

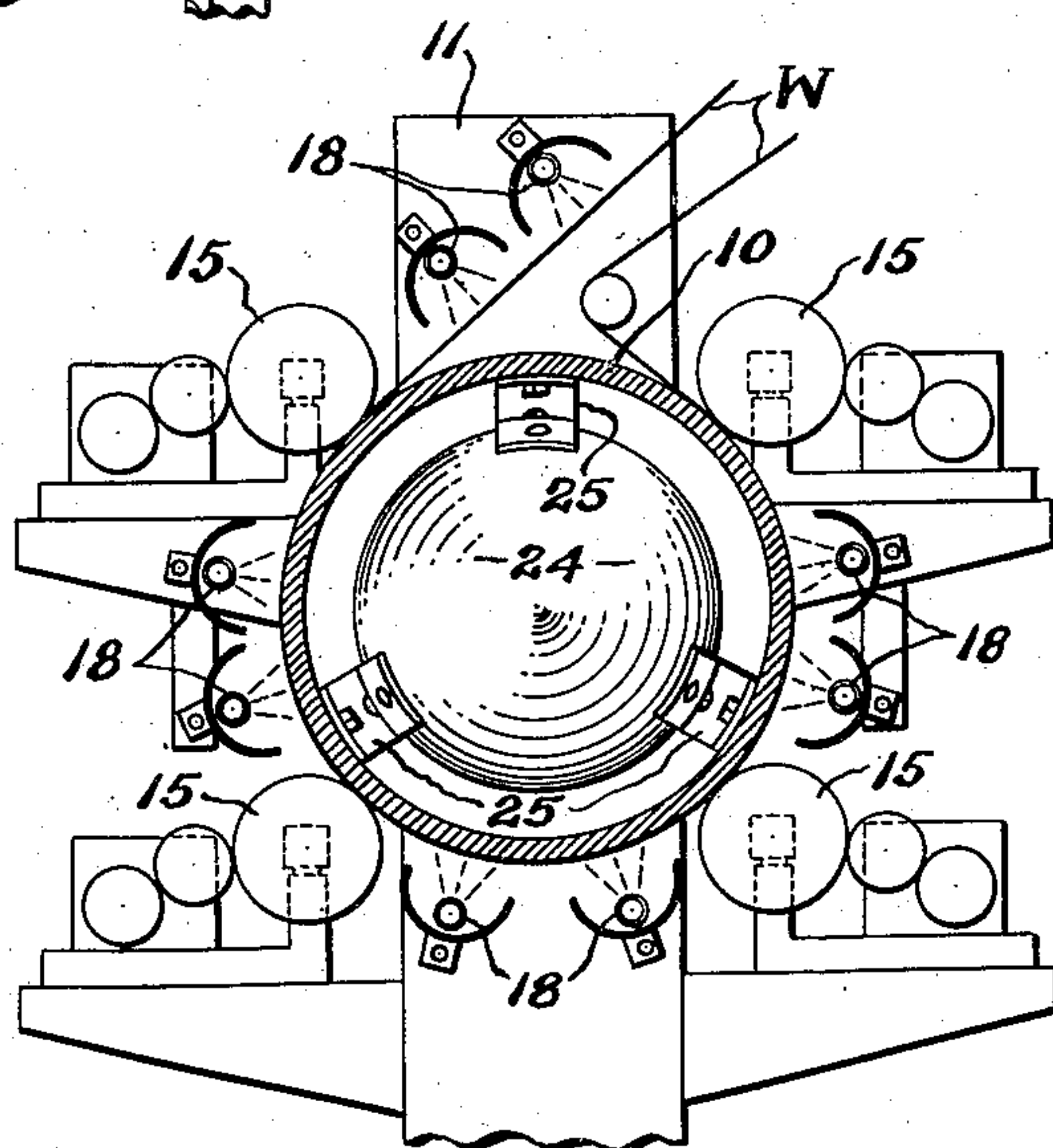
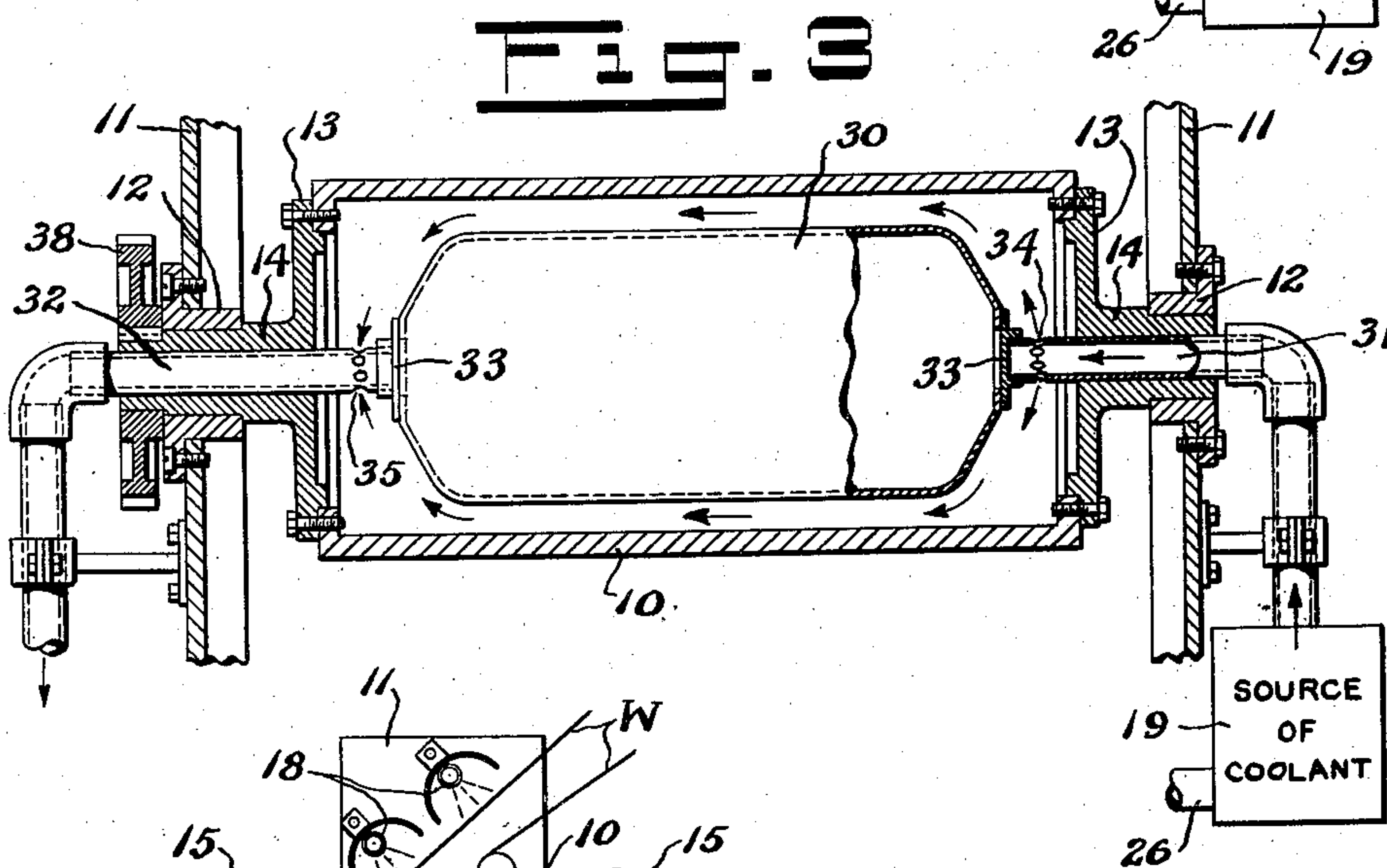
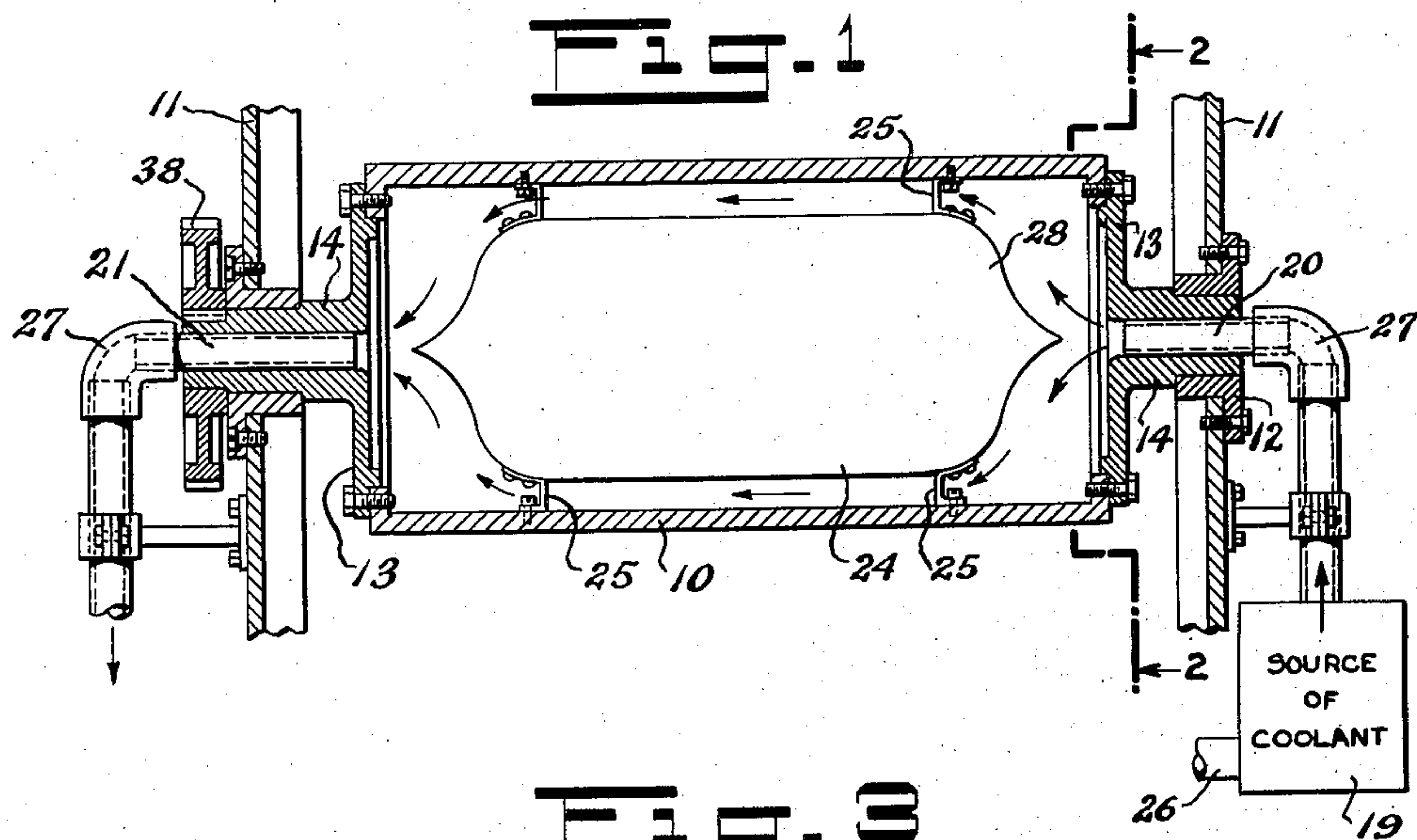
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PRINTING PRESS WITH COOLED CYLINDER

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**FIG. 2**

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## PRINTING PRESS WITH COOLED CYLINDER

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6 Claims. (Cl. 101—178)

The invention relates to a printing press which prints multicolors upon a web or band such as paper or fabric passing around an impression cylinder which is internally cooled. The invention has particular applicability in connection with a press which uses a common impression cylinder for a plurality of printing means one for each color. The invention also relates to the cooled cylinder per se. Aniline inks lend themselves particularly to multicolor printing since they can be rapidly dried and thereby enable inks of different colors to be superimposed upon each other with but a small intervening time interval without color smearing or other difficulty. Dryers of any suitable form are used between each printing unit or means to more quickly dry the ink or dry it sufficiently to enable another printing impression to be made. Cooling means are provided to keep the impression cylinder from expanding from the heat of the drying means.

An object of the invention is to construct a printing press having an impression cylinder with associated ink drying means and providing cooling for the impression cylinder.

A further object of the invention is to construct a multicolor printing press having a common impression cylinder for all of the printing means and utilizing heating means between each printing means to dry the ink with means to cool the common impression cylinder so that it does not expand and lose accuracy in the registry of the various printing means.

Another object is to cool the impression cylinder of a multicolor printing press in a simple and efficient manner with an inexpensive construction.

Another object is to construct an improved form of rotatable cooled cylinder.

Other objects of the invention will be more apparent from the following description when taken in connection with the accompanying drawing illustrating preferred embodiments of the invention in which:

Figure 1 is a longitudinal section through the impression cylinder of the printing press;

Figure 2 is a side elevation of a multicolor printing press; and

Figure 3 is a longitudinal section through the impression cylinder of a printing press of another form of construction.

A multicolor printing press of the form which uses a common impression cylinder 10 for all printing means is illustrated although the invention is applicable to any impression cylinder. The impression or outer cylinder is mounted for rotation on suitable mounting means, that shown being a frame 11 having spaced bearings 12 and each end of the impression cylinder is provided with a closing head 13 at each end carrying a shaft 14 at least one of which is hollow. The shaft is received in the bearing to rotatably mount the cylinder. A plurality of printing means 15 is spaced around the periphery of the impression cylinder. The printing means may be of any suitable form and includes such parts as the printing cylinder, ink transfer rolls and a roll for picking up the

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ink from an ink pan or reservoir all of which are designated by the numeral 15. Four printing means are illustrated but it is clear that there may be a greater or lesser number as desired.

The printing means prints a different color on the band or web W of paper or fabric as it travels around the impression or outer cylinder. In order to prevent smearing of the ink of one color by the color printed thereover or adjacent thereto by the succeeding printing means, one or more dryer units 18 are located between each of the printing means. These drying means may take several forms and they provide heat which is directed toward the printing web and hence toward and onto the impression or outer cylinder. In time the impression cylinder will heat up and expand so that accurate registry between the succeeding printing means may be lost. Also expansion of the impression cylinder may vary the pressure between the printing means and the web to be printed which is not desirable.

In order to prevent heating and expansion of the impression cylinder means are provided to cool the same. This means includes a source of a cooling medium such as air or other gas, vapor or fluid which may be atmospheric air and if desired, the cooling medium may be refrigerated. The impression cylinder is provided with an inlet means and an outlet means into and out of the interior of the cylinder. The inlet means 20 preferably is through one of the hollow shafts forming the mounting means, and the outlet means 21 is through the outer hollow shaft.

In order to assure efficient cooling of the impression cylinder, a deflecting cylinder 24 is mounted within the impression cylinder for directing the coolant or cooling medium along the inner surface or wall of the impression cylinder. In the construction of Figure 1, brackets 25 suitably support the deflection cylinder spaced from the inner wall of the impression cylinder. The deflection cylinder of Figure 1 rotates with the impression cylinder. The deflection cylinder has closed ends 28 and the ends may be flared for smooth coolant flow to the peripheral space between the deflecting cylinder and the impression cylinder. The deflection cylinder not only brings the cooling medium adjacent to the inner surface of the impression cylinder but also it increases the cooling medium flow along the inner wall or surface of the impression cylinder and thereby secures more efficient transfer of heat from the impression cylinder to the cooling medium. By reducing the space between the two cylinders the speed of flow therebetween may be increased without increasing the volume of air provided by the source of cooling medium. The brackets may be constructed to create turbulence in the flow of cooling medium between the cylinders and thereby also improve the cooling efficiency. Turbulence is secured in any way desired such as by making the brackets relatively wide.

Any suitable source of cooling medium may be provided. If the cooling medium is atmospheric air then this air may be blown back into the atmosphere from the outlet connection. If, however, the cooling medium is other than air or if it is refrigerated, then it is desirable to connect the outlet 21 from the impression cylinder to an inlet 26 in the source of coolant for return of the cooling medium thereto. Since the deflection cylinder rotates with the impression cylinder, the connection of the inlet and outlet means with the impression cylinder will be through a rotary coupling 27 of any desired form.

It is not essential that the deflecting cylinder rotate with the impression cylinder as illustrated in a modified form shown in Figure 3. A deflecting cylinder 30 with closed ends is mounted upon tubes or pipes 31 and 32 which extend through the hollow shafts 14. The tube 31 provides the inlet means and tube 32 provides the outlet



means. The inner ends of each tube are closed such as by a plate 33 and holes 34 and 35 through the tubes at the end space between the head for the impression cylinder and the end of or head for the deflecting cylinder which connects the tubes with the cooling chamber between the cylinders. Since the tubes and the deflecting cylinder do not rotate with the shaft for the impression cylinder, rotatable couplings are not necessary.

The impression cylinder is rotated by suitable drive means connected with a gear 38 mounted on the shaft 14. Each printing means is connected with the impression cylinder through suitable gear means as is known to drive the same at the same peripheral speed as the impression cylinder.

The cooled rotatable cylinder is of general applicability although finding particular usefulness in connection with a printing press and a multicolor printing press. In any such general applicability the heat may be applied to the periphery of the outer cylinder for any desired purpose by heating means and hence similar to the drying means used on a printing press or the heat may be applied to the outer cylinder from the product upon the cylinder which may be heated and transfer its heat to the cylinder.

This invention is presented to fill a need for improvements in a printing press with cooled cylinder and the cylinder. It is understood that various modifications in structure, as well as changes in mode of operation, assembly and manner of use, may and often do occur to those skilled in the art, especially after benefiting from the teachings of an invention. Hence, it will be understood that this disclosure is illustrative of preferred means of embodying the invention in useful form by explaining the construction, operation and advantages thereof.

What is claimed is:

1. A printing press for printing upon a web comprising a hollow impression cylinder having an outer periphery and an inner surface and closed ends, means mounting the impression cylinder for rotation including at least one hollow shaft, at least one printing means mounted adjacent the cylinder to print upon a web passing thereover, at least one drying means mounted adjacent the outer periphery of the impression cylinder and following each printing means to direct heat upon the web and cylinder, inlet means and outlet means connected with the interior of the impression cylinder through at least one hollow shaft, a deflecting cylinder of smaller diameter than the interior dimension of the impression cylinder, the diameter of the deflecting cylinder being such that its periphery is adjacent the inner surface of the impression cylinder, the deflecting cylinder having a closed periphery and closed ends, means mounting the deflection cylinder within and spaced from the inner surface of the impression cylinder, and a source of a cooling medium connected with the inlet means.

2. A printing press as in claim 1 in which both shafts are hollow and the inlet means passes through one shaft and the outlet means passes through the other shaft.

3. A printing press for printing multicolors upon a web comprising a hollow impression cylinder having an outer periphery and an inner surface and closed ends, means mounting the cylinder for rotation including a hollow shaft open at least at one end, a plurality of printing means mounted at spaced intervals around and adjacent to the outer periphery of the impression cylinder to multi-print upon a web passing thereover, at least one drying means mounted adjacent the periphery of the impression cylinder and following each printing means to direct

heat upon the web and cylinder, inlet means and outlet means connected with the interior of the impression cylinder through at least one open end of the hollow shaft, a deflecting cylinder of smaller diameter than the interior dimension of the impression cylinder, the diameter of the deflecting cylinder being such that its periphery is adjacent the inner surface of the impression cylinder, the deflecting cylinder having a closed periphery and closed ends, means mounting the deflection cylinder within and spaced from the inner surface of the impression cylinder, and a source of a cooling medium connected with the inlet means.

4. A printing press for printing upon a web comprising a hollow impression cylinder means having an outer periphery and an inner surface and closed ends, means mounting the impression cylinder for rotation including a hollow shaft open at least at one end, at least one printing means mounted adjacent the outer periphery of the impression cylinder to print upon a web passing thereover, at least one drying means mounted adjacent the outer periphery of the impression cylinder and following each printing means to direct heat upon the web and cylinder, inlet means and outlet means connected with the interior of the impression cylinder through at least one open end of the hollow shaft, a deflecting cylinder of smaller diameter than the interior dimension of the impression cylinder, the diameter of the deflecting cylinder being such that its periphery is adjacent the inner surface of the impression cylinder, the deflecting cylinder having a closed periphery and closed ends, bracket means mounting the deflection cylinder to the inner surface of and spaced from the inner wall of the impression cylinder, and a source of a cooling medium connected with the inlet means.

5. A printing press as in claim 4 in which the bracket means is constructed to create turbulence in the flow of cooling medium.

6. A printing press for printing upon a web comprising a hollow impression cylinder having an outer periphery and an inner surface and closed ends, means mounting the impression cylinder for rotation including a hollow shaft open at each end thereof, at least one printing means mounted adjacent the outer periphery of the impression cylinder to print upon a web passing thereover, at least one drying means mounted adjacent the outer periphery of the impression cylinder and following each printing means to direct heat upon the web and cylinder, a deflecting cylinder of smaller diameter than the interior dimension of the impression cylinder, the diameter of the deflecting cylinder being such that its periphery is adjacent the inner surface of the impression cylinder, the deflecting cylinder having a closed periphery and closed ends, a tube extending through each hollow shaft and connected with the deflection cylinder to mount the latter within and spaced from the inner wall of the impression cylinder, each tube having holes therethrough between the ends of the deflection cylinder and the impression cylinder, and a source of cooling medium connected with one of the tubes.

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