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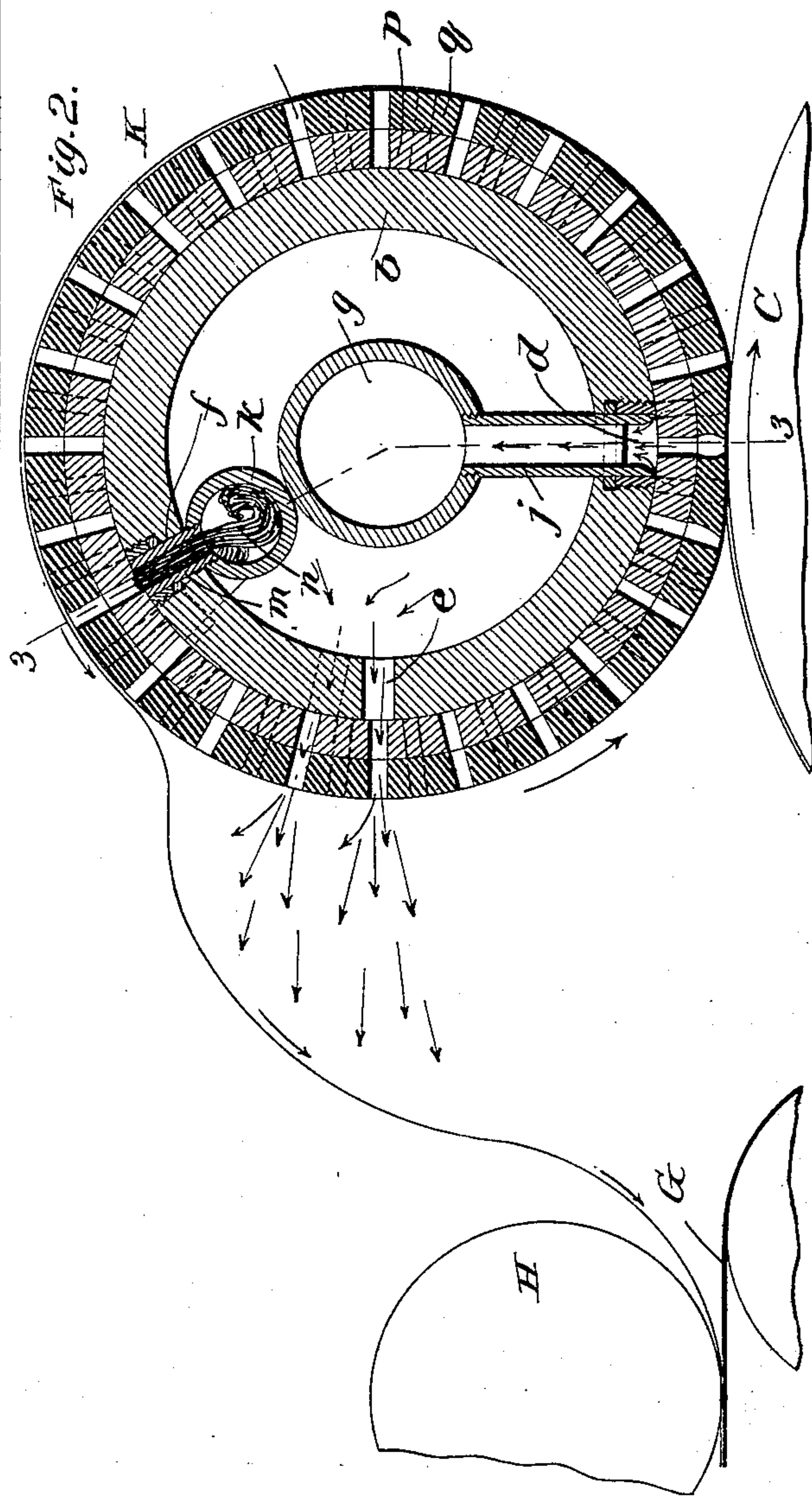
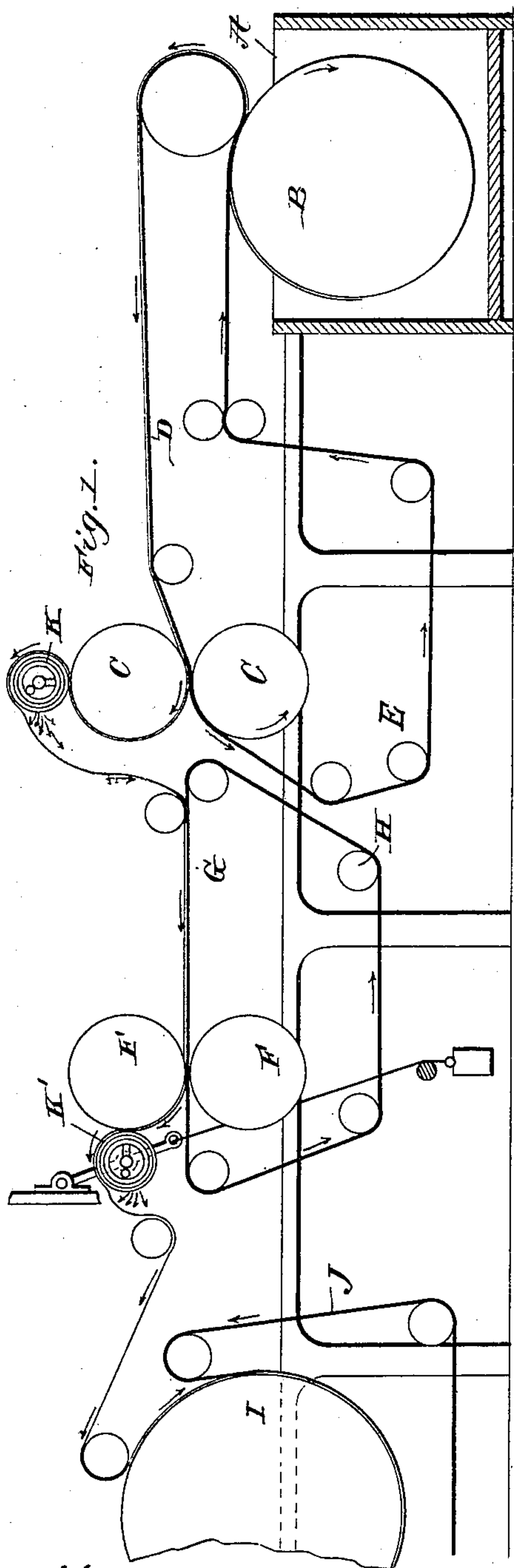
Patented Dec. 24, 1901.

M. D. KEENEY.  
PAPER MAKING MACHINE.

(Application filed Dec. 20, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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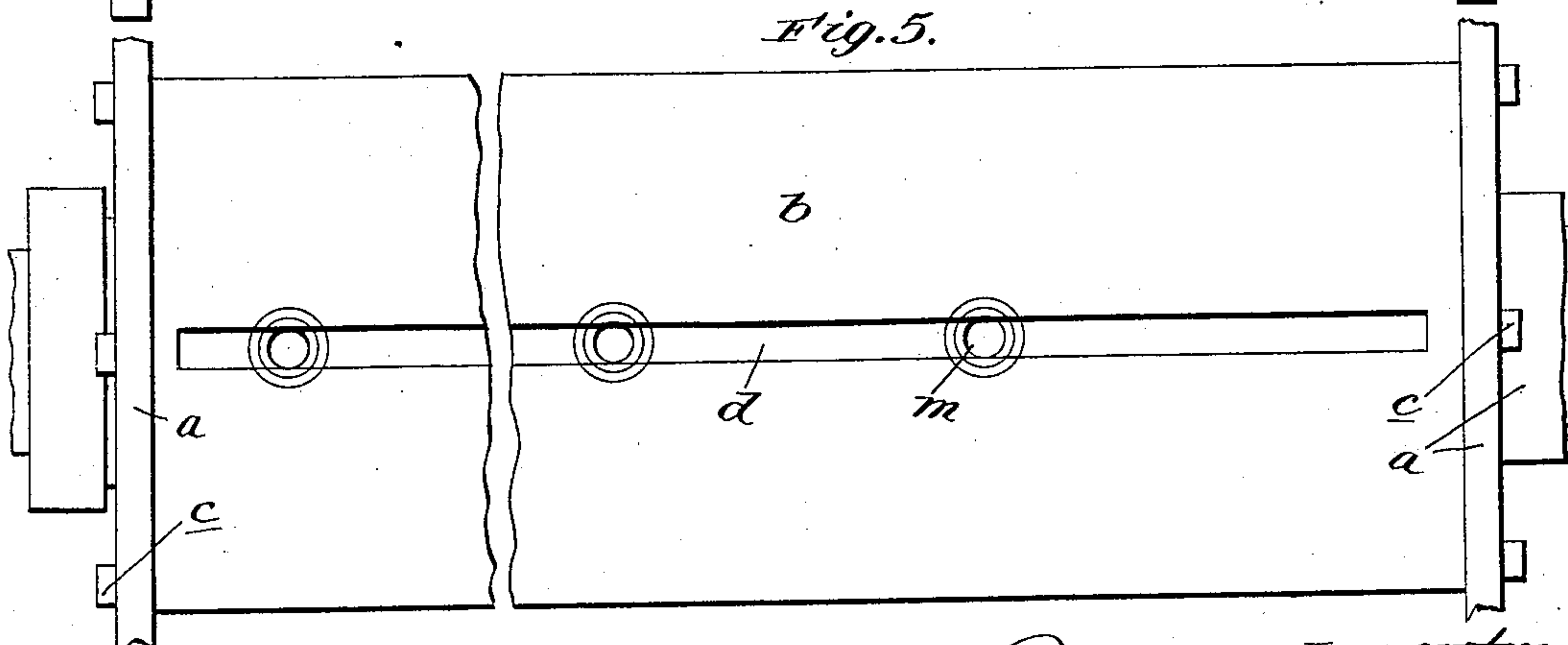
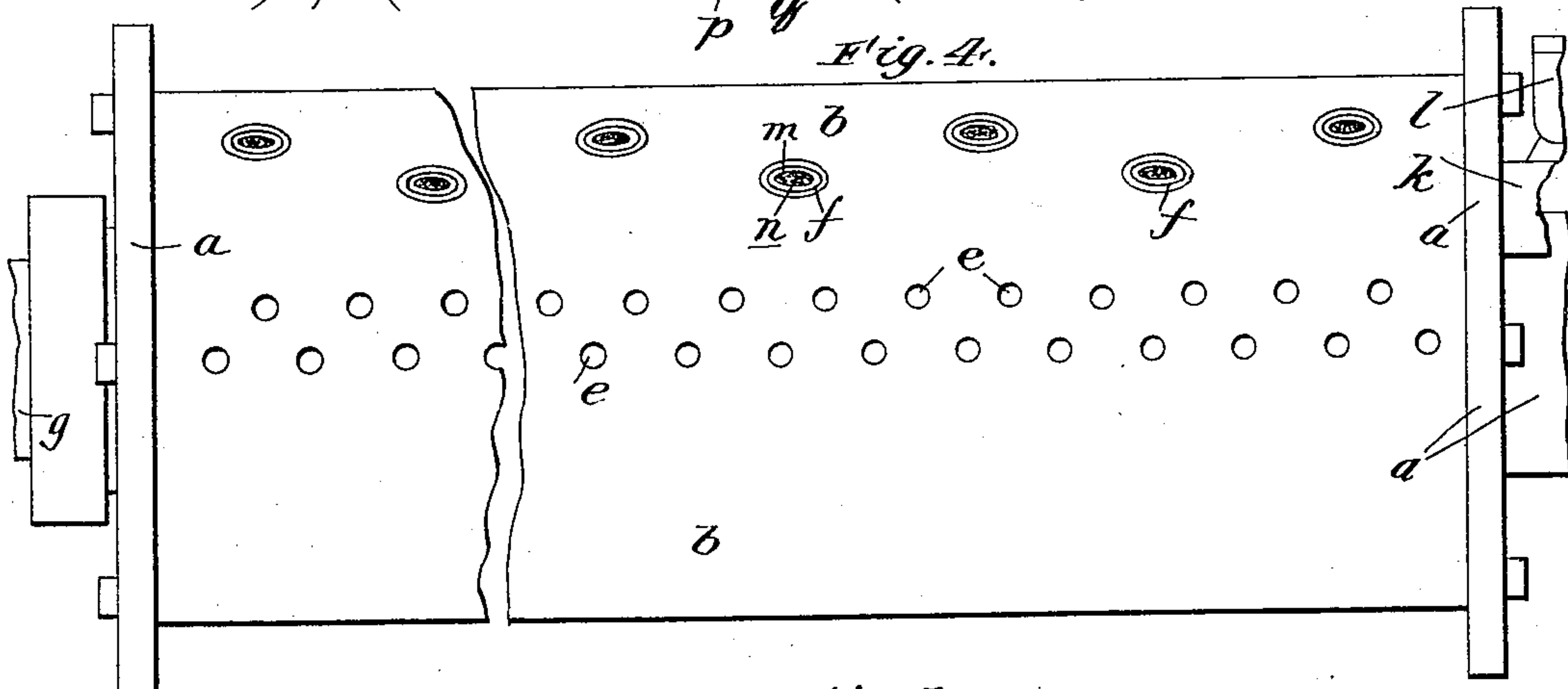
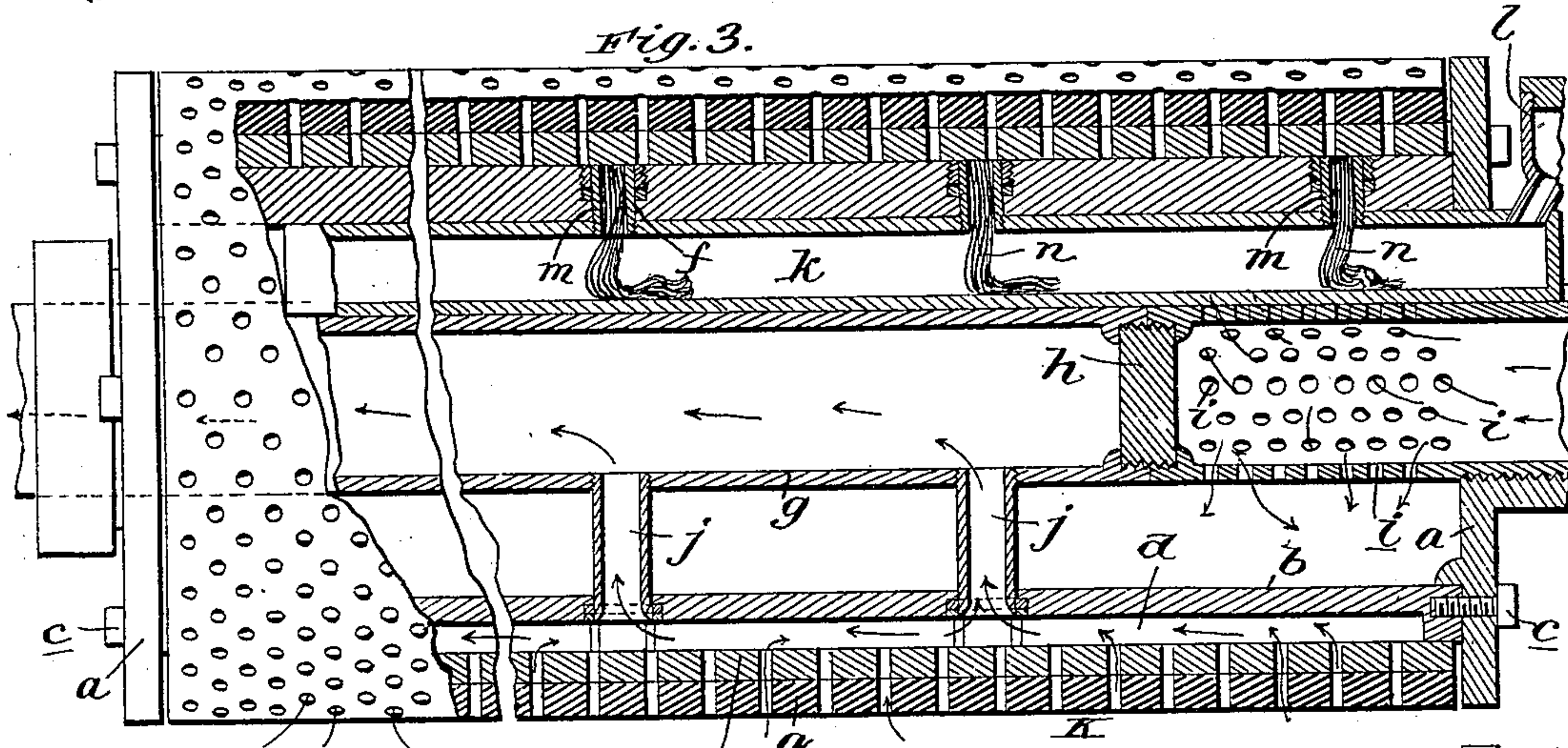
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# UNITED STATES PATENT OFFICE.

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## PAPER-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 689,400, dated December 24, 1901.

Application filed December 20, 1900. Serial No. 40,511. (No model.)

*To all whom it may concern:*

Be it known that I, MARBLE D. KEENEY, a citizen of the United States, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Paper-Making Machines, of which the following is a specification.

My invention relates to improvements in Fourdrinier and cylinder paper-making machines, and while designed more particularly for use in the making of tissue and other light papers may be employed to advantage in the manufacture of Fourdrinier and cylinder papers of all kinds.

It consists, first, in the provision of means for automatically delivering the web of paper from the first-press rolls to the second-press felt or apron and from the second-press rolls to the drier felt or apron, and thereby preventing breaks in the web intermediate of the first-press rolls and the drier or driers, and, second, in the peculiar and advantageous combined suction and blast rolls hereinafter described, and particularly pointed out in the claims appended.

In the accompanying drawings, Figure 1 is a diagrammatic view, partly in vertical section, illustrating a portion of a cylinder paper-making machine equipped with my improvements. Fig. 2 is an enlarged vertical section illustrating one of the combined suction and blast rolls and the manner in which said roll operates to take the web of paper from a press-roll and deliver such web to a preceding felt or apron. Fig. 3 is a view, partly in elevation and partly in section, of the suction and blast roll, said view as compared with Fig. 2 being on a slightly-reduced scale and its sectional portion taken on the broken line 3 3 of Fig. 2. Fig. 4 is a front elevation of the suction and blast roll with the outer rotary portion of the same removed. Fig. 5 is a similar view illustrating that part of the stationary portion of the roll which is arranged contiguous to a press-roll.

In the said drawings similar letters of reference designate corresponding parts in all of the several views, referring to which—

A is a vat which ordinarily forms part of a cylinder paper-making machine. B is a forming-cylinder therein.

C C are the rolls of the first press.

D is the first-press felt or endless apron, which takes around idler-rolls E and over the forming-cylinder and between the press-roll C after the usual manner.

F F are the rolls of the second press.

G is the second-press felt or endless apron, which takes around the usual idler-rolls H and between the rolls F and has its rear portion arranged adjacent to the first-press rolls C.

I is a drier.

J is the drier felt or apron, and K K' are my improved suction and blast rolls, the former being shown as arranged above the upper press-roll C and the latter in advance of the press-roll F. They may, however, be arranged in any manner with respect to their complementary rolls that is conducive to the purposes of my invention. The suction and blast rolls K K' are similar in construction, and therefore a detail description of the roll K (illustrated in Figs. 2 to 5) will suffice to impart a clear understanding of both. The said roll K in the preferred embodiment of the invention comprises a stationary or fixed portion, which is mounted in any approved manner in a suitable frame or support, and a rotary portion which is free to be moved by contact with the press-roll, which may be driven by belt or friction from any other rotary part of the machine. The stationary portion is preferably made up of metallic heads *a*, a metallic cylinder *b*, interposed between and connected by bolts *c* or other means to the heads and having a longitudinal groove *d* in that portion of its periphery which is contiguous to the adjacent press-roll and also having the apertures *e*, preferably arranged in a staggering manner, as best shown in Fig. 4, and the larger apertures *f*, which are also preferably arranged in a staggering manner, a pipe or conduit *g*, which preferably occupies the longitudinal center of the roll and is divided by a partition *h* and provided at one side of said partition with one or a plurality of apertures *i*, which connect its interior with the interior of the cylinder *b*, tubes *j*, which connect the interior of the pipe *g* at the opposite side of the partition *h* with the groove *d* in the periphery of the cylinder, an oil-reservoir in the form of a pipe *k*, which is interposed between the conduit *g* and the wall of the cylinder *b*



and has its inner end closed and its outer end extended through one of the heads *a* and connected to an oil-cup *l*, and tubes *m*, which communicate with the oil-reservoir *k* and extend through and are suitably secured in the apertures *f* of the cylinder and are adapted to receive wicks *n*. The rotary portion of the roll is made up of a foraminated metallic cylinder *p*, which snugly surrounds the metallic cylinder *b* of the stationary portion between the heads *a* thereof, and a cylinder *q*, preferably of rubber, which is vulcanized on or otherwise secured to the metallic cylinder *p*, so as to turn therewith, and is provided with apertures in register with those of said metallic cylinder *p*.

The oil-reservoir *k* is designed to be supplied with oil or lubricant through the cup *l*, and the lubricant is conveyed by capillary attraction through the wicks *n* to the inner surface of the metallic cylinder *p* of the rotary portion, whereby it will be seen that the said cylinder *p* and the cylinder *b* are thoroughly lubricated, and consequently movement of the former on the latter is rendered easy and frictional wear of both is reduced to a minimum. It will also be seen that the roll is adapted to hold a large quantity of lubricant in such manner that the same is not liable to be carried away or otherwise affected by the air passing through the roll.

The apertures *e* are preferably arranged, as shown, with reference to the direction of rotation of the rotary portion of the combined suction and blast roll and the press-roll complementary to the combined suction and blast roll and are designed to permit a blast of air to pass from the interior of the cylinder through the registered apertures in the metallic and rubber cylinders of the rotary portion and blow the web of paper off the roll after the manner indicated by arrows in Fig. 2.

That end of the conduit *g* to the right of the partition *h* in Fig. 3 is designed to be connected with a fan or other blower or source of air-pressure, and the other end of the conduit, which is in communication with the groove *d* through the tubes *j*, is designed to be connected with a vacuum-pump or other device calculated to create a partial vacuum in the portion of the conduit to the left of the partition *h* in Fig. 3, and by the vacuum thus created the sheet or web of paper is drawn from the press-roll and held by the vacuum to the suction-roll until thrown off by the air-blast. The groove *d* constitutes the receiving portion of the conduit that is adapted to be connected to a suction or vacuum-creating device.

In practice the rolls *K K'* are arranged as shown in Figs. 1 and 2 with respect to their complementary press-rolls—that is to say, they are arranged with their grooves *d* contiguous to the press-rolls. From this it follows that as the web of paper passes under the rolls *K K'* it will be taken off the press-rolls and held tight to the exterior of the ro-

tary portions of the rolls *K K'* and carried around in the direction indicated by the arrow with the same. This is due to the suction through the grooves *d*, tubes *j*, and pipes *g* of the rolls *K K'*, and also to the fact that the outer cylinders *q*, being of rubber or other yielding material, cave when they contact with the press-rolls, as best shown in Fig. 2, with the result that air is forced therefrom and the web of paper is caused to adhere to the periphery of the rubber cylinder. The web of paper is thus carried around with the rotary portions of the rolls until it is thrown off the same by the blast of air through the pipe *g* at the right of the partition *h*, the apertures *i*, the interior of the cylinders *b*, and the apertures *e*. In either case the web of paper is subject to the action of the blast through the apertures *e* and the apertures of the rotary portion in register therewith and is forced or delivered by the same in a gentle manner to the felts or aprons in advance of the rolls. This is advantageous, since it renders it unnecessary to handle the web of paper and prevents breaks in the web intermediate of the first-press rolls and the drier or driers.

As indicated by arrows in Fig. 1 of the drawings, the two presses are run in a common direction. This is usual in the manufacture of tissue and other light papers on cylinder and Fourdrinier machines; but it is obvious that when heavy papers are to be made the second press will be run in the opposite direction. The second-press felt or apron is brought up close to the top roll of the first press in order to catch the sheet or web as it is forced off the roll *K* by the blast of air, this insuring the delivery of the web of paper to the second press without the aid of the attendant.

It will be appreciated from the foregoing that my improvements, while simple and inexpensive, add materially to the efficiency of the cylinder and Fourdrinier, also the machines extant, especially when the same are to be used in the manufacture of tissue and other light papers; also, that my improvements are susceptible of ready application to cylinder and Fourdrinier machines at present in use, which is an important advantage.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A roll for use in paper-making machines, comprising an inner cylindrical stationary portion having one or more openings extending through its wall from the inner to the outer side thereof, and also having a conduit communicating with its interior and adapted to be connected with a means for supplying air under pressure, and a conduit leading to the periphery of the cylindrical portion, and adapted to be connected with a suction or vacuum-creating device, and an outer foraminated, cylindrical portion arranged and adapted to turn on the inner stationary portion.



2. A roll for use in paper-making machines, comprising an inner portion made up of a cylinder having a longitudinal groove in its periphery, and also having apertures in its wall  
5 in communication with its interior, a conduit communicating with the interior of the cylinder and adapted to be connected with an air-blast device, and a conduit connected with the groove in the periphery of the cylinder  
10 and adapted to be connected with a suction or vacuum-creating device, and an outer portion arranged and adapted to turn upon the cylinder of the inner portion and comprising an inner cylinder of metal and an outer cylinder of rubber and registered apertures in  
15 said cylinders.

3. A roll for use in paper-making machines, comprising an inner portion made up of a cylinder of metal having a longitudinal groove  
20 in its periphery, and also having apertures in its wall in communication with its interior,

a conduit communicating with the interior of the cylinder, and adapted to be connected with an air-blast device, a conduit connected with the groove in the periphery of the cylinder and adapted to be connected with a suction or vacuum-creating device, an oil-reservoir arranged in the cylinder, conduits connecting said reservoir and the exterior of the cylinder, and wicks arranged in said cylinder, and an outer portion arranged and adapted to turn upon the cylinder of the inner portion; said outer portion being of metal and provided with apertures.

In testimony whereof I have hereunto set  
my hand in presence of two subscribing witnesses.

MARBLE D. KEENEY.

Witnesses:

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FRED G. ALLEN.