May 27, 1958 E. F. HEISER 2,835,987

MECHANICAL DRAWING COMPONENT

Filed Jan. 12, 1955 2 Sheets-Sheet 1

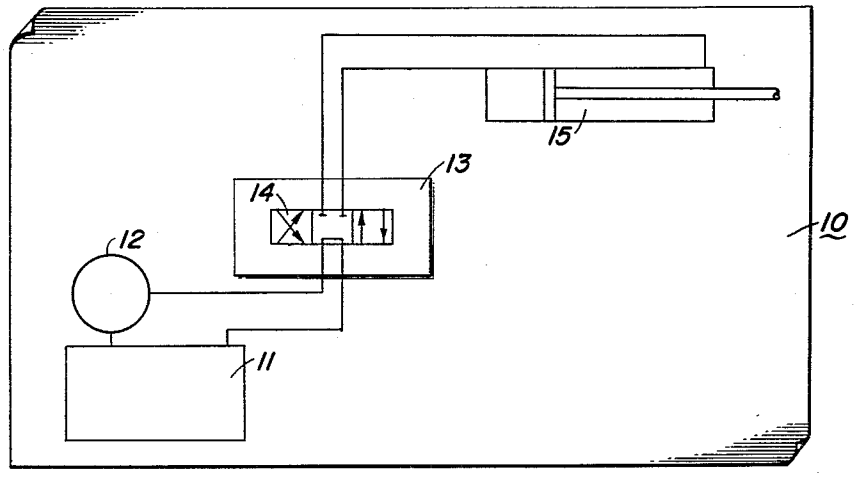



Fig. 1

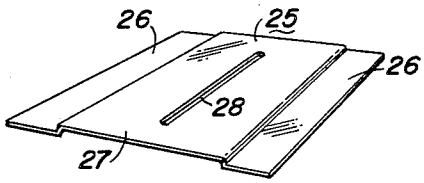



Fig. 2

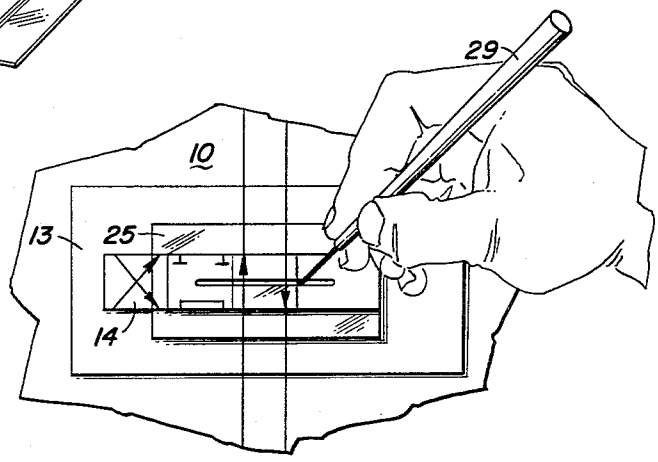



Fig. 3

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MECHANICAL DRAWING COMPONENT

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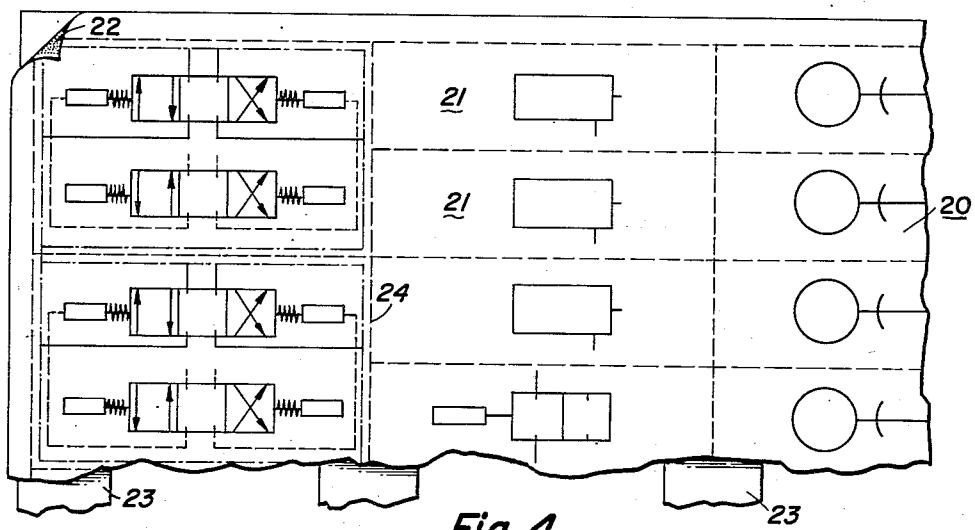



Fig. 4

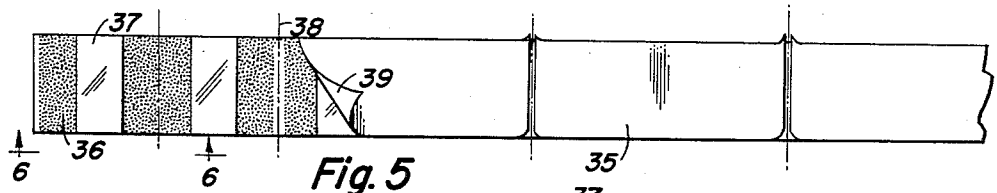



Fig. 5




Fig. 6

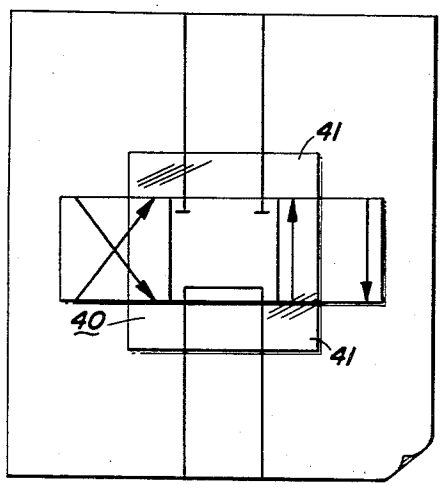



Fig. 7

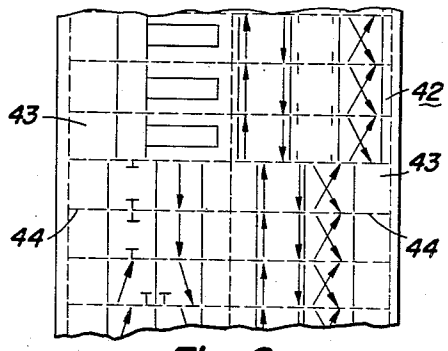



Fig. 8

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# MECHANICAL DRAWING COMPONENT

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Application January 12, 1955, Serial No. 481,364

4 Claims. (Cl. 35—28)

This invention relates in general to drafting methods and equipment, and relates more specifically to premade component members cooperating with a conventional circuit drawing to produce a complete, whole drawing.

Line drawings by conventional methods are time consuming to produce. Manufacturers and suppliers of hydraulic equipment, for example, are required to provide proposed circuit drawings when selling an installation. Many such drawings are required for each sale made. Further, once sold and installed, layout drawings are required in full detail.

Further, such drawings can often lead to expensive errors. A layout on paper may look very acceptable, but when the circuit is actually built, the component parts do not operate as expected. The designer of such a layout is required to trace a circuit by visualizing movement of valves, cylinders, or electrical components. Often this visualization fails.

Therefore, an object of this invention is to provide printed labels of standard circuit components, which labels may be held on the surface of a layout sheet and interconnected into a composite drawing by conventional drafting means.

Another object of the invention is to provide attachment guide means which will hold a label on a layout sheet and allow the label to be shifted relative to the sheet in order to simulate changing conditions of components in a circuit.

And another object of this invention is to provide a label adapted to be placed in a fixed position upon a work sheet, and a shiftable label imposed upon the fixed label.

Still another object of this invention is to provide such labels in sheet form with adhesive material so positioned on the back of the sheet that cutting the label from the sheet will produce adhesive edges for adhering the label to the layout sheet.

Figure 4 is a fragmentary section of a sheet of labels a means of manpulating such label;
prepared in such a manner that cutting any one labe. from the sheet will produce opposed gummed edges

Figure 3 illustrates the assembled shiftable label and

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings, in which:

Figure 1 is a representation of a layout drawing of a simple hydraulic circuit constructed by the method, and with structural parts, embodying the principles of this invention;

Figure 2 is a holding guide device for shiftable labels; thereon;

Figure 5 illustrates an alternate method of producing holding guides to serve the purpose of the guide illustrated in Figure 2;

Figure 6 is a side view taken along line 6—6 of Figure 5;



Figure 7 is an illustration of a label guide produced from the strip of Figure 5 in use with a shiftable label thereunder; and,

Figure 8 is a fragmentary section of a sheet of printed labels without gummed edge provisions, intended primarily as shiftable labels for use with the guide devices of Figures 2 and 7.

Before describing this invention it is believed to be proper to briefly relate the background which preceded its devolopment. It has always been necessary to prepare a circuit drawing or diagram of the system for a piece of machinery or equipment as it was engineered or designed. Along with the design of the machine itself the circuit drawing was required to furnish the necessary information for construction and to provide a record for future reference. These two reasons are important to the designer and builder of machinery or equipment. Accordingly, each designer who had occasion to make drawings or diagrams of valves, pumps, cylinders, motors, piping, and other related parts which comprise a system, devised methods of his own to indicate the various elements in the system. For example, a square or a rectangle was frequently used to indicate a valve. The various connections to the valve were shown by lines which connected to the rectangle at any convenient point. The symbol thus established was given an identifying number on the circuit drawing, and this number provided the index key to the particular element. By checking the identifying number the full specifications and details on the element could be found in a general file.

The above described procedure proved satisfactory for the builders of machines having air or hydraulic components, but complications developed as more and more machines of this type were built based on fluid operation. The ultimate user of the machine found that for maintenance and service purposes it was necessary to also have the builder's circuit drawings. For each machine with a fluid system the user received a different type of drawing on which the supplier used his own diagram system. Obviously no two were alike and considerable confusion resulted.

Because of the rapid growth of the air and hydraulic industry and the extension of fluid power systems to innumerable new machines, it became necessary to establish a standard diagramming procedure. A joint industry conference, commonly referred to as "JIC," was called and many builders and users of hydraulic equipment and machinery were present. From this conference a standardized system was developed for diagramming fluid systems. Standard symbols were adopted to represent each element in the system and the method for showing piping systems between the various elements. Using these standard symbols, any fluid system diagram could be understood and the circuit traced.

The standard procedure cured the problem of universal understandability but created another problem. The new standard requires considerably more design time to execute acceptable drawings. It requires considerably more time to make a complete valve symbol in accordance with the new standard than it did to box in a rectangle and assign a number. Those familiar with the art will at once recognize the factual basis of this statement.

In order to reduce the drawing time of these new standard symbols, various templates have been created and are available. These templates outline the basic element of the standard parts. However, these templates have two very serious shortcomings. They only indicate parts of valves in accordance with the basic symbols and complete valves must still be drawn by combining these parts. Secondly, templates are rough, and lines cannot

be complete because the templates must of necessity have connecting portions to hold them together.

This invention has two main aspects. First, a series of labels or transfers is provided, each of which shows a component valve symbol. Secondly, a means is provided whereby the parts of valve symbols may be moved on the original circuit layout to show each valve in each of its positions. In the preferred practice of this invention a series of labels of uniform size is provided which may be kept in a convenient file. Each label indicates a valve or element as normally used on a circuit diagram. When making up a layout the designer can start with a blank piece of paper and attach to it the various valve labels which are required to make up the circuit. Thereafter the connecting lines are drawn between the labels to complete the layout. This procedure results in a considerable saving of time not only from the standpoint of first drafting time but also because it frequently happens that as a fluid circuit evolves on paper it is found that the elements first selected are not correct, or the relative position on the layout is not suitable. The usual procedure is to erase the symbol and draw in another. With the label technique of this invention the designer would simply add another over the first or preferably the label is removably attached and therefore may be replaced or moved.

The second, and perhaps even more important aspect of the present invention, is the provision of means whereby the valves or elements on the original layout may be moved through their various positions to simplify checking the complete system operation. Very often it is extremely difficult to originate and design a fluid circuit with numerous elements making up the system. There may be as many as eight or ten valves in a system, and in some cases many more. Each valve will have two or more positions, and each valve can have two to five and even more connecting lines. Some lines in the system are under pressure all of the time, some are never under pressure, and some alternate from drain lines to pressure lines. The positioning of the valves will determine the condition in the various lines.

In working out a circuit, the designer first makes a layout of all the elements as he assumes they should be. He must then check through to make sure that each valve will perform the required operation to get the correct end result. This means that he must keep in mind all valves and connections with their respective positions and conditions of pressure for every phase of the operation. In other words, the designer must visualize each changed condition throughout a complex system each time he visualizes a shift in position of any single valve or controlling condition.

According to this invention it is proposed to provide shiftable labels bearing the shiftable parts. These shiftable labels may be used along or preferably in conjunction with the afore-described stationary labels. In the practical application of this shiftable concept, there is provided a transparent window which can be attached to the layout sheet or the label. The window is so designed that the small label bearing the proper indicia thereon may be slidably held upon the surface of the label or layout sheet. The movable label is marked to show the various connections within the valve. The designer can then check the circuit by placing each movable label representing an element in the required position to show the complete circuit with any valve positions he selects. The designer can then quickly move a valve element to a desired position, and he need not retain a mental picture of where the particular element should be. At a glance he can see exactly how any part of the circuit is connected at any one time. The window is preferably made of transparent material in order that the original lines of the label or layout sheet can show through. Such visibility is advantageous.

Referring to the drawings for description of particular preferred embodiments of the invention, the reference character **10** indicates a layout sheet showing an extremely simplified hydraulic system. This system includes a sump **11** with a pump **12** supplying fluid under pressure through a valve **13** to a hydraulic piston or cylinder **15**. The shiftable parts of the valve **13** are indicated by the reference character **14**. Even though this drawing is extremely simple, it will at once be seen that a considerable amount of drawing time will be required to draw the pump, valve, and hydraulic piston in conformity with established standards, whereas standard printed labels for these elements could be quickly attached and the connecting hydraulic lines added in a matter of moments.

In Figure 4 of the drawings there is illustrated a sheet **20** of standard labels as an example of one possible method of printing these labels in convenient form. Decalcomania and fully gummed paper labels are possible alternatives to this preferred embodiment, but draftsman tracing paper or cloth is to be much preferred. Thus prints can be made of a drawing employing such photographical transparent material. Therefore, the preferred embodiment employs such material and the finished drawing may then be printed in conventional manners of print reproduction. The individual labels **21** on sheet **20** are outlined by dotted cutting guide lines **24**. On this particular label sheet **20**, four parallel gummed strips **22** have been applied to the back of the sheet under the vertical cutting guide means. The gummed strips are covered by protective covering strips **23**. Actually the protective covering **23** carries the adhesive material, and when applied to the back of the sheet **20** will transfer the adhesive material to produce the gummed strips **22**. Thus, when an individual label **21** is cut from the sheet **20** along the guide lines **24**, opposed edges of the label will be provided with narrow adhesive strips along the edge which will removably secure the label to the surface of the layout sheet. Thus the draftsman is able to produce a larger portion of his layout drawing with a pair of scissors.

The other type of label is a shiftable label as before mentioned. The shiftable label may be used alone or in conjunction with the permanent label. However, to be shiftable, this label cannot be gummed, and must be held by suitable holding guide means. One such guide means is illustrated in Figure 2 and referred to by the reference character **25**. The guide **25** is a molded or formed transparent plastic material having side edges **26** with gummed surfaces to adhere the guide in a selected position upon the layout sheet or upon a label. A bridge area **27** extends between the gummed edges **26** and provides a clearance portion into which a slidable label may be inserted. A slot **28** in the top surface of the bridge area **27** provides an entry for a sharpened awl **29** to prick into the label and permit longitudinal shifting of the label.

In Figure 8 of the drawings, there is illustrated a sheet **42** of slide labels containing individual labels **43** outlined by cutting guide lines **44**. Preferably the paper upon which the sheet **42** is printed is a stiffer material, somewhat similar to that upon which the ordinary name card is printed. Thus the labels are slightly stiff for easy manipulation under the bridge area **27**. However, the sheet **42** may be a vellum type paper as used for the label sheets **20** in order that printing through the strips may be carried out photographically, such as in the blueprint method. The individual labels **43**, when cut from the sheet **42**, are inserted into the guide holder and shifted as indicated in the Figure 3.

Although the guide **25** is desirable and very convenient, it is nevertheless expensive and is difficult to produce. Accordingly, an alternate type of construction is illustrated in the Figure 5. Figure 5 illustrates a continuous strip **35** which may be cut into individual guides **40** along cutting lines **38**. The strip is composed of a gummed tape **36** upon which individual nonadhesive and trans-

parent bridge pieces 37 are secured. If it were mechanically possible to accurately space the adhesive portions along the strip 36, the provision of the nonadhesive window sections 37 would not be essential. However, it is much more convenient and accurate to provide a fully gummed strip 36 and make a portion of the tape nonadhesive by the use of the separate pieces 37. Furthermore, for some reason which is not quite fully understood, the use of the insert pieces makes a less snug fit to a paper surface than a straight strip piece, and therefore makes the insertion of the individual labels 43 under the guide 40 much more easy. A convenient paper backing 39 is employed on the strip 35 to protect the gummed surface until the guide 40 is ready for application. Cutting of the individual guide 40 from the strip 35 produces a guide member with a nonadhesive and transparent center portion and gummed edges 41.

This invention has been described in connection with hydraulic and air circuits, but it is understood that the use of labels removably attachable to the surface of the circuit layout sheet may be adapted to electrical or other circuits as well.

Although the invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention as hereinafter claimed.

What is claimed is:

1. In a circuit drawing representative of an operative circuit, the provision of a label having at least a portion of circuit components printed thereon, label holder means attachable to the surface of a circuit layout sheet, said label holder means being a member having a viewing area with an adhesive area securable to a surface, said label being slidably engageable upon said circuit drawing by said label holder means and shiftable to selected relative positions with respect to said drawing, whereby said label may be employed to represent a component part of changeable character in a representation of a circuit and thereby permit accurate testing of such representation under conditions simulating actual operating conditions of a physical embodiment of the circuit.

2. In a circuit drawing representative of an operative circuit, the provision of a label having at least a portion of a circuit component printed thereon, label holder means attachable to the surface of a circuit layout sheet, said label holder means comprising a member having first and second edges adhesively securable to the surface of said sheet, a nonadhesive viewing area between said first and second side edges, said label being insertable between said side edges under said viewing area and thereby being removably securable upon the said surface of the circuit layout sheet, whereby said label may be employed to represent a component part of changeable character in a representation of a circuit and thereby permit accurate testing of such representation under conditions simulating actual operating conditions of a physical embodiment of the circuit.



3. In a circuit drawing representative of an operative circuit, the provision of labels having at least a portion of circuit components printed thereon, guide means attachable to the surface of a circuit layout sheet, said guide means comprising a member having first and second side edges adhesively securable to the surface of said sheet, a nonadhesive viewing area between said first and second side edges, said labels being insertable between said side edges under said viewing area and thereby being removably securable and shiftable upon the said surface of the circuit layout sheet, whereby said labels may be interconnected into a conventional line drawing to produce a completed circuit.

4. In a circuit drawing representative of an operative circuit, the provision of shiftable labels having at least a portion of circuit components printed thereon, guide means attachable to the surface of a circuit layout sheet, said guide means comprising members having adhesive side edges with nonadhesive viewing area portions therebetween, said guide means thereby being attachable to the surface of the said circuit layout sheet and the shiftable labels inserted under the nonadhesive viewing portion, whereby the labels may be shifted with respect to the said surface to thereby permit accurate testing of the completed compound circuit drawing simulating actual operating conditions of a physical embodiment of the circuit.


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