your LyX based application.

- Drawings.tex - the file containing the drawings and annotations instructions that is included in PatentApplication.tex. Initially, you will find references to figures and annotations for two drawings that are provided for reference only.

- Drawings.lyx - the file containing the drawings and annotations instructions that is included in PatentApplication.lyx. Initially, you will find references to figures and annotations for two drawings that are provided for reference only.

- VisioDrawing.pdf - an example Visio drawing exported in PDF format.

- TpXDrawing.tpx - an example TpX drawing containing TikZ code.

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[3]Mac is a trademark of Apple Inc.

If you are using a MiKTEX LATEX installation, you can install the latest version of the **uspatent** package using the *MiKTEX Package Manager* invoked by typing `mpm` in a command prompt and selecting the `uspatent` package for installation.

4 Starting a New Patent Application

A new application is started by creating a new directory for your application and copying the files listed in section 3.4 to this new directory.

The basic idea here is that you will rename the file PatentApplication.lyx (if you are using LYX) or PatentApplication.tex (if you are using LATEX) to the name of your invention (e.g. MyInvention.lyx or .tex). You can also rename the Drawings.lyx or Drawings.tex file, but you will need to reference the newly named drawings file in your patent application document. There is no need to do that. You will be editing the information in the new MyInvention file and also the drawings file. As you edit the drawings file you will eventually remove the need for the example drawings. You will know when you no longer need the example drawing files and at that time they can be removed. Don't delete them right away because they are required temporarily to build your document.

Many headaches are created by special characters in file names, so it is recommended that your directories (entire directory tree) and file names contain no spaces or other strange characters. If you want to insert a space, use an underscore "_" to separate words. I tend to use a programming style called *CamelCase* (or the technical term *medial capitals*).

After creating your new directory containing your renamed files, you should see if they produce the proper output by following the directions in section §5 or section §6 if you are using LATEX, or section §7 if you are using LYX. If you can produce PDF output following these instructions, then you're ready to get started.

5 Driving LATEX from the command line

LATEX can be used to edit and produce your patent application presuming you have:

- LATEX installed properly.

- A text editor of any kind.

- A PDF viewer of any kind.

Assuming you have followed the directions in section §4, you will have a directory called MyInvention and in it you will have at least the files uspatent.cls, MyInvention.tex, Drawings.tex, VisioDrawing.pdf, and TpXDrawing.tpx.

To produce your application, type from the command line from within this directory:

<div align="center">

`pdflatex MyInvention`

</div>

followed by the enter key.

If you've done everything correctly during installation, you will see lots of messages streaming forth (LATEX is very verbose). In the end, the last few messages should be:

```
Output written on PatentApplication.pdf (9 pages,
239717 bytes).

Transcript written on PatentApplication.log
```

If you've gotten this far, then everything's right and you can view your patent application by opening PatentApplication.pdf with your PDF viewer. By editing your MyInvention.tex file with your text editor, compiling your document with pdflatex, and viewing it with your PDF viewer, you can create your application using the most primitive tools at your disposal.
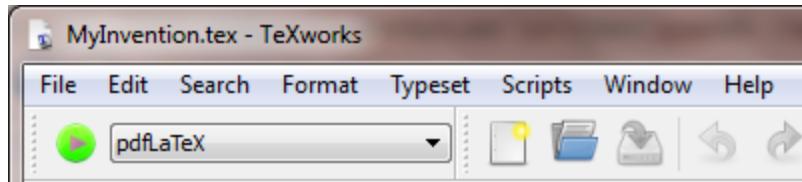
Figure 1: TEXworks ribbon bar

Figure 2: LYX Output Controls

6 Driving TEXworks

LATEX can be used to edit and produce your patent application presuming you have:

- LATEX installed properly.

- TEXworks installed (usually comes with your LATEX installation).

Assuming you have followed the directions in section §4, you will have a directory called MyInvention and in it you will have at least the files uspatent.cls, MyInvention.tex, Drawings.tex, VisioDrawing.pdf, and TpXDrawing.tpx.

To edit your application, open MyInvention.tex with TEXworks or type from the command line from within this directory:

```
texworks MyInvention.tex
```

You can become familiar with TEXworks yourself, but there are two things you want to notice to get an application out immediately. They are at the top of the dialog and are located right next to each other and are shown in figure 1. One is a drop-down list selector that selects the program used to produce the output file. This should be set to pdfLATEX as shown. The other is the green arrow to the left. Clicking this with the mouse causes the document to be compiled and the resulting PDF document to be produced and opened automatically to the right of the editor dialog. Sometimes you will need to click the arrow twice to get the figure numbers updated properly. You will see a log at the bottom of the editor. If there are problems found, you will need to figure out how to fix them before you can proceed. Compile often so you remember what you've done and can more easily fix any problems that crop up.

7 Driving LYX

LYX can be used to edit and produce your patent application presuming you have:

- LATEX installed properly (remember LYX is just a front-end for LATEX).

- LYX installed properly.

Assuming you have followed the directions in section §4, you will have a directory called MyInvention and in it you will have at least the files uspatent.cls, MyInvention.lyx, Drawings.lyx, VisioDrawing.pdf, and TpXDrawing.tpx.

To edit your application, open MyInvention.lyx with LYX.

If you created MyInvention.lyx by making a copy of PatentApplication.lyx, then all of the document settings should be correctly configured (see 7.1 for a complete list of settings).

The output controls are shown in figure 2. Pressing the googly eyes to the left should cause LYX to produce the PDF document and open it for display. For the display to work, you will need to have a PDF reader installed.
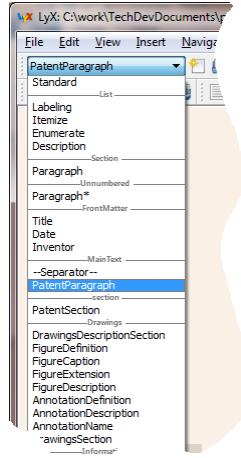
Figure 3: LYX Environments
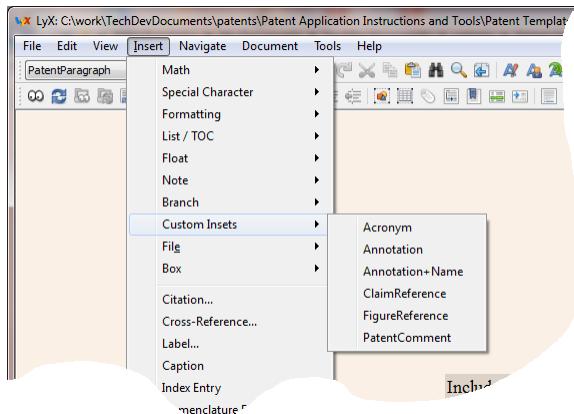
Figure 4: LYX Custom Insets

You can learn more about LYX on your own, but I have to call your attention at this time to two key customizations that are unique to the patent application layout:

- Environments

- Custom Insets

The file uspatent.layout provided overrides and restricts the *environments* available in LYX. To access these environments, click the drop-down selector in the upper left corner of the LYX editor dialog as shown in figure 3. Similarly, it provides *custom insets* that provide for certain cross-referencing features. To access these, select them from the drop-down menu by selecting: [Insert][Custom Insets] as shown in figure 4.

The environments and custom insets are the full extent of the LYX customization and access all of the special patent application features. These features are explained elsewhere in this document but I figured you might want to know where to find them now.

7.1 LYX Document Settings

If you start your new patent application by renaming the PatentApplication.LYX file and editing it, you should never need to bother with any LYX document settings *provided you don't change them*. **You are strongly encouraged to not change LYX document settings**. This section is provided for completeness so that you know how LYX is set up or in case you get yourself in trouble.
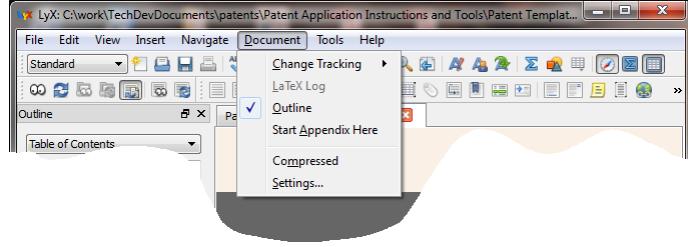
Figure 5: L_YX Document Settings
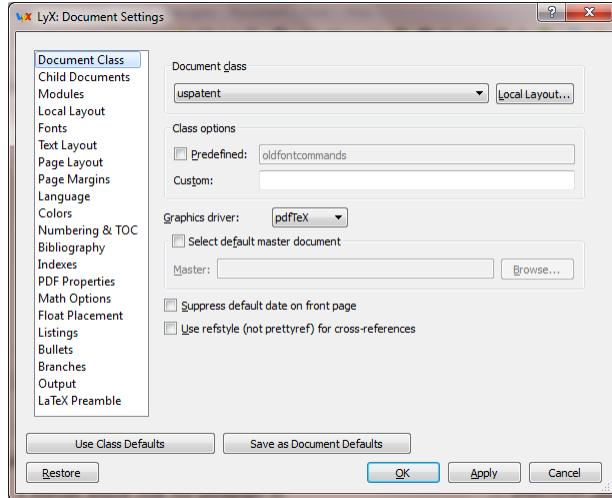
Figure 6: L_YX Document Class Settings

Fortunately, for the most part, the default L_YX settings are used. Also, since the application format is rigidly enforced from within the L^AT_EX class, most of the L_YX settings are overridden anyway. This section contains the L_YX settings that are required.

L_YX document settings are accessed via the Settings selection in the Document drop-down menu using [Document][Settings] as shown in figure 5.

7.2   Document Class

Set the document class by pressing the button labeled Local Layout and browsing to the uspatent.layout file that must be located in the same directory as your patent application file. Note that usually file classes and the associated layout files are selected directly from the drop-down document class selection button but our layout is local. You will be warned that things will work properly only if the layout file is kept along with your patent application file in the same directory. The Document Class dialog is shown in figure 6.

7.3   Output Control - pdfL^AT_EX

There are many offshoots from L^AT_EX (see section 3.1); we need to ensure that L_YX will choose pdfL^AT_EX which is the only output format that will work with the patent class file.

The output is selected from the Document Output Settings dialog as shown in figure 7. Under Output Format select (PDF) pdflatex as the Default Output Format. There are other settings that can prevent pdfL^AT_EX as a choice. Make sure that the "use non-Tex fonts (via XeT_EX/LuaT_EX) box" is not checked in the Document Fonts Settings menu as shown in figure 8.
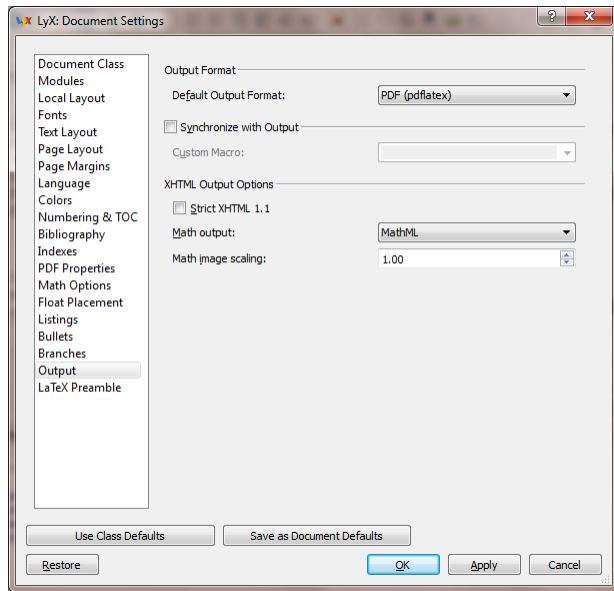
Figure 7: LyX Document Output Settings
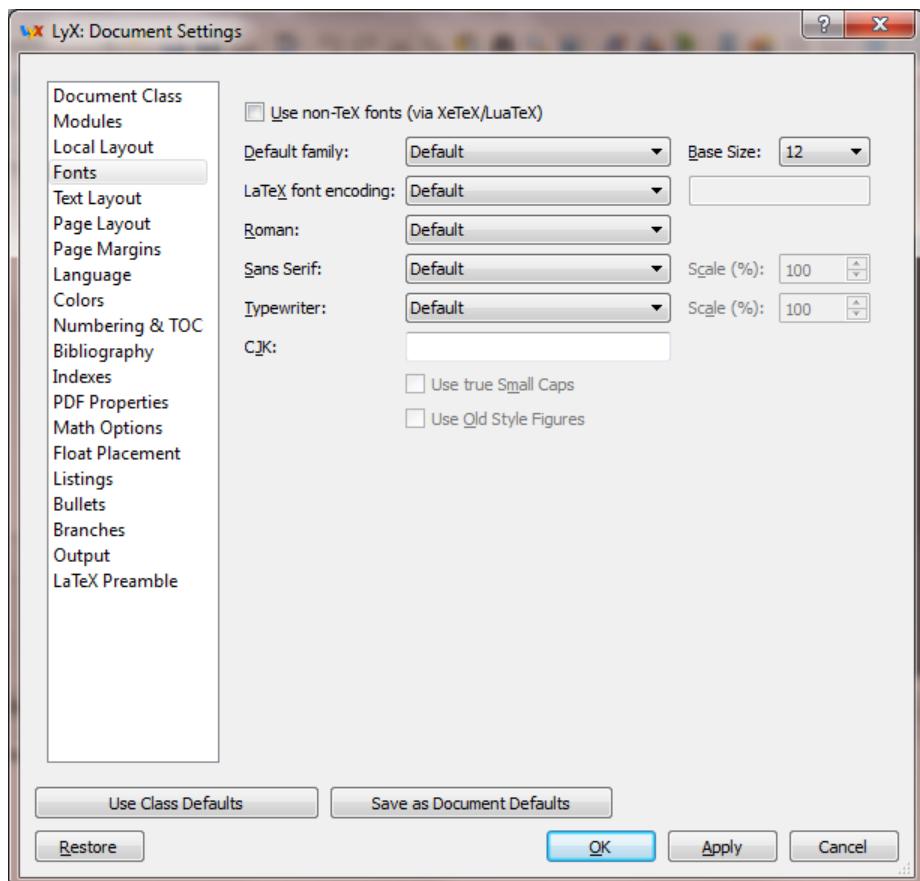
Figure 8: LyX Document Font Settings

8   The Layout of the Patent Application

Two possible LaTeX patent application documents are shown in figure 9 and figure 10. Two possible corresponding LyX patent application documents are shown in figure 11 and figure 12.   There are two styles to reflect the tastes of patent lawyers who reviewed this document. I use the first layout style.
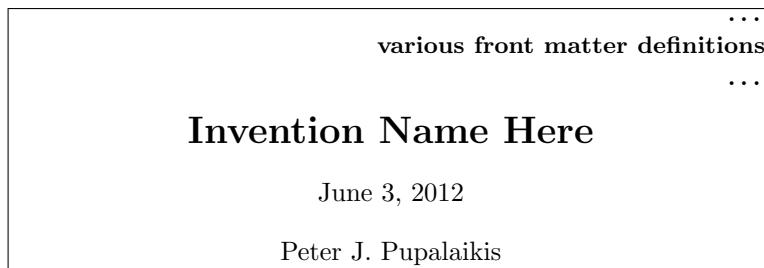
The LaTeX document starts with a declaration of the uspatent class. Every LaTeX document must contain at least one of these declarations and here we specify the file containing the typesetting and macro definitions that are used in the patent application. It ends with an \end{document} statement. After the class definition, there are various front matter definitions (see section §9) that define things like the title, inventor, etc. This is followed by an inclusion of a drawings file. This file defines how the drawings will be read in, described, annotated, etc. See section §11 for information on how drawings are controlled. After the drawings, we see the \maketitle macro which is described in section §9. This macro defines where the title page should be printed and where the patent sections start. The remainder of the patent application consists mostly of patent sections set off by the \patentSection macro described in section 10.1. Each section consists of one or more paragraphs where each paragraph begins with \patentParagraph (see section 10.2). You will notice two macros that control drawings: \patentDrawingDescriptions and \patentDrawings. These macros expand into automatically generated sections containing a brief description of the drawings and the drawings themselves. The control of drawings is explained in section §11. Finally, you will notice two macros that delimit the area where the patent claims are placed: \patentClaimsStart and \patentClaimsEnd. The formatting of claims is described in section §12.

The LyX document starts directly with the various front matter definitions (see section §9) that define things like the title, inventor, etc. This is followed by an inclusion of a drawings file. This file defines how the drawings will be read in, described, annotated, etc. See section §11 for information on how drawings are controlled. The remainder of the patent application consists mostly of patent sections formatted by the **PatentSection** environment described in section 10.1. Each section consists of one or more paragraphs where each paragraph is formatted with the **PatentParagraph** environment (see section 10.2). You will notice two environments that control drawings: —**BRIEF DESCRIPTION OF THE DRAWINGS**– and —**PATENT DRAWINGS**—. These environments expand into automatically generated sections containing a brief description of the drawings and the drawings themselves. The control of drawings is explained in section §11. Finally, you will notice two environments that delimit the area where the patent claims are placed: —**START OF PATENT CLAIMS**— and —**END OF PATENT CLAIMS**—. The formatting of claims is described in section §12.

9   Front Matter

Front matter is, as the name indicates, information that must appear at or near the front of the document. The information must be provided prior to the title (see section 9.6), date (see section 9.7), and inventor name (see section 9.5) in LyX documents, because LyX will expect to emit the title page immediately following the last of these three definitions. In LaTeX, the emission of the title page is determined by the location of the \maketitle macro.

Thus in LyX, the front matter appears like:

· · ·
various front matter definitions
· · ·
Invention Name Here
June 3, 2012
Peter J. Pupalaikis

As mentioned, in LyX, the end of the front matter and title page information is delimited by the last of the invention name, date, and inventor.

In LaTeX, the front matter appears like:

```
\documentclass[english]{uspatent} % includes the uspatent.cls class
definitions


...front matter...  % all front matter definitions go here

\include{Drawings} % includes the figures information


\maketitle % outputs the title and begins the patent application


\patentSection{Field of the Invention}
\patentParagraph blah, blah blah ...


                              ...

\patentSection{Cross Reference to Related Applications}
\patentParagraph blah, blah blah ...


                              ...

\patentSection{Background of the Invention}
\patentParagraph blah, blah blah ...


                              ...

\patentSection{Objects of the Invention}
\patentParagraph blah, blah blah ...


                              ...

\patentSection{Summary of the Invention}
\patentParagraph blah, blah blah ...


                              ...

\patentDrawingDescriptions


\patentSection{Detailed Description of the Preferred Embodiments}
\patentParagraph blah, blah blah ...


                              ...

\patentClaimsStart
...
\patentClaimsEnd


\patentSection{Abstract}
\patentParagraph blah, blah blah ...


                              ...

\patentDrawings


\end{document}
```

Figure 9: Skeleton LATEX Patent Application Document

14

```
\documentclass[english]{uspatent} % includes the uspatent.cls class
definitions

...front matter...  % all front matter definitions go here

\include{Drawings} % includes the figures information


\maketitle % outputs the title and begins the patent application


\patentSection{Technical Field}
\patentParagraph blah, blah blah ...


                              ...

\patentSection{Cross Reference to Related Applications}
\patentParagraph blah, blah blah ...


                              ...

\patentSection{Background}
\patentParagraph blah, blah blah ...


                              ...

\patentSection{Summary}
\patentParagraph blah, blah blah ...


                              ...

\patentDrawingDescriptions


\patentSection{Detailed Description}
\patentParagraph blah, blah blah ...


                              ...

\patentClaimsStart
...
\patentClaimsEnd


\patentSection{Abstract}
\patentParagraph blah, blah blah ...


                              ...

\patentDrawings


\end{document}
```

Figure 10: Skeleton LaTeX Patent Application Document

. . . front matter. . .

Include: Drawings.lyx

Field of the Invention

blah, blah blah . . .

Cross Reference to Related Applications

blah, blah blah . . .

Background of the Invention

blah, blah blah . . .

Objects of the Invention

blah, blah blah . . .

Summary of the Invention

blah, blah blah . . .

—BRIEF DESCRIPTION OF THE DRAWINGS—

Detailed Description of the Preferred Embodiments

blah, blah blah . . .

—START OF PATENT CLAIMS—

. . .

—END OF PATENT CLAIMS—

Abstract

blah, blah blah . . .

—PATENT DRAWINGS—

Figure 11: Skeleton LYX Patent Application Document

. . . front matter. . .

Include: Drawings.lyx

Technical Field

blah, blah blah . . .

Cross Reference to Related Applications

blah, blah blah . . .

Background

blah, blah blah . . .

Summary

blah, blah blah . . .

—BRIEF DESCRIPTION OF THE DRAWINGS—

Detailed Description

blah, blah blah . . .

—START OF PATENT CLAIMS—

. . .

—END OF PATENT CLAIMS—

Abstract

blah, blah blah . . .

—PATENT DRAWINGS—
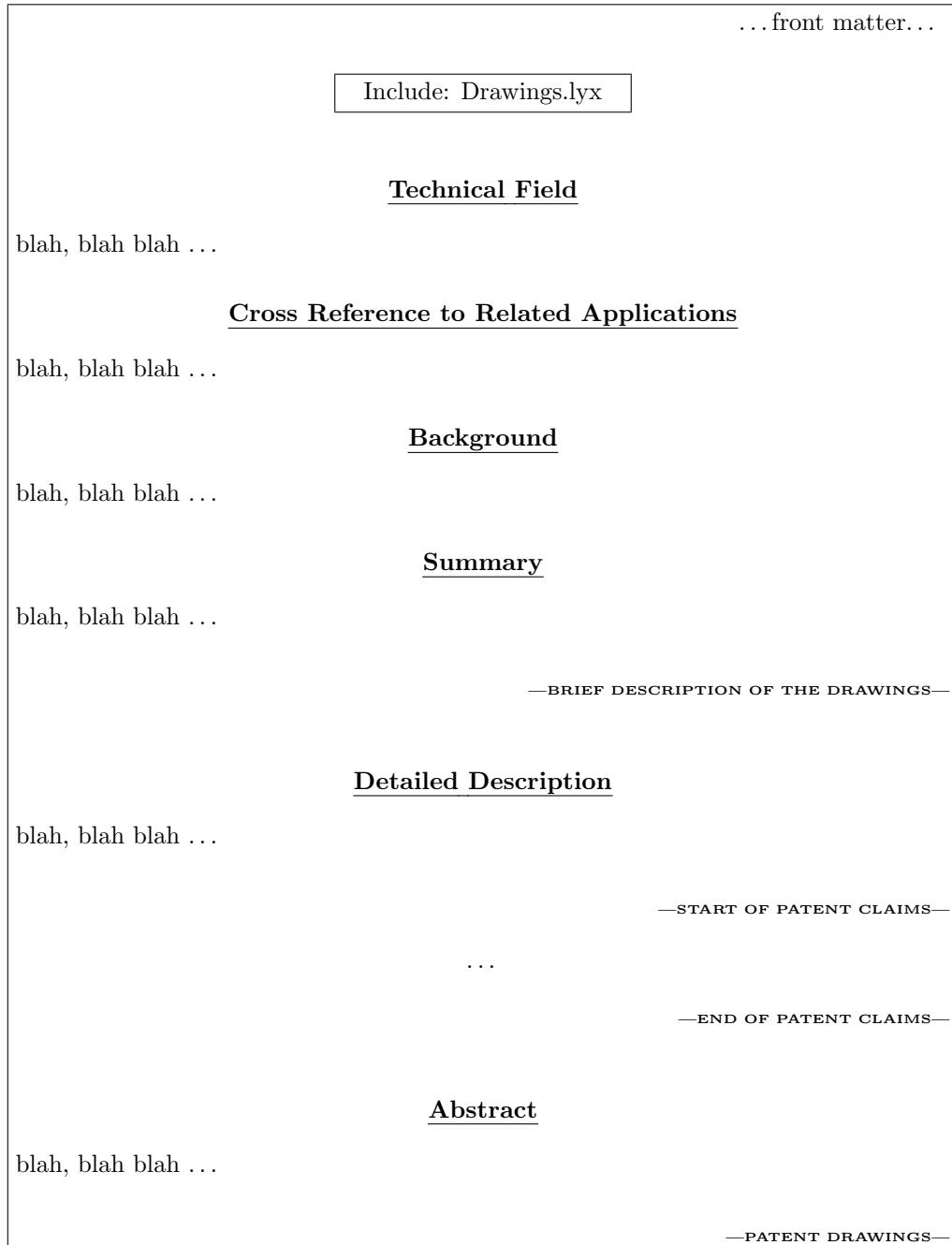
Figure 12: Skeleton L_YX Patent Application Document

```
\documentclass[english]{uspatent}

...
various front matter definitions
...

\title{Invention Name Here}
\date{June 3, 2012}
\inventor{Peter J. Pupalaikis}

\maketitle
```

Here we see that the `\maketitle` macro defines the end of the front matter and title page definitions.

In case you are wondering, your patent application will look nothing like it looks in the LyX editor with the title followed by the date followed by the inventor name. This is what is meant by WYSIWYM. You know that you need all of this information and it needs to go somewhere. LyX provides the method of entering this information and later when you compile the document, you'll see where it actually goes.

9.1 Assignee Information

The assignee is the name of the entity that will own the rights to the invention. Typically this is the company for which the inventor works. The assignee information is defined using:

- The assignee name is defined using the \setAssigneeName macro in LaTeX or the **AssigneeName** environment in LyX.

- The assignee address is defined using the \setAssigneeAddress macro in LaTeX or the **AssigneeAddress** environment in LyX.

- The assignee city, state & zip code is defined using the \setAssigneeCity macro in LaTeX or the **AssigneeCity** environment in LyX.

- The assignee phone number is defined using the \setAssigneePhone macro in LaTeX or the **AssigneePhone** environment in LyX.

Here is an example LyX assignee definition:

> **Assignee Name:Company Name**
> **Assignee Address:Number and Street Name**
> **Assignee City:City, State and Zip**
> **Assignee Phone:Telephone Number**

Here is an example LaTeX assignee definition:

```
\setAssigneeName{Company Name}
\setAssigneeAddress{Number and Street Name}
\setAssigneeCity{City, State and Zip}
\setAssigneePhone{Telephone Number}
```

I have been advised that some patent attorneys prefer not to include the assignee information in the patent application. If you or your patent attorney prefers not to provide this information, then simply don't define these fields. You should note, however, that in draft mode (see 9.8), the patent prints with a confidential heading which does not print if the assignee name has not been defined.

9.2   Patent Lawyer Information

The patent lawyer information is defined using:

- The lawyer name is defined using the \setLawyerName macro in LaTeX or the **LawyerName** environment in LyX.

- The lawyer registration number is defined using the \setLawyerNumber macro in LaTeX or the **LawyerNumber** environment in LyX.

- The lawyer phone number is defined using the \setLawyerPhone macro in LaTeX or the **LawyerPhone** environment in LyX.

Here is an example LyX patent lawyer definition:

> **Patent Lawyer Name:First M. Last**
> **Patent Lawyer Reg Number: #:99,999**
> **Patent Lawyer Phone:(845) 555-2000**

Here is an example LaTeX assignee definition:

> \setLawyerName{First M. Last}
> \setLawyerNumber{Reg \#:99,999}
> \setLawyerPhone{845-555-2000}

I have been advised that some patent attorneys prefer not to include the patent lawyer information in the patent application. If you or your patent attorney prefers not to provide this information, then simply don't define these fields.

9.3   Docket Number

To track the progress of a patent during prosecution, a patent application is assigned a *docket number*. This is the number that you refer to internal to your company. At my company, this number is provided by the paralegal handling patent applications. When we are planning on filing an application, she provides a new number to use.

We use a numbering scheme which is in the form LEC-YY-1NN0-U1 where YY is the last two digits of the year, NN is the number of the patent filed this year, and U or D is used depending on whether the invention is a design or utility patent. By the way, the classes, layouts and all of this documentation pertains only to utility patent applications. Sometimes the number after the U is used to distinguish related applications such as continuations, provisionals and divisionals. You will need to find out this numbering scheme at your company and how these numbers are assigned.

The application number is defined using the \setDocketNumber macro in LaTeX or the **DocketNumber** environment in LyX.

Here is an example LyX document docket number definition:

> **Docket Number:LEC-YY-1NN0-U1**

Here is an example LaTeX document docket number definition:

> \setDocketNumber{LEC-YY-1NN0-U1}

If you do not have and never will have a docket number, simply don't define it.

9.4 Document Version

The document version is defined using the \setDocumentVersion macro in LaTeX or the **DocumentVersion** environment in LyX. The argument is x.y where x is the major version number and y is the minor version number. This version number is only printed in draft mode.

Here is an example LyX document version definition:

> **Version:0.0**

Here is an example LaTeX document version definition:

> \setDocumentVersion{0.0}

If you do not supply a version number, a value of 0.0 is supplied for you.

9.5 Inventor Name(s)

Inventions often include multiple inventors. All inventors are considered equal from the view of the patent office regardless of the order in which they are listed. That being said, the first inventor named gets some additional prestige factor in that the patent is referred to in many places as invented by the first named inventor suffixed with "et al.". The drawing section also contains only the first named inventor (see section 11.3).

The first named inventor is assigned differently from all of the other inventors and is assigned using the \inventor macro in LaTeX or the **Inventor** environment in LyX. In LaTeX and LyX, the first named inventor is generally assigned under the invention title and date. Other inventors are assigned using the \setOtherInventor macro in LaTeX or the **OtherInventor** environment in LyX. These assignments are made in the front matter prior to the invention title, date and first inventor. LaTeX keeps track of all of the inventors added, so the same macro is used to assign each one. The title page output during compilation provides a list starting with the first inventor followed by the other inventors in the order that they are listed. The uspatent.cls LaTeX class file provides for up to eight inventors before the title page production fails.

Here is an example LyX inventors definition:

> **OtherInventor:John D. Smith**
> **OtherInventor:Sally G. Jones**
> **OtherInventor:Samuel J. Jackson**
>
> # Invention Name Here
>
> June 3, 2012
>
> Peter J. Pupalaikis

Here is an example LaTeX inventors definition:

> \setOtherInventor{John D. Smith}
> \setOtherInventor{Sally G. Jones}
> \setOtherInventor{Samuel J. Jackson}
>
> \title{Invention Name Here}
> \date{June 3, 2012}
> \inventor{Peter J. Pupalaikis}

In the above LyX example, the inventor Peter J. Pupalaikis is entered in the **Inventor** environment, although, like the invention title and date, there is no visual indication in the editor that it has been entered in this environment. If you click on the text for the inventor name, however, you will see the environment in the environment drop down box as shown in figure 3.

9.6   Title

The document title is defined using the \title macro in LATEX or the **Title** environment in LYX. The argument is the name of the invention.

Here is an example LYX title definition:

Invention Name Here

Here is an example LATEX title definition:

\title{Invention Name Here}

In the above LYX example, the title is entered in the **Title** environment, although there is no visual indication in the editor that it has been entered in this environment. If you click on the text for the title, however, you will see the environment in the environment drop down box as shown in figure 3.

9.7   Date

The date is only the date of the version not the invention and is used to help with versioning. The document date is defined using the \date macro in LATEX or the **Date** environment in LYX. The argument is the date of the version.

Here is an example LYX date definition:

June 3, 2012

Here is an example LATEX date definition:

\date{June 3, 2012}

In the above LYX example, the date is entered in the **Date** environment, although there is no visual indication in the editor that it has been entered in this environment. If you click on the text for the date, however, you will see the environment in the environment drop down box as shown in figure 3.

If the date is not provided, then todays date (at the time of document compilation) is supplied.

9.8   Printing Mode

There are two printing modes supported by the patent application class:

- application mode - default - the mode that you will print for submission to the patent office.

- draft mode - the mode that you will print as you develop the document

The draft mode should really be the default, but I chose to make application mode default for people who don't read documentation.

You choose application mode using the \setPrintingModeApplication macro in LATEX or the **ApplicationMode** environment in LYX. You choose draft mode using the \setPrintingModeDraft macro in LATEX or the **DraftMode** environment in LYX. There is no argument for these macros.

In draft mode, the version and date are printed, a company confidential warning is printed on each page, and the annotation list (see 14.2.3) is printed at the end of the document.

In patent office mode, the document is typeset in the form ready for filing.

10   Sections and Numbering

10.1   Patent Sections

Sections of the patent are delimited by the \patentSection macro in LaTeX or the **PatentSection** environment in LyX. This macro will expand into the section name with the appropriate formatting. If you started your application following the instructions in section §4 you should never need to use this macro.

Here is an example LyX section definition:

> **<u>Field of the Invention</u>**

Here is an example LaTeX section definition:

> ```
> \patentSection{Field of the Invention}
> ```

In the above LyX example, the section name is entered in the **PatentSection** environment. The visual indication in the editor that it has been entered in this environment is that it is bold, small caps and underlined (mostly - don't worry, it will print better). If you click on the text for the section name, you will see the **PatentSection** environment in the environment drop down box as shown in figure 3.

10.2   Paragraph Numbering

Patents must be submitted with some form of numbering of lines or paragraphs. This is so that during correspondence with the patent examiner, the correct text can be identified and referenced. Paragraphs are numbered using the \patentParagraph macro in LaTeX or the **PatentParagraph** environment in LyX. There is no argument for this macro. Almost every paragraph should begin with this macro. When your application is produced, this will be expanded to a number like: **[0001]** in front of the paragraph.

Unfortunately, in LyX there will be no visual indication that the paragraph has been numbered and your only check is to click on the paragraph text and observe the environment in the environment drop down box as shown in figure 3. The good news is that entire groups of paragraphs can be selected and the **PatentParagraph** environment applied. You will run into some trouble with equations. Equations technically form a new paragraph as far as LyX is concerned, but they ought not be numbered as paragraphs. To solve issues where the equation has a paragraph number, try entering a carriage return after the text just prior to an equation and a carriage return right after an equation (to ensure that the equation is truly in its own paragraph) and then set the environment of the equation to **Standard** (the top environment entry). I would like to make this more automatic, but the method for LyX customization eluded me.

Here is an example LaTeX patent paragraph definition:

> ```
> \patentParagraph The beginning of a paragraph to be
> numbered...
> ```

One note here is that if you inspect LaTeX code exported by LyX, you will find the \patentParagraph with braces enclosing the entire paragraph to be numbered. Either way works and you can use whichever method you are comfortable with.

In LaTeX you may get tired of typing the verbose macro \patentParagraph before each paragraph so you might want to redefine a new one that does not clash with any other macro settings you might be using like:

> ```
> \def\pp{\patentParagraph}
> ```

11   Drawings

One of the biggest nuisances in writing a patent application regards drawings and the requirements on how they are described and referenced, and how the various drawing elements are referenced. Some things you must be aware of regarding drawings and patent applications:

- Drawings must be displayed on pages at the end of the patent application following specific formatting guidelines that ensure high quality and clear labeling.

- There must be a section in the patent that provides a brief description of the drawings with each drawing listed and described in order.

- Generally, drawing elements are not referred to by naming the elements on a drawing itself. Instead, drawing elements that are referenced should have a numbered line pointing to the drawing element (a drawing element *annotation*) and the element should be referred to in the patent application text using the elements name followed by the number as a reference.

- Every annotated drawing element must be referred to at least once in the patent application.

- Each element must have a unique number. If an element in multiple drawings is the same, it should be numbered the same. The corollary is that any element numbered the same is presumed to be the same.

These drawing requirements cause a cross-referencing nightmare that we attempt to solve to some degree using LaTeX and the U.S. Patent class file. The main problems are:

- We do not generally know the final ordering of the figures during construction of the application. This is solved using cross-references on most word processors except that the drawing description in the brief description of the drawings must go with the correct figure number. On most word processors, if the drawings are rearranged, the figure reference will correctly connect to the drawing, but the figure numbers will be out of order or the numbers will not match the descriptions provided.

- While most word processors can account for cross-referencing, they cannot work with cross references within figures or other embedded graphics. This means that drawing element annotations cannot be automatically cross referenced the way figures can. Because of this, we cannot know the actual annotation numbers until the end of the document creation, but we cannot finish the document creation because we can't properly refer to the annotation numbers which leaves us gridlocked.

- Similarly with the figure number problems, the names of the annotated elements must match the numbers they refer to. As an example, if I refer to the widget [23] in FIG. 1, then there better be a line pointing to the widget element in figure 1 and it better be labeled with the number 23. The checking and maintenance of this proper connection is cumbersome.

The way that we partially solve these problems using LaTeX and LyX is to provide for an area in the patent application where the required drawing and annotation information is filled in. Once this information is filled in, the following problems are solved:

- The drawings will automatically be drawn on properly formatted pages containing header information that is in part provided by front matter definitions (see section §9).

- A section containing the brief description of the drawings will be automatically produced containing a list of the figures in the proper order matched properly to their descriptions. There are also certain obscure punctuation requirements in patents that will be properly followed automatically.

- The annotation numbers are automatically assigned and can be cross-referenced from within the patent application. These numbers are attached to an element name so that drawing annotation references can be made with the name and the number so that you can always be sure that the element named in the application has the correct associated number that annotates the element in the drawing.

- If certain recommended drawing tools are used (see section 14.2), the annotation numbers can automatically be added to the drawings themselves - something absolutely not possible with any other word-processor. Otherwise, if LaTeX based drawing tools cannot be used, an annotation number list is generated in draft mode (see section 9.8) that breaks the gridlock by allowing the annotations to be cross-referenced properly and produce the correct numbers during application construction and the drawings annotated properly (albeit in a manual manner) at the very end.

Before going into too much detail about how this all works, I want to explain to you the basic directions you will need to follow regarding your drawings to make all of this work. First, about the drawing file; if you are using LaTeX, your drawing file will be called something like Drawings.tex and will be included somewhere near the top of the patent application file (see section §8). Note that this is not a requirement - you are perfectly entitled to list all of your figures and annotations inside your application - it's just annoying to have to look at this information constantly at the top of your application - but you can do what you want. Similarly, if you are using LyX you will have a file called Drawings.LyX that is included at the top of the file. Like in LaTeX, these drawing definitions can also be in line at the top of your application.

Inside the Drawings file or inline, you list the following:

For each figure:

- The figure definition. Figures are defined by the \figureDefinition macro in LaTeX or the **FigureDefinition** environment in LyX. The argument is the exact name of the file (matching case) without path or extension. This is the name of the file that will get loaded in the patent drawings section and is the name you will use to reference the figure. The figure definition statement must come before any other attributes of a figure are described like the extension, description, and caption and basically assigns the figure number and matches it up with the name defined for the figure.

- After the figure definition, in any order:

  - The figure extension. Figure extensions are defined by the \figureExtension macro in LaTeX or the **FigureExtension** environment in LyX. The argument is the exact name of the file extension (matching case). This extension will be appended to the file name to load the file in the patent drawings section and will determine how the file gets loaded. Special loading of pdf, tpx and tex file extensions are handled. If a file for the figure has not yet been created, use no extension. Do not define an empty extension, just don't supply one. This will cause a placeholder figure to be listed in the drawings section until the file is actually created and the proper file extension provided. If neither the recognized extensions of pdf, tpx or tex are provided, the file will be attempted to be loaded as a graphics file and if the extension is supported by LaTeX, then it will load. Some known recognized graphics extensions are png and jpg.

  - The figure description. Figure descriptions are defined by the the \figureDescription macro in LaTeX or the **FigureDescription** environment in LyX. The argument is the exact text for the description of the figure. This description is the exact text that will be used when the section providing the brief description of the drawings is automatically produced. In order for it to come out right, you should not use any initial capitalization or any final punctuation. It should contain the appropriate text that would follow a statement like "FIG. 1 . . . " but again, with no period at the end. It should start with a verb like "is", "shows", "depicts", etc. See section 11.2 for more information.

  - The (optional) figure caption. Figure captions are defined by the the \figureCaption macro in LaTeX or the **FigureCaption** environment in LyX. The argument is the exact text for the caption for the figure. Note that the use of a caption on a figure is rare. Unlike normal documents that you might be familiar with, a caption is not provided for any descriptive purposes in a patent application. Instead it is provided mostly to call attention to figures that are not actually part of an invention. The only use I have ever come across for a caption is to distinguish *prior art*. Prior art are things already done before and things already done before cannot be patented or be part of an invention. It is, however, sometimes useful to provide prior art drawings that are either necessary to describe to someone how to practice the invention or in discussions within your patent application to distinguish between what you have invented shown in one figure versus what has already been done in a figure with a prior art caption. If you provide a prior art caption, it should be all upper case. Be careful labeling things as prior art, for once submitted as such, the patent office will consider this an admission that the material in the drawing is not patentable.

  - (optional) An instruction to clear the page after the figure is displayed inside the Drawings Section (see 11.3). LaTeX has very sophisticated algorithms for the placement of floating diagrams (called floats or float environments). Generally, LaTeX is allowed to use its own algorithms to place floats

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properly and this works out well. Your patent figures will be placed either in the center of the page or will be doubled up with other figures, depending on LaTeX's decisions. LaTeX does not like many floats listed one after another and after about ten such floats, it generates an error and asks for help. This is a problem that I'd like to try to solve automatically but have not been able to. So, when this error occurs you must break up your figure list with an instruction to clear the page after the drawing is placed. This allows LaTeX to flush out its list of drawings and start over. For patents with lots of drawings, you might need instructions in two or three locations. Generally, you can always give this instruction after a large drawing that you know will be on a single page anyway and its always safe to unconditionally, except for the last drawing, clear the page (you will just get one drawing per drawing page, which is not too bad). Do not clear the page after the last drawing. To clear the page after a drawing, use the `\figureClearPageAfter` macro in LaTeX or the **FigureClearPageAfter** environment in LyX.

For each annotation within a figure, annotations are defined. Annotation definitions are associated with the last figure definition occurring before it:

- The annotation definition. Annotations are defined by the `\annotationDefinition` macro in LaTeX or the **AnnotationDefinition** environment in LyX. The argument is the the name you will use to refer to the annotation when cross-referencing. The annotation definition statement must come before any other attributes of an annotation are described like the name and description and basically assigns the annotation number and matches it up with the name defined for the annotation.

- After the annotation definition, in any order:

  - The annotation name. Annotation names are defined by the `\annotationName` macro in LaTeX or the **AnnotationName** environment in LyX. The argument is the exact text that should be used for the element in the drawing. This text should ideally be one word and certainly as few as possible so that when the text is used within the patent application, the application reads properly.

  - The annotation description. Annotation descriptions are defined by the `\annotationDescription` macro in LaTeX or the **AnnotationDescription** environment in LyX. The argument is a description sufficient for identifying the element in the drawing. This text should be as descriptive as possible. The annotation description will not appear anywhere in your patent application except it will appear in the annotation list (see section 11.4) when the application is printed in draft mode (see section 9.8). The sole purpose of the annotation description is to allow the author to match annotation numbers and names with the elements in a figure and primarily provided as an aid when the drawing annotation numbers are drawn into the figures at the very end. For example, a reasonable strategy for producing the application is to fill out the annotation while writing the patent so that the annotation numbers and names can be referred to within the application. Then, at the very end, the annotation list is printed and the author manually goes to each drawing, connects a line to the element described by the annotation description and adds the correct number. Using this strategy, you can see that it is essential that when this step is performed, the description is sufficient to properly identify the element in the drawing.

An example drawing file for LaTeX is shown in figure 13 and for LyX is shown in figure 14. It is helpful to understand the data structures created when these example drawing files are processed. The figures data structure produced is shown in table 1 and the annotations data structure produced is shown in table 2. These data structures are fairly straightforward, but I'll point out a few things:

- The figure definition (the `\figureDefinition` macro in LaTeX or the **FigureDefinition** environment in LyX) assigned a unique figure number that gets associated with all of the subsequent figure assignments until the next figure definition statement.

- The annotation definition (the `\annotationDefinition` macro in LaTeX or the **annotationDefinition** environment in LyX) assigned a unique annotation number that gets associated with all of the subsequent annotation assignments until the next annotation definition statement.

```
\figureDefinition{VisioDrawing}
\figureExtension{pdf}
\figureDescription{is an example drawing created in Visio}
\annotationDefinition{Widget}
\annotationName{widget}
\annotationDescription{a widget in the Visio drawing}
\annotationDefinition{Thing}
\annotationName{thing}
\annotationDescription{a thing in the visio drawing}
\annotationDefinition{WidgetThingConnection}
\annotationName{connection}
\annotationDescription{the arrow connecting the widget and the thing}

\figureDefinition{TpXDrawing}
\figureExtension{tpx}
\figureCaption{PRIOR ART}
\figureDescription{is an example drawing created in TpX}
\annotationDefinition{input}
\annotationName{input}
\annotationDescription{the input}
\annotationDefinition{output}
\annotationName{output}
\annotationDescription{the output}
\annotationDefinition{mathProcessor}
\annotationName{math processor}
\annotationDescription{the math procesor}
```

Figure 13: Drawing definitions in LaTeX

Drawing Number	Element	Definition
1	Name	VisioDrawing
	Extension	pdf
	Description	an example drawing created in Visio
	Caption	none
2	Name	TpXDrawing
	Extension	tpx
	Description	an example drawing created in TpX
	Caption	PRIOR ART

Table 1: Figure Definitions

Figure Definition:VisioDrawing
Figure Extension:pdf
Figure Description:is an example drawing created in Visio
Annotation Definition:Widget
Annotation Name:widget
Annotation Description:a widget in the Visio drawing
Annotation Definition:Thing
Annotation name:thing
Annotation Description:a thing in the visio drawing
Annotation Definition:WidgetThingConnection
Annotation Name:connection
Annotation Description:the arrow connecting the widget and the thing
Figure Definition:TpXDrawing
Figure Extension:tpx
Figure Caption:PRIOR ART
Figure Description:is an example drawing created in TpX
Annotation Definition:input
Annotation Name:input
Annotation Description:the input
Annotation Definition:output
Annotation Name:output
Annotation Description:the output
Annotation Definition:mathProcessor
Annotation Name:math processor
Annotation Description:the math procesor

Figure 14: Drawing definitions in L_YX

Annotation Number	Figure	Element	Definition
1	1	**Name**	Widget
		Text	widget
		Description	a widget in the Visio drawing
2		**Name**	Thing
		Text	thing
		Description	a thing in the visio drawing
3		**Name**	WidgetThingConnection
		Text	connection
		Description	the arrow connecting the widget and the thing
4	2	**Name**	input
		Text	input
		Description	the input
5		**Name**	output
		Text	output
		Description	the output
6		**Name**	mathProcessor
		Text	math processor
		Description	the math processor

Table 2: Annotation Definitions

- All of the annotations definitions between figure definitions are all associated with the figure number that preceded the definition.

Subsequent subsections refer to how this data is used:

- See section 11.1 for how to cross reference drawings and annotations.

- See section 11.2 for how the brief description of the drawings gets produced.

- See section 11.3 for how the drawings get produced.

11.1   Drawing and Annotation Cross-referencing

There are four main macros for cross-referencing drawings and drawing elements. These are:

- The \referencePatentFigure macro in LaTeX or the **FigureReference** custom inset (see figure 4) in LyX references figures. The argument is the same as the argument supplied to a previous \figureDefinition macro in LaTeX or the **FigureDefinition** environment in LyX (see page 24). This macro will expand to "FIG. xx" where xx is the number determined for the figure.

- The \annotateWithName macro in LaTeX or the **Annotation+Name** custom inset (see figure 4) in LyX references drawing elements. The argument is the same as the argument supplied to a previous \annotationDefinition macro in LaTeX or the **AnnotationDefinition** environment in LyX (see page 25). This macro will expand to "xxxx [yy]" where xxxx is the text for the drawing element provided in a previous \annotationName macro in LaTeX or the **AnnotationName** environment in LyX and yy is the number determined for the annotation.

- The \annotate macro in LaTeX or the **Annotation** custom inset (see figure 4) in LyX references drawing elements, but without the associated name. The argument is the same as the argument supplied to a previous \annotationDefinition macro in LaTeX or the **AnnotationDefinition** environment in LyX (see page 25). This macro will expand to "[yy]" where yy is the number determined for the annotation. This macro is mostly used when the \annotateWithName macro in LaTeX or the **Annotation+Name** custom inset in LyX is inappropriate when, for example, the name associated with the annotation number produces awkward text in the patent application. In circumstances like this, the annotation name corresponding to the drawing element is manually written followed by the \annotate macro. When this is done, the agreement between the element name and number must be checked prior to filing.

- The \annotationNumberReference (or \annotateNoBrackets which is an alias) macro in LaTeX references only the drawing element number. The argument is the same as the argument supplied to a previous \annotationDefinition macro in LaTeX or the **AnnotationDefinition** environment in LyX (see page 25). This macro will expand to "yy" where yy is the number determined for the annotation. This macro is mostly used in LaTeX based drawing packages (see section 14.2) to automatically draw the number associated with the annotation on the drawing. Sometimes, this number needs to be underlined when the annotation number in a drawing cannot be pointed to an element. This is somewhat rare. In this case, use the \annotateNumberReferenceUnderlined macro or simply enclose the \annotateNumberReference macro with \underline{}.

11.2   The Brief Description of the Drawings Section

The brief description of the drawings is a required section that is placed between the Summary of the Invention section and the Detailed Description of the Preferred Embodiments section. It is produced automatically by placing the the \patentDrawingDescriptions macro in LaTeX or the **DrawingsDescriptionSection** environment in LyX just before the Detailed Description of the Preferred Embodiments section. No argument is provided.

This macro expands into something like:

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the invention, reference is made to the following description and accompanying drawings, in which:

FIG. 1 aaaa;

FIG. 2 bbbb;

. . .

FIG. x cccc; and

FIG. y dddd.

Here, aaaa, bbbb, cccc and dddd refers to a figure description supplied by a previous `\figureDescription` macro in LaTeX or the **FigureDescription** environment in LyX (see page 24) and x and y refer to corresponding figure numbers. Notice that the brief description of the drawings is punctuated so that it reads as a long run-on sentence (see 13.2).

11.3   The Drawings Section

The drawings section is placed at the very end of the document (or just before the `\end{document}` macro in LaTeX). It is produced automatically using the `\patentDrawings` macro in LaTeX or the **DrawingsSection** environment in LyX.

This macro expands into something like:

---

invention name

inventor name et. al.

docket number

patent attorney name (xxx)-xxx-xxxx

1/N

name.ext

FIG. x caption

Here the invention name (provided by the `\title` macro in LaTeX or the **Title** environment in LyX), first named inventor (provided by the `\inventor` macro in LaTeX or the **Inventor** environment in LyX), docket number (provided by the `\setDocketNumber` macro in LaTeX or the **DocketNumber** environment in LyX), patent attorney name (provided by the `\setLawyerName` macro in LaTeX or the **LawyerName** environment in LyX), and patent attorney phone number (provided by the `\setLawyerPhone` macro in LaTeX or the **LawyerPhone** environment in LyX) correspond to information provided in the front matter (see section §9). The fields name, ext and caption correspond to information provided in the figure definition (see page 24) and x corresponds to the assigned figure number. The 1/N refers to the page number of the drawings out of the total N pages found (note that you will need to run LaTeX multiple times to get this right).

If you have problems with drawing placement or get LaTeX errors, you might need to clear pages after certain drawings (see clearing pages on page 24).

11.4   The Annotation List

When printed in draft mode (see section 9.8), the drawings are automatically preceded by the annotation list section by virtue of the `\patentDrawings` macro in LaTeX or the **DrawingsSection** environment in LyX.

The annotation list is a section with the heading "Annotation List". It contains, for each figure with at least one annotation:

```
                              ...

\patentClaimsStart
\beginClaim{AnIndepClaim}
An Independent claim.
\beginClaim{ADepClaim}
A dependent claim of \claimRef{AnIndepClaim}.
\patentClaimsEnd


                              ...
```

Figure 15: LᴬTᴇX Patent Claims

—START OF PATENT CLAIMS—

AnIndepClaim
An Independent Claim.

ADepClaim
A dependent claim of | AnIndepClaim |.

—END OF PATENT CLAIMS—

Figure 16: LʸX Patent Claims

- The number of the figure followed by its variable name (supplied by a previous \figureDefinition macro in LᴬTᴇX or the **FigureDefinition** environment in LʸX - see page 24) followed by the figure description (supplied by a previous \figureDescription macro in LᴬTᴇX or the **FigureDescription** environment in LʸX - see page 24).

- For each annotation within the figure:

  - The number of the annotation followed by its variable name (supplied by an \annotationDefinition macro in LᴬTᴇX or the **annotationDefinition** environment in LʸX) followed by its text name (supplied by an \annotationName macro in LᴬTᴇX or the **AnnotationName** environment in LʸX) followed by its description (supplied by an \annotationDescription macro in LᴬTᴇX or the **AnnotationDescription** environment in LʸX).

Note that figures without annotations are not shown in the annotation list.

12   Claims

Claims are relatively unstructured (from a LᴬTᴇX and LʸX standpoint); a qualified patent attorney is generally required to get claim structure and language correct. The Claims section should appear after the Detailed Description of the Preferred Embodiments section and is begun and ended with the \patentClaimsStart and \patentClaimsEnd macros in LᴬTᴇX or the **ClaimsStart** and **ClaimsEnd** environments in LʸX. These take no arguments. The Patent Claims section will always start on a new page and will automatically begin with a statement like: "What is claimed:". This statement will be printed automatically, but the statement can be customized (see 13.1).

Each claim begins with the \beginClaim macro in LᴬTᴇX or the **Claim** environment in LʸX. The argument is a name by which the claim is referenced. The argument should be a name and should not imply the number as claim numbers are assigned automatically.

A claim is referred to within the claims section with the \claimRef macro in LATEX or the **ClaimReference** custom inset (see figure 4) in LYX. The argument is the previously mentioned name of the claim defined by the argument of a previous \beginClaim macro in LATEX or the **Claim** environment in LYX.

A LATEX example is shown in figure 15 and a LYX example is shown in figure 16.

Note that since claims use standard LATEX style of cross-referencing, you will need to compile your document twice at least to get the claim references properly updated. LYX takes care of this automatically.

13 Customizations and Formatting

If you are an inventor trying to take a first shot at writing a patent application, you will not need any customizations mentioned in this section. If you are a patent attorney trying to use these tools to improve your patent application flow, you will invariably desire various changes to meet your style. The first, easiest customization is in the naming and inclusion of various sections. The names and the sections you wish to include is up to you and can be changed easily by editing the PatentApplication.tex or PatentApplication.lyx template documents which you are free to do. More difficult customizations can be performed by editing the uspatent.cls and uspatent.layout files, but these will require excessive skill with LATEX and LYX. There are some relatively easy customizations that have been anticipated. These can only be made with LATEX code, however (use [Insert] [TEX Code] to accomplish these customizations from within LYX).

13.1 Claims

The uspatent.cls file begins the claims section with the text: "What is claimed:". To change this, redefine the \WhatIsClaimed macro.

Here is an example redefinition:

```
\renewcommand{\WhatIsClaimed}{WHAT IS CLAIMED IS:}
```

13.2 Brief Description of the Drawings

The uspatent.cls file provides for a Brief Description of the Drawings section as outlined in section 11.2. To change the name of this section, redefine the \annotationFigureListSectionName macro. To change the preamble of this section, redefine the \annotationFigureListPreamble macro.

Here is an example redefinition:

```
\renewcommand{\annotationFigureListSectionName}{%
\patentSection{Description of the Drawings}}
\renewcommand{\annotationFigureListPreamble}{%
Reference is made to the following description and
accompanying drawings, in which:\par}
```

Also, during review of this document, there seems to be some question of whether the description of the drawings really ought to be a run-on sentence. To make the descriptions read as separate sentences each ending in a period, provide the \setFigureListNoRunOn macro.

14 Drawing Packages

This section describes some basic ways to work with drawings with known drawing packages. I recommend that you provide drawings in either TpX (pdf or TikZ format) or in pdf produced by other drawing packages. To check the quality of drawings, even in pdf, create your drawing and zoom the drawing on your computer screen. If the drawing retains its crispness even under extreme zoom settings, then the quality is good. If it does not, you will need to find another solution. This quality is illustrated in figure 17 and figure 18. Lossy formats like JPEG should particularly be avoided.

Figure 17: Zoomed Drawing Exhibiting Badness

Figure 18: Zoomed Drawing Exhibiting Goodness
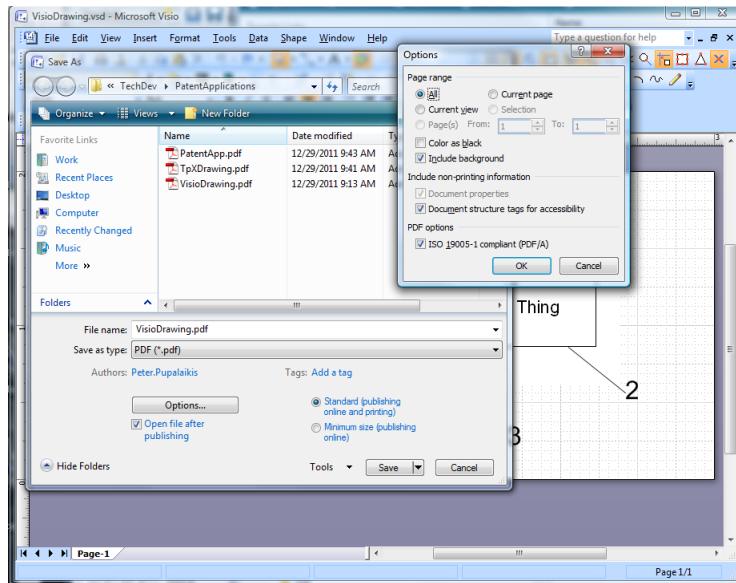
Figure 19: Saving Visio Drawings as PDF

14.1 Visio

When using Visio, the preferred method is to create your pictures in a two step process:

1. Create your picture in whatever tool is appropriate. Visio is a good tool for creating basic engineering diagrams, but other tools might be appropriate. Make sure this picture is no bigger than 5" × 8" to allow for annotation lines to extend outside the picture boundaries.

2. Import your picture into Visio. In the case that the picture was created in Visio, import the picture into another Visio document using [insert][object] and then check the create from file check box. Browse to your file and import it. If you are creating a visio drawing within visio (recommended), then use [insert][object] and specify a visio drawing.

Basically, the idea here is to use Visio as a *housing* for your drawing. The housing contains the main drawing, sets the size of the drawing absolutely, and is where the annotations are drawn. The main drawing can be another embedded Visio drawing.

When using Visio, the annotations must be numbered in Visio. This numbering should definitely wait until the end since if you change the numbering, you'll have to edit each and every drawing. If you want, annotate the drawing with a text label, include the annotation in the annotation list as described in section §11 with similar descriptive text, and at the very end when you are almost finished with the application, go back and change the text to the numbers provided in the annotation list that is shown in the application in draft mode.

14.1.1 Saving Your Drawing

When editing and saving your Visio drawing, you'll want to save your drawing in Visio format and save it as a PDF. The PDF document is what gets included in the application. To do this, you want to use [Save As...], select PDF as the type, then make sure the options are set to ISO 19005-1 compliant PDF.

14.2 TpX

TpX is the best tool for creating LaTeX drawings. What's good about it is that it easily allows importing other documents and touching them up. More importantly though, it allows automatic drawing annotation. This section will explain what you need to know to deal with TpX documents.
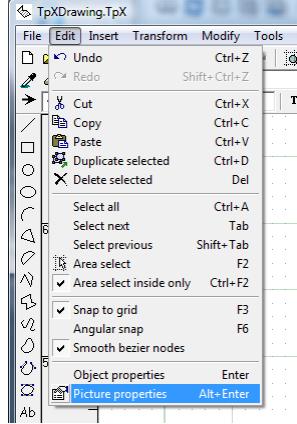
Figure 20: Accessing TpX Drawing Properties

14.2.1   TpX Settings

Your TpX document must be saved with certain settings. These settings can be found under the menu [Edit][Picture properties] as shown in figure 20.

You will only need to change a few very important properties. These are:

- TEXFormat=none - this prevents writing out spurious EPS files.

- PdfTEXFormat=pdf or tikz (recommended) - this causes the graphics portion of the drawing to be output in PDF if pdf is selected or it is embedded within the TpX document in Ti*k*Z format if tikz is chosen.

- TEXFigure=none - this prevents the LATEX portion of the file from including figure information which is already included in the macro that imports the file.

- FontSizeInTEX=0 - this causes the font size to be used from your patent application document settings.

A comprehensive list of the desired settings are:

- Caption=
- Comment=
- Label=
- PicScale=1
- Border=2
- TEXFormat=none
- PdfTEXFormat=pdf or tikz (recommended)
- BitmapRes=20000
- PicMagnif=1
- IncludePath=
- LineWidth=0.3
- ArrowsSize=0.7
- StarsSize=1
- HatchingStep=2
- HatchingLineWidth=0.5
- DottedSize=0.5
- DashSize=1

- DefaultFontHeight=5
- FontName=
- DefaultSymbolSize=30
- ApproximationPrecision=0.01
- MiterLimit=10
- T$_{\text{E}}$XCenterFigure=1
- T$_{\text{E}}$XFigure=none
- T$_{\text{E}}$XFigurePlacement=
- T$_{\text{E}}$XFigurePrologue=
- T$_{\text{E}}$XFigureEpilogue=
- T$_{\text{E}}$XPicEpilogue=
- FontSizeInT$_{\text{E}}$X=0
- MetaPostT$_{\text{E}}$XText=1

14.2.2   Drawing Size

Unfortunately (for Americans), TpX operates with grids that are metric only. TpX drawings are absolutely sized with the origin at 0,0 in the lower left corner. The numbering of the grids is in millimeters. You will want to make sure your drawing is no larger than 6" × 9" which means 150 mm × 230 mm. Remember, you will need to place annotation lines outside the drawing, so ideally, you want to keep the drawing without annotations to 5" × 8" which means 130 mm × 200 mm. Usually, I place a rectangle filled white set to the back with white lines (i.e. no lines showing) first that are the exact size I want the drawing to be so that I don't go outside the boundaries.

14.2.3   Annotations

TpX is great for annotating because it can be handled automatically. This is done by drawing a line to the element and then labeling it. The line drawing is self explanatory. The labeling should be such that it is aligned 1 mm below the line end vertically and lined up with the line end horizontally as shown in figure 21.

Notice in figure 21 that the text properties dialog is shown showing how the annotation is labeled. TpX enables two types of annotation labels:

- T$_{\text{E}}$X - the text you will see on the diagram which can be labeled in plain English. This text will not actually show up in your figure if there is a Tex te label.

- T$_{\text{E}}$X te - the text that describes what will be seen in the diagram. Note here that we use the macro \annotateNoBrackets{input} which tells the document compiler to figure out the number that belongs in the label. In order for this to work properly, the label input must have been entered in the annotation list as described in section §11. If you don't, the drawing will show ?? for the number when you print your application.

As mentioned, these text labels can be used in two ways:

- no T$_{\text{E}}$X te label - the label shown in the drawing and in your document will be the label shown in the T$_{\text{E}}$X box.

- T$_{\text{E}}$X te label provided - the label shown while editing your document will be the T$_{\text{E}}$X label, but the label shown when you print your document will be the T$_{\text{E}}$X te label which can be a macro, if desired.

If using TpX, you should know that the size of the drawing will be such that a box can surround the figure, as seen on the TpX screen. This means according to the T$_{\text{E}}$X text shown, which is unfortunate. You will need to keep your T$_{\text{E}}$X text short so that it does not make TpX think that the drawing is larger than it will actually be when formatted.
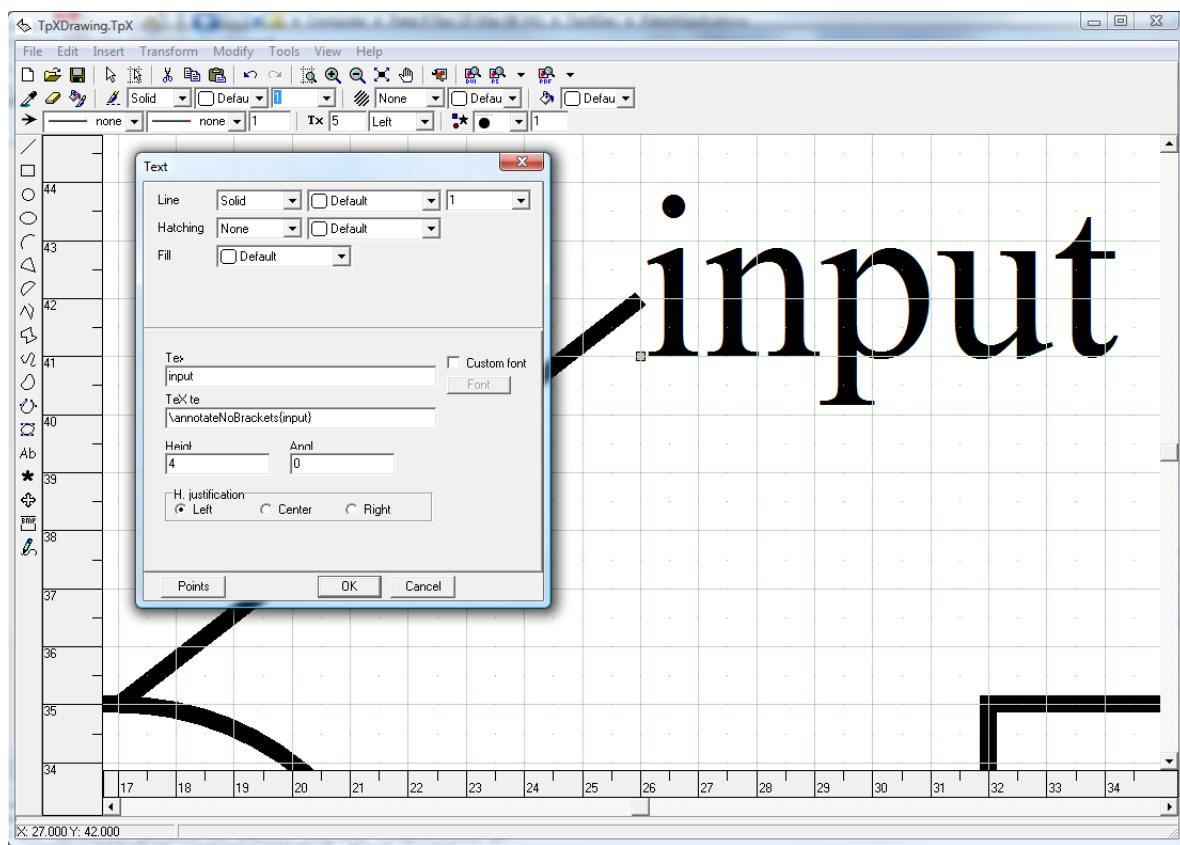
Figure 21: Annotation Alignment

14.2.4   Text Labels

Text labels may be added to your drawing by using insert text. When you insert text, there are many possibilities for how your text labels will be shown. You can use macros, formulas and other things as well as plain text. The strategy you want to follow is when you are inserting just plain text, then use insert text and just type it in. When you are inserting something other than plain text, like a formula, then use insert text, type in some text that you want to see when editing the document (you cannot see the actual formula until you view the final document), and then edit the text properties. When you edit the text properties, you will see two boxes as shown in figure 21:

- T_EX - the text you will see on the diagram which can be labeled in plain English. This text will not actually show up in your figure if there is a Tex te label.

- T_EX te - the text that describes what will be seen in the final output. This can be plain text, L^AT_EX formulas, macros, etc. The writing of L^AT_EX formulas is beyond the scope of this document. Just know that you have this capability.

Appendix A - uspatent.cls Listing

```
%%
%% This is file 'uspatent.cls',
%%
%%
%%   Author: Peter J. Pupalaikis  (pete_pope  at hotmail dot com)
%%   Copyright 2012 Peter J. Pupalaikis
%%   Version 1.0
%%
%%   This work may be distributed and/or modified under the
%%   conditions of the LaTeX Project Public License, either
%%   version 1.3 of this license or (at your option) any
%%   later version.
%%   The latest version of the license is in
%%      http://www.latex-project.org/lppl.txt
%%   and version 1.3 or later is part of all distributions of
%%   LaTeX version 2003/06/01 or later.
%%
%%   This work consists of the files listed in the README file.
%%
\NeedsTeXFormat{LaTeX2e}
\ProvidesClass{uspatent}%
  [2012/06/09 v0.0 U.S. Patent Application Class]
%\DeclareOption*{\PassOptionsToClass{\CurrentOption}{memoir}}
%\ProcessOptions
\LoadClass[letterpaper,12pt]{memoir}[1996/10/24]

\newif\ifPatentOfficeMode
\PatentOfficeModetrue

\newcommand{\setAssigneeName}{\def\assigneeName}
\newcommand{\setAssigneeAddress}{\def\assigneeAddress}
\newcommand{\setAssigneeCity}{\def\assigneeCity}
\newcommand{\setAssigneePhone}{\def\assigneePhone}
\newcommand{\setDocketNumber}{\def\patentNumber}
\newcommand{\setLawyerName}{\def\patentLawyerName}
\newcommand{\setLawyerNumber}{\def\patentLawyerNumber}
\newcommand{\setLawyerPhone}{\def\patentLawyerPhone}
\newcommand{\setOtherInventor}[1]{\otherInventor{#1}}
\newcommand{\setDocumentVersion}{\def\patentDocumentVersion}
\newcommand{\setPrintingModeDraft}{\PatentOfficeModefalse}
\newcommand{\setPrintingModeApplication}{\PatentOfficeModetrue}
\newcommand{\inventor}{\author}

\settrimmedsize{11in}{8.5in}{*}
\setlength{\trimtop}{0pt}
\setlength{\trimedge}{0pt}
\settypeblocksize{8.5in}{36pc}{*}
\setulmargins{1.5in}{*}{*}
\setlrmargins{*}{*}{1}
\setmarginnotes{17pt}{51pt}{\onelineskip}
\setheadfoot{5\onelineskip}{3\onelineskip}
\setheaderspaces{*}{2\onelineskip}{*}
\checkandfixthelayout
\captiondelim{}

\ifpdf
\usepackage[pdftex]{graphicx}
%No Commas in the PDF Title!?!
\usepackage[
hyperindex=true,
pdfusetitle,
bookmarks=true,
extension= pdf,
linkcolor=black,
colorlinks=true,
```

```
hyperfootnotes=false,
pdffitwindow=true,
pdftoolbar=true,
pdfmenubar=true,
debug=false,
pagebackref=true
]{hyperref}
\DeclareGraphicsExtensions{ .pdf, .jpg, .tif}
\else
\usepackage[dvips]{graphicx}
\DeclareGraphicsExtensions{ .eps, .jpg }
\fi

\usepackage{amsmath}
\usepackage{enumitem}
\usepackage[nolist]{acronym}
\usepackage{memhfixc}
\usepackage{xspace}
\usepackage{prettyref}
\usepackage{lmodern}
\usepackage[T1]{fontenc}
\usepackage{babel}
\usepackage{tikz}

\newrefformat{eq}{\textup{(\ref{#1})}}
\newrefformat{cla}{claim \ref{#1}}
\newrefformat{tab}{Table \ref{#1}}
\newrefformat{fig}{\figurename \ \textbf{\ref{#1}}}

\newcommand{\patentTitlePage}{%

\ifx\assigneeName\undefined
\global\edef\assigneeName{~}
\global\edef\confidentialAssignee{~}
\else
\global\edef\confidentialAssignee{%
Confidential Property of \assigneeName}
\fi
\ifx\assigneeAddress\undefined
\global\edef\assigneeAddress{~}
\fi
\ifx\assigneeCity\undefined
\global\edef\assigneeCity{~}
\fi
\ifx\assigneePhone\undefined
\global\edef\assigneePhone{~}
\fi
\ifx\patentNumber\undefined
\global\edef\patentNumber{~}
\fi
\ifx\patentLawyerName\undefined
\global\edef\patentLawyerName{~}
\fi
\ifx\patentLawyerNumber\undefined
\global\edef\patentLawyerNumber{~}
\fi
\ifx\patentLawyerPhone\undefined
\global\edef\patentLawyerPhone{~}
\fi
\ifx\patentDocumentVersion\undefined
\global\edef\patentDocumentVersion{0.0}
\fi
\ifx\thedate\undefined
\global\edef\thedate{\today}
\fi

\ifPatentOfficeMode
%patent office mode
```

```
\pagestyle{title}
\makeoddhead{myheadings}
{}{}{\scriptsize{\patentNumber}}
\makeevenhead{myheadings}
{}{}{\scriptsize{\patentNumber}}
\else
%not patent office mode
\pagestyle{title}
\makeoddhead{myheadings}
{\confidentialAssignee}
{}
{\scriptsize{Draft of \thedate\\version \patentDocumentVersion}}
\makeevenhead{myheadings}
{\confidentialAssignee}
{}
{\scriptsize{Draft of \thedate\\version \patentDocumentVersion}}
\fi
\begin{titlingpage}
\aliaspagestyle{titlingpage}{myheadings}
\begin{center}
\textbf{APPLICATION FOR UNITED STATES LETTERS PATENT}
\vskip 172 pt
Title: \MakeUppercase{ \thetitle }
\end{center}
\vskip 172 pt
\begin{flushleft} \begin{tabular}{rl}  Inventors:  &
\theauthor \\
& \inventorListName{1} \\
& \inventorListName{2} \\
& \inventorListName{3} \\
& \inventorListName{4} \\
& \inventorListName{5} \\
& \inventorListName{6} \\
& \inventorListName{7} \\
& \inventorListName{8} \\
\end{tabular}\par \end{flushleft}
\begin{flushright}
\tiny{
\vskip 10 pt
%\\[4\baselineskip]
\patentLawyerName \\
\patentLawyerNumber \\
[2\baselineskip]
\assigneeName \\
\assigneeAddress \\
\assigneeCity \\
\assigneePhone
}
\end{flushright}
\end{titlingpage}
\parindent 10pt
\DoubleSpacing
}

\renewcommand{\maketitle}{
\patentTitlePage
\patentStart
}

\def\figureName{FIG.}

\def\etal{%
\expandafter\ifx\csname inventorname 1\endcsname\relax
\else
~et~al.
\fi
}
```

41

```
% use this command to put a comment in the margin
\newcommand{\patentComment}[1]{
\ifPatentOfficeMode
%patent office mode
\else
%not patent office mode
\begin{SingleSpace}
\marginpar{\tiny\textcolor{red}{ \begin{flushleft} #1 \end{flushleft}}}
\end{SingleSpace}
\fi
}

\newcommand{\patentSection}[1]{
\Needspace{8pc}
\section[#1][]{}
%\label{#2}
\begin{center}
\textbf{\underline{\MakeUppercase{{#1}}}}
\end{center}
}

\newcommand{\patentParagraph}{
\par\noindent
\refstepcounter{parnum}[\textbf{%
\ifnum \value{parnum} < 10 0\else\fi
\ifnum \value{parnum} < 100 0\else\fi
\ifnum \value{parnum} < 1000 0\else\fi
\arabic{parnum}}]
\indent}

\newcommand{\patentStart}{
\ifPatentOfficeMode
%patent office mode
\pagestyle{myheadings}
\makeoddhead{myheadings}{}{}{\scriptsize{\patentNumber}}
\makeevenhead{myheadings}{}{}{\scriptsize{\patentNumber}}
\makeoddfoot{myheadings}{}{\thepage}{}
\makeevenfoot{myheadings}{}{\thepage}{}
\else
%not patent office mode
\pagestyle{myheadings}
\makeoddhead{myheadings}
{\confidentialAssignee}
{}{\scriptsize{Draft of \thedate\\version \patentDocumentVersion}}
\makeevenhead{myheadings}
{\confidentialAssignee}
{}{\scriptsize{Draft of \thedate\\version \patentDocumentVersion}}
\makeoddfoot{myheadings}{\thepage}{}{\scshape{\tiny{\thetitle}}}
\makeevenfoot{myheadings}{\scshape{\tiny{\thetitle}}}{}{\thepage}
\fi

\begin{center}\textbf{\MakeUppercase{ \thetitle }}\end{center}

% don't show section numbers!
\setcounter{secnumdepth}{-1}
% let them go into the "TOC" (even though we won't print it) because
% this allows the PDF file to contain the appropriate bookmarks
\setcounter{tocdepth}{1}

\setbeforesecskip{0pc}
\setaftersecskip{0pc}
\parskip=10pt

% this is used to number paragraphs
\newcounter{parnum}
}
```

```
\makeatletter
\newcount\@inventornumber
\@inventornumber=0
\makeatother

\makeatletter
\def\otherInventor#1{
\global\advance\@inventornumber by 1
\expandafter\edef\csname inventorname \the\@inventornumber\endcsname{#1}}
\makeatother

\def\inventorListName#1{\csname inventorname #1\endcsname}

% Claims are the only area where I still use labels, hence the
% prettyref include.
% \patentClaimsStart essentially begins the enumerate environment and
% \patentClaimsEnd essentially ends it.
% I'd like to remove this dependency someday and use the counter
% mechanisms used elsewhere.

% Inside, a claim is begin with \beginClaim which labels it and starts
% an \item.
% Claims are referenced with \claimRef
\newcommand{\beginClaim}[1]{\item \label{cla:#1}}
\newcommand{\claimRef}[1]{claim \ref{cla:#1}}

\newcommand{\WhatIsClaimed}{What is claimed:}

\newcommand{\patentClaimsStart}{
\newpage
\section[Claims][]{}
\parskip=0pt
\WhatIsClaimed
\begin{enumerate}
}

\newcommand{\patentClaimsEnd}{
\end{enumerate}
\newpage
}

%I'm not sure what this is but I'm afraid to remove it
\newcommand{\putfigcaption}{}

% Patent drawings have a special header that numbers the drawing pages
\newcommand{\patentDrawingsStart}{
\cleartooddpage
%\newpage
\ifPatentOfficeMode
%patent office mode
\setcounter{page}{1}
\pagestyle{myheadings}
\makeoddhead{myheadings}{}{
\tiny{\thetitle} \\
\tiny{\theauthor\etal} \\
\tiny{\patentNumber} \\
\tiny{\patentLawyerName\ \patentLawyerPhone}\\[.1in]
\tiny{\thepage/\thelastpage}
}{}
\makeevenhead{myheadings}{}{
\tiny{\thetitle} \\
\tiny{\theauthor\etal} \\
\tiny{\patentNumber} \\
\tiny{\patentLawyerName\ \patentLawyerPhone}\\[.1in]
\tiny{\thepage/\thelastpage}
}{}
\makeoddfoot{myheadings}{}{}{}
\makeevenfoot{myheadings}{}{}{}
```

```
\else
%not patent office mode
\pagestyle{myheadings}
\makeoddhead{myheadings}
{\confidentialAssignee}
{}
{\scriptsize{Draft of \thedate\\version \patentDocumentVersion}}
\makeevenhead{myheadings}
{\confidentialAssignee}
{}
{\scriptsize{Draft of \thedate\\version \patentDocumentVersion}}
\makeoddfoot{myheadings}{\thepage}{}{\scshape{\tiny{\thetitle}}}
\makeevenfoot{myheadings}{\scshape{\tiny{\thetitle}}}{}{\thepage}
\fi

\section[Drawings][]{}
\begin{SingleSpace}
}

\newcommand{\patentDrawingsEnd}{
\end{SingleSpace}
%\newpage
\clearpage
}

\makeatletter
\newcount\@annotationnumber
\@annotationnumber=0
\makeatother

\makeatletter
\newcount\@annotationfigurenumber
\@annotationfigurenumber=0
\makeatother

\makeatletter
\def\advanceannotationfigurenumber{
\global\advance\@annotationfigurenumber by 1}
\makeatother

\makeatletter
\def\setannotationnumber#1{%
\global\@annotationnumber=#1
\global\advance\@annotationnumber by -1
}
\makeatother

\def\annotationnextfigure{
\global\advance\@annotationfigurenumber by 1}

\makeatletter
\def\setannotationfigurenumber#1{%
\global\@annotationfigurenumber=#1
}
\makeatother

\makeatletter
\def\@newannotation#1{
\expandafter\ifx\csname anonum#1 \endcsname\relax
\global\advance\@annotationnumber by 1
\expandafter\edef\csname anoele \the\@annotationnumber\endcsname{#1}
\expandafter\edef\csname anonum#1 \endcsname{\the\@annotationnumber}
\expandafter\edef\csname anofignum \the\@annotationnumber\endcsname{%
\the\@annotationfigurenumber}
\else\message{error: duplicate annotation #1}\fi}
\makeatother

\makeatletter
```

```
\def\annotationDefinition{%
\@ifnextchar[{\@annotationDefinitionmulti}{\@newannotation}}
\def\@annotationDefinitionmulti[#1]#2{%
\@newannotation{#2}\annotationName{#1}
\@ifnextchar[{\@annotationDefinitionfull}{}}
\def\@annotationDefinitionfull[#1]{\annotationDescription{#1}}
\makeatother

\makeatletter
\def\annotationDescription#1{%
\expandafter\ifx\csname anodesc \the\@annotationnumber\endcsname\relax
\expandafter\def\csname anodesc \the\@annotationnumber\endcsname{#1}
\else
\message{error while assigning description ''#1'' to annotation variable
''\annotationListVariableName{\the\@annotationnumber}''
 - it was already defined as
''\annotationListDescription{\the\@annotationnumber}''.}\fi}
\makeatother

\makeatletter
\def\annotationName#1{%
\expandafter\ifx\csname anotext \the\@annotationnumber\endcsname\relax
\expandafter\def\csname anotext \the\@annotationnumber\endcsname{#1}
\else
\message{error while assigning text name ''#1'' to annotation variable
''\annotationListVariableName{\the\@annotationnumber}''
 - it was already defined as
''\annotationListText{\the\@annotationnumber}''.}\fi}
\makeatother

\makeatletter
\def\annotationReference#1{%
[\thinspace\annotationNumberReference{#1}\thinspace]}
\makeatother

\def\annotationNameAndReference#1{%
\annotationTextReference{#1}~\annotationReference{#1}}

\def\annotationDescriptionreference#1{%
\csname anodesc \annotationNumberReference{#1}\endcsname}

\def\annotationTextReference#1{%
\csname anotext \annotationNumberReference{#1}\endcsname}

\def\annotationNumberReference#1{\csname anonum#1 \endcsname}

\def\annotationNumberReferenceUnderlined#1{\underline{\csname anonum#1 \endcsname}}

\def\annotationListVariableName#1{\csname anoele #1\endcsname}

\def\annotationListText#1{\csname anotext #1\endcsname}

\def\annotationListDescription#1{\csname anodesc #1\endcsname}

\def\annotationListFigureNumber#1{\csname anofignum #1\endcsname}

\def\annotationListFigureDescription#1{\csname anofigdesc #1\endcsname}

\def\annotationListFigureExtension#1{\csname anofigext #1\endcsname}

\def\annotationListFigureCaption#1{\csname anofigcap #1\endcsname}

\def\annotationListFigureName#1{\csname anofigname #1\endcsname}

\def\annotationListPrintFigure#1#2{
\edef\testa{#1}\edef\testb{#2}\edef\testzero{0}
\ifx\testb\testzero
\figureName #1---\annotationListFigureName{#1}.%
```

```
\annotationListFigureExtension{#1}%
---\annotationListFigureDescription{#1}
\par
\else
\ifx\testa\testb
\else
\figureName #1---\annotationListFigureName{#1}.%
\annotationListFigureExtension{#1}%
---\annotationListFigureDescription{#1}
\par
\fi\fi
}


\def\annotationListSectionName{\section*{Annotation List}}


\makeatletter
\def\printAnnotationList{{%
\@annotationnumber=1
\@annotationfigurenumber=0
\expandafter\ifx\csname anoele \the\@annotationnumber\endcsname\relax
\else
\annotationListSectionName\par
\loop
\expandafter\ifx\csname anoele \the\@annotationnumber\endcsname\relax
\else
\leftskip = -10 pt
\annotationListPrintFigure{%
\annotationListFigureNumber{\the\@annotationnumber}}
{\the\@annotationfigurenumber}
\leftskip = 10 pt
%\hangindent = 20 pt
%\hangafter
\par
\@annotationfigurenumber=%
\annotationListFigureNumber{\the\@annotationnumber}
\the\@annotationnumber---%
\annotationListVariableName{\the\@annotationnumber}---%
\annotationListText{\the\@annotationnumber}---%
\annotationListDescription{\the\@annotationnumber}
\par
\leftskip = -10 pt
\advance\@annotationnumber by 1
\repeat
\fi
}}
\makeatother


\def\annotationFigureListPrintFigure#1{
\figureName ~#1 \annotationListFigureDescription{#1}}


\def\annotationFigureListSectionName{%
\section*{Brief Description of the Drawings}}
\def\annotationFigureListPreamble{%
For a more complete understanding of the invention,
reference is made to the following description and accompanying
drawings, in which:\par}


\def\setFigureListNoRunOn{%
\def\annotationFigureListLast{.}
\def\annotationFigureListNextLast{.}
\def\annotationFigureListOther{.}
}


\def\annotationFigureListLast{.}
\def\annotationFigureListNextLast{; and}
\def\annotationFigureListOther{;}


\makeatletter
```

```
\def\printAnnotationFigureList{{
\@annotationfigurenumber=1
\expandafter\ifx\csname anofigdesc \the\@annotationfigurenumber\endcsname\relax
\else
\annotationFigureListSectionName\par
\annotationFigureListPreamble\par
\loop
\expandafter\ifx\csname anofigdesc \the\@annotationfigurenumber\endcsname\relax
\else
\annotationFigureListPrintFigure{\the\@annotationfigurenumber}%
{\advance\@annotationfigurenumber by 1
\expandafter\ifx\csname anofigdesc \the\@annotationfigurenumber\endcsname\relax
\annotationFigureListLast\else{\advance\@annotationfigurenumber by 1
\expandafter\ifx\csname anofigdesc \the\@annotationfigurenumber\endcsname\relax
\annotationFigureListNextLast\else\annotationFigureListOther\par\fi}\fi}\fi}
\advance\@annotationfigurenumber by 1
\repeat
\fi
}}
\makeatother

\makeatletter
\def\figureDescription#1{%
\expandafter\ifx\csname anofigdesc \the\@annotationfigurenumber\endcsname\relax
\expandafter\def\csname anofigdesc \the\@annotationfigurenumber\endcsname{#1}
\else
\message{error while assigning description ``#1'' to annotation figure number
``\the\@annotationfigurenumber'' - it was already defined as
``\annotationListFigureDescription{\the\@annotationfigurenumber}''.}\fi}
\makeatother

\makeatletter
\def\figureExtension#1{%
\expandafter\ifx\csname anofigext \the\@annotationfigurenumber\endcsname\relax
\expandafter\def\csname anofigext \the\@annotationfigurenumber\endcsname{#1}
\else
\message{error while assigning extension ``#1'' to annotation figure number
``\the\@annotationfigurenumber'' - it was already defined as
``\annotationListFigureExtension{\the\@annotationfigurenumber}''.}\fi}
\makeatother

\makeatletter
\def\figureCaption#1{%
\expandafter\ifx\csname anofigcap \the\@annotationfigurenumber\endcsname\relax
\expandafter\def\csname anofigcap \the\@annotationfigurenumber\endcsname{#1}
\else
\message{error while assigning caption ``#1'' to annotation figure number
``\the\@annotationfigurenumber'' - it was already defined as
``\annotationListFigureCaption{\the\@annotationfigurenumber}''.}\fi}
\makeatother

\makeatletter
\def\figureClearPageAfter{%
\expandafter\def\csname anofigcp \the\@annotationfigurenumber\endcsname{}}
\makeatother

\makeatletter
\def\@newfigure#1{
\expandafter\ifx\csname fignum#1 \endcsname\relax
\global\advance\@annotationfigurenumber by 1
\expandafter\edef\csname anofigname \the\@annotationfigurenumber\endcsname{#1}
\expandafter\edef\csname fignum#1 \endcsname{\the\@annotationfigurenumber}
\else\message{error: duplicate annotation #1}\fi}
\makeatother

\makeatletter
\def\figureDefinition{\@ifnextchar[{\@figuredefinitionmulti}{\@newfigure}}
\def\@figuredefinitionmulti[#1]#2{\@newfigure{#2}\figureDescription{#1}}
```

```
\makeatother

\makeatletter
\def\figureReference#1{FIG.~\figurenumberreference{#1}}
\makeatother

\def\figurenumberreference#1{\csname fignum#1 \endcsname}

\expandafter\def\csname showfigure pdf\endcsname #1#2#3{%
\begin{figure}[!ht]
\centering
\includegraphics[]{#1.#2}\par
\figureReference{#1}~~#3 \par
\end{figure}
}

\expandafter\def\csname showfigure tpx\endcsname #1#2#3{%
\begin{figure}[ht]
\centering
\input{"#1.tpx"}\par
\figureReference{#1}~~#3 \par
\end{figure}
}

\expandafter\def\csname showfigure tex\endcsname #1#2#3{%
\begin{figure}[ht]
\centering
\input{"#1.tex"}\par
\figureReference{#1}~~#3 \par
\end{figure}
}

\expandafter\def\csname showfigure placeholder\endcsname #1#2#3{%
\begin{figure}[ht]
\centering
no extension provided for file name #1.\par This will be
used as a placeholder\par
\figureReference{#1}~~#3 \par
\end{figure}
}

\expandafter\def\csname showfigure unk\endcsname #1#2#3{%
\begin{figure}[ht]
\centering
\includegraphics[]{#1.#2}\par
\figureReference{#1}~~#3 \par
\end{figure}
}

\makeatletter
\def\figures{{%
\@annotationfigurenumber=1
\expandafter\ifx\csname anofigname \the\@annotationfigurenumber\endcsname\relax
\else
\figuresStart
\loop
\expandafter\ifx\csname anofigname \the\@annotationfigurenumber\endcsname\relax
\else
\expandafter\ifx\csname anofigext \the\@annotationfigurenumber\endcsname\relax
\edef\figureextension{placeholder}
\else
\edef\figureextension{%
\annotationListFigureExtension{\the\@annotationfigurenumber}}
\fi
\expandafter\ifx\csname showfigure \figureextension\endcsname\relax
% this is an unknown figure extension
\def\figureshower{\csname showfigure unk\endcsname}
\else
```

```
\def\figureshower{\csname showfigure \figureextension\endcsname}
\fi
\figureshower{\annotationListFigureName{\the\@annotationfigurenumber}}%
{\figureextension}%
{\annotationListFigureCaption{\the\@annotationfigurenumber}}
\expandafter\ifx\csname anofigcp \the\@annotationfigurenumber\endcsname\relax
\else
\clearpage
\fi
\advance\@annotationfigurenumber by 1
\repeat
\figuresEnd
\fi
}}
\makeatother

\def\annotationFigureListSectionName{
\patentSection{Brief Description of the Drawings}}

\def\annotationListSectionName{\patentSection{Annotation List}}

\def\annotationFigureListPreamble{
\patentParagraph{For a more complete understanding of the invention,
reference is made to the following description and accompanying
drawings, in which:}}

\def\patentDrawingDescriptions{\printAnnotationFigureList}

\def\referencePatentFigure#1{\figureReference{#1}}
\def\annotate#1{\annotationReference{#1}}
\def\annotateWithName#1{\annotationNameAndReference{#1}}

\def\annotationFigureListPrintFigure#1{
\patentParagraph{\figureName ~#1 is \annotationListFigureDescription{#1}}}

\def\annotateNoBrackets#1{\annotationNumberReference{#1}}

\def\figuresStart{\patentDrawingsStart}
\def\figuresEnd{\patentDrawingsEnd}

\def\patentDrawings{%
\ifPatentOfficeMode
\else
\printAnnotationList
\fi

\figures
}

\endinput
%%
%% End of file 'patent.cls'.
```

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Appendix B - PatentLayout.tex Listing

```
%%
%% This is file 'PatentApplication.tex',
%%
%%
%%   Author: Peter J. Pupalaikis  (pete_pope  at hotmail dot com)
%%   Copyright 2012 Peter J. Pupalaikis
%%   Version 1.0
%%
%%   This work may be distributed and/or modified under the
%%   conditions of the LaTeX Project Public License, either
%%   version 1.3 of this license or (at your option) any
%%   later version.
%%   The latest version of the license is in
%%       http://www.latex-project.org/lppl.txt
%%   and version 1.3 or later is part of all distributions of
%%   LaTeX version 2003/06/01 or later.
%%
%%   This work consists of the files listed in the README file.
%%
\documentclass[english]{uspatent}
\begin{document}

\setAssigneeName{Assignee Name}
\setAssigneeAddress{Assignee Address}
\setAssigneeCity{Assignee City, State, Zip}
\setAssigneePhone{Assignee Phone}
\setDocketNumber{Docket Number}
\setLawyerName{Patent Lawyer Name}
\setLawyerNumber{Patent Lawer Reg. Number}
\setLawyerPhone{Patent Lawyer Phone}
\setOtherInventor{Another Inventor}
\setOtherInventor{Yet Another Inventor}
\setDocumentVersion{0.0}
\setPrintingModeApplication

\include{Drawings}

\title{Invention Name Not Yet Defined}
\date{Date of this version}
\inventor{First Named Inventor}

\maketitle

\patentSection{Field of the Invention}

\patentParagraph Describe the field of the invention like...

\patentParagraph The present invention relates to \ldots and in particular to \ldots

\patentParagraph In other words, the basic types of things that the invention improves or is
    implemented in.

\patentSection{Background of the Invention}

\patentParagraph Describe the past. Focus on problems that you will be solving. Talk about
    prior-art in detail to describe what has been done before and what the problems are. You
    are telling a story that inevitably leads up to ending statements like:

\patentParagraph What is needed is\ldots

\patentParagraph The things that are needed will be put forth as solutions in the next
    section.

\patentSection{Objects of the Invention}
```

```
\patentParagraph It is an object of this invention to \ldots Note that the objects should
    match the things that are needed as described in the last section. Do not describe the
    invention here, just the problems that will be solved or the utility of the invention.

\patentParagraph Still other objects and advantages of the invention will in part be obvious
     and will in part be apparent from the specification and drawings.

\patentSection{Summary of the Invention}

\patentParagraph In order to overcome \ldots, we do\ldots

\patentParagraph The invention accordingly comprises the several steps and the relation of
    one or more of such steps with respect to each of the others, and the apparatus
    embodying features of construction, combinations of elements and arrangement of parts
    that are adapted to affect such steps, all is exemplified in the following detailed
    disclosure, and the scope of the invention will be indicated in the claims.

\patentDrawingDescriptions

\patentSection{Detailed Description of the Preferred Embodiments}

\patentParagraph The details of the invention go here. I will use this area to make
    reference to the drawings so you can see how it's done.

\patentParagraph The arrangement in \referencePatentFigure{VisioDrawing} shows an exemplary
    arrangement of a preferred embodiment. In \referencePatentFigure{VisioDrawing}, one sees
     a \annotateWithName{Widget} and a \annotateWithName{Thing} with a preferable \
    annotateWithName{WidgetThingConnection} that enables the \annotateWithName{Thing} to
    process the data coming from the \annotateWithName{Widget}. I think you get the idea.
    You can refer to the number as \annotationNumberReferenceUnderlined{Widget}.

\patentParagraph You can either write: \annotateWithName{Thing} or you can write thing~\
    annotate{Thing}. They both produce the same thing.

\patentParagraph Note that you make and refer to equations like this:

\begin{equation}
E=mc^{2}\label{eq:energy}
\end{equation}

\patentParagraph One of my favorite equations is:

\begin{equation}
e^{j\theta}=\cos\left(\theta\right)+j\cdot\sin\left(\theta\right)\label{eq:euler}
\end{equation}

\patentParagraph We refer to the first equation as \prettyref{eq:energy} and the second as \
    prettyref{eq:euler}. The second equation \prettyref{eq:euler} is Euler's equation.

\patentParagraph It will thus be seen that the objects set forth above, among those made
    apparent from the preceding description, are efficiently attained and, because certain
    changes may be made in carrying out the above method and in the construction(s) set
    forth without departing from the spirit and scope of the invention, it is intended that
    all matter contained in the above description and shown in the accompanying drawings
    shall be interpreted as illustrative and not in a limiting sense.

\patentParagraph It is also to be understood that the following claims are intended to cover
     all of the generic and specific features of the invention herein described and all
    statements of the scope of the invention which, as a matter of language, might be said
    to fall therebetween.

\patentClaimsStart

\beginClaim{Claim1}

This is an independent claim.

\beginClaim{Claim2}
```

```
The method of \claimRef{Claim1} further comprising\ldots

\patentClaimsEnd

\patentSection{Abstract}

A simple statement of what the invention pertains to\ldots

\patentDrawings
\end{document}
```

Appendix C - Patent Application Document Printout

The following pages contain a printout of the final document created upon compilation of the PatentApplication.lyx or PatentApplication.tex document with the uspatent.cls file provided.

APPLICATION FOR UNITED STATES LETTERS PATENT

Title: INVENTION NAME NOT YET DEFINED

Inventors: First Named Inventor
Another Inventor
Yet Another Inventor

Patent Laywer Name
Patent Lawer Reg. Number

Assignee Name
Assignee Address
Assignee City, State, Zip
Assignee Phone

INVENTION NAME NOT YET DEFINED

<u>FIELD OF THE INVENTION</u>

[**0001**]   Describe the field of the invention like...

[**0002**]   The present invention relates to . . . and in particular to . . .

[**0003**]   In other words, the basic types of things that the invention improves or is implemented in.

<u>BACKGROUND OF THE INVENTION</u>

[**0004**]   Describe the past. Focus on problems that you will be solving. Talk about prior-art in detail to describe what has been done before and what the problems are. You are telling a story that inevitably leads up to ending statements like:

[**0005**]   What is needed is. . .

[**0006**]   The things that are needed will be put forth as solutions in the next section.

<u>OBJECTS OF THE INVENTION</u>

[**0007**]   It is an object of this invention to . . . Note that the objects should match the things that are needed as described in the last section. Do not describe the invention here, just the problems that will be solved or the utility of the invention.

[**0008**] Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification and drawings.

SUMMARY OF THE INVENTION

[**0009**] In order to overcome . . . , we do. . .

[**0010**] The invention accordingly comprises the several steps and the relation of one or more of such steps with respect to each of the others, and the apparatus embodying features of construction, combinations of elements and arrangement of parts that are adapted to affect such steps, all is exemplified in the following detailed disclosure, and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[**0011**] For a more complete understanding of the invention, reference is made to the following description and accompanying drawings, in which:

[**0012**] FIG. 1 is an example drawing created in Visio; and

[**0013**] FIG. 2 is an example drawing created in TpX.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[**0014**] The details of the invention go here. I will use this area to make reference to the drawings so you can see how it's done.

[**0015**]   The arrangement in FIG. 1 shows an exemplary arrangement of a preferred embodiment. In FIG. 1, one sees a widget [1] and a thing [2] with a preferable connection [3] that enables the thing [2] to process the data coming from the widget [1]. I think you get the idea. You can refer to the number as 1 and if you need it underlined in a drawing, use 1.

[**0016**]   You can either write: thing [2] or you can write thing [2]. They both produce the same thing.

[**0017**]   Note that you make and refer to equations like this:

$$E = mc^2 \tag{1}$$

[**0018**]   One of my favorite equations is:

$$e^{j\theta} = \cos(\theta) + j \cdot \sin(\theta) \tag{2}$$

[**0019**]   We refer to the first equation as (1) and the second as (2). The second equation (2) is Euler's equation.

[**0020**]   It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, because certain changes may be made in carrying out the above method and in the construction(s) set forth without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description and shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

[**0021**]   It is also to be understood that the following claims are intended to cover all

3

of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

What is claimed:

1. This is an independent claim.

2. The method of claim 1 further comprising. . .

<u>ABSTRACT</u>

A simple statement of what the invention pertains to. . .

Invention Name Not Yet Defined
First Named Inventor et al.
Docket Number
Patent Laywer Name Patent Lawyer Phone

1/1

1

Widget → Thing

2

3

FIG. 1

4

Input → $\frac{1}{2} - x^2$ → Output

5

6

FIG. 2 PRIOR ART

Index