

PATENTED OCT. 20, 1903.

APPLICATION FILED MAR. 28, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

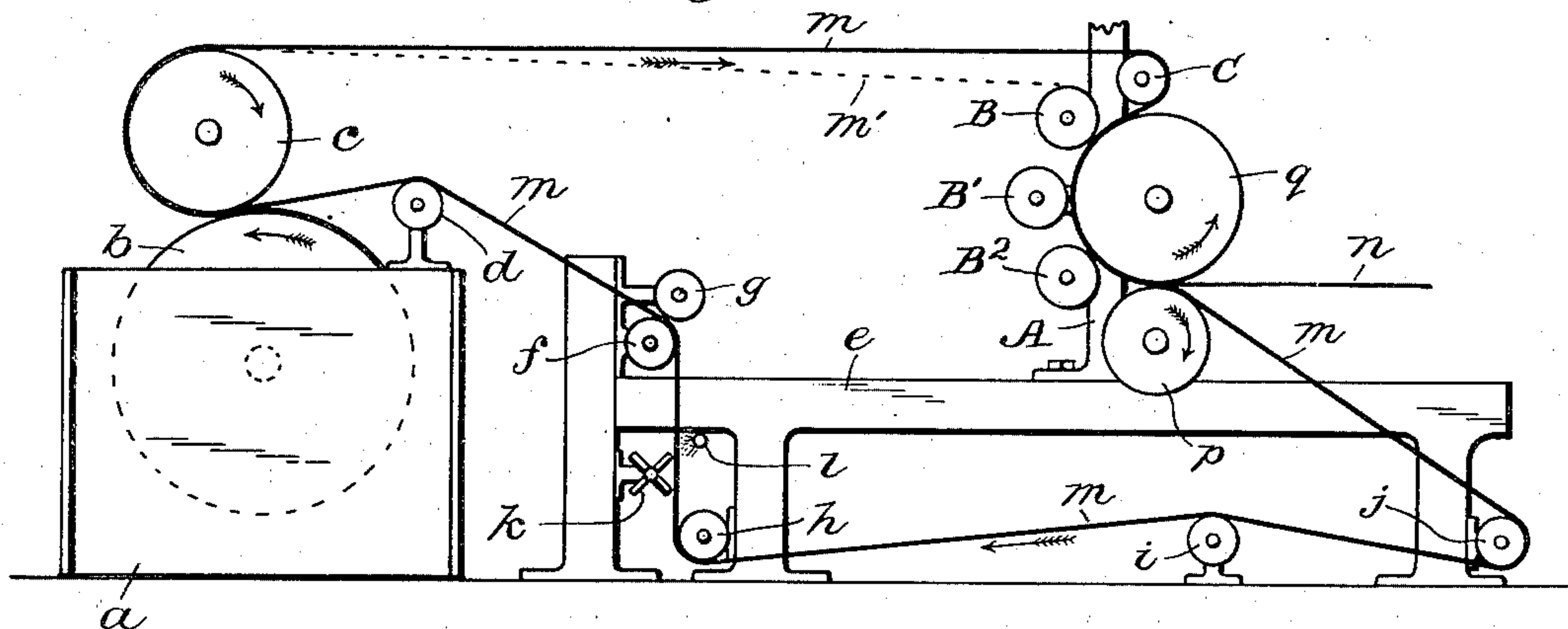


Fig. 2.

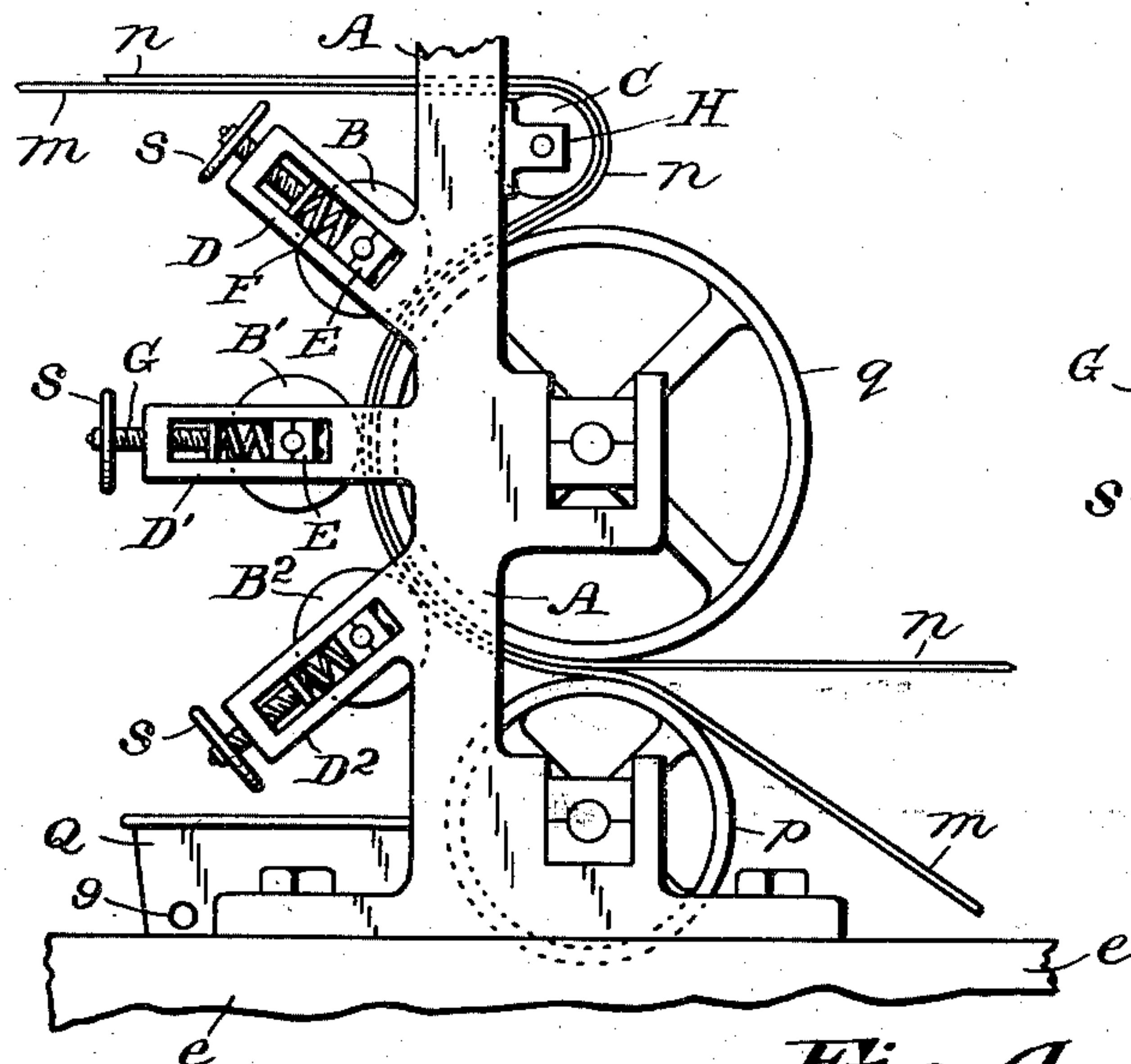


Fig. 3.

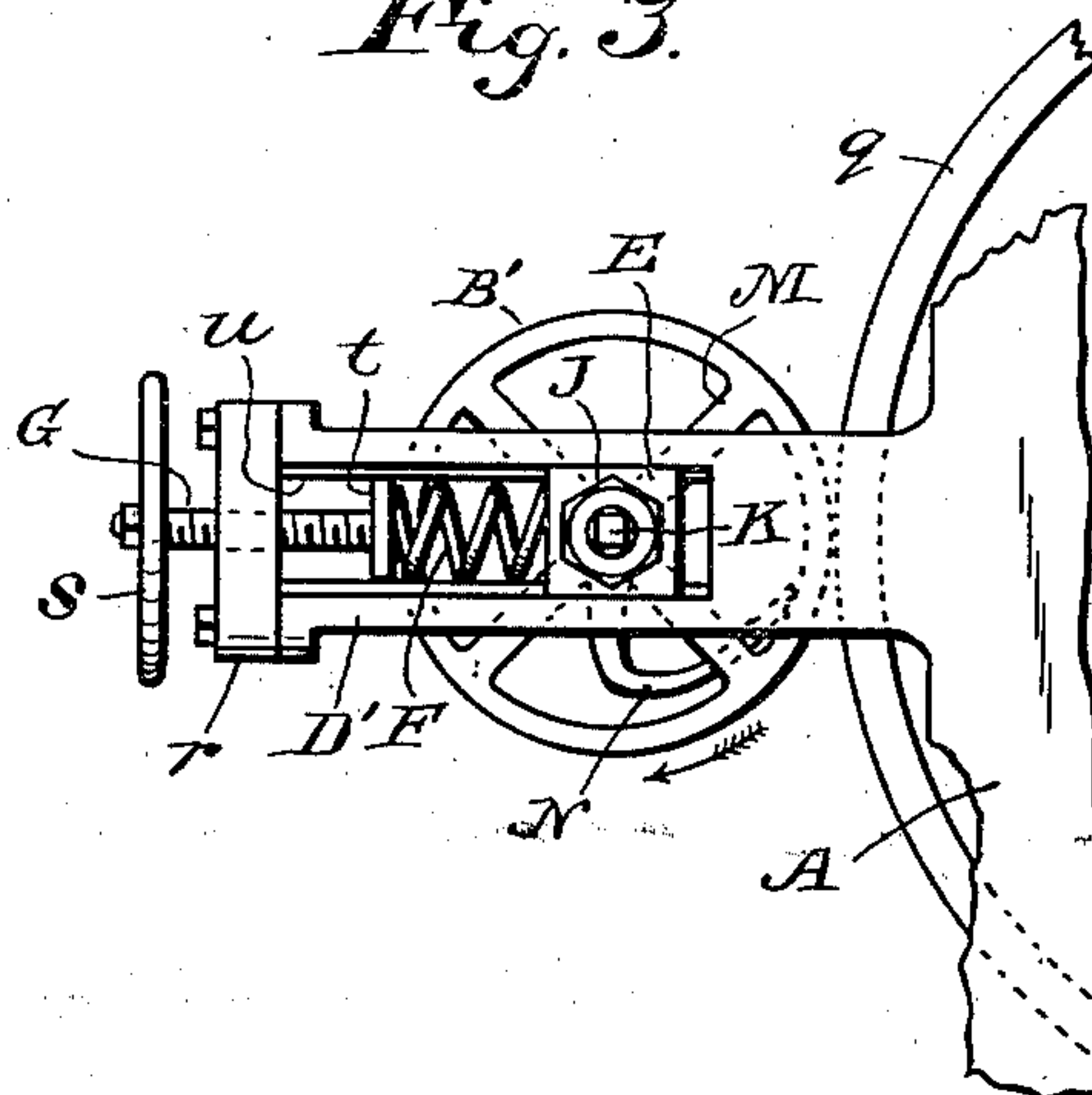


Fig. 4.



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WATER-EXTRACTOR FOR PAPER-MAKING MACHINES.

SPECIFICATION forming part of Letters Patent No. 741,980, dated October 20, 1903.

Application filed March 28, 1903. Serial No. 149,942. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. SCANLAN, a citizen of the United States, residing at Brownstown, in the county of Jackson and State of Indiana, have invented new and useful Improvements in Water-Extractors for Paper-Making Machines; and I do declare the following to be a full, clear, and exact description of the invention, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to apparatus for extracting water from the paper web while being carried on the felt before passing between the first pair of press-rolls in paper-making machines.

The object of the invention is to provide means that may be cheaply produced and operated economically, whereby as much of the water as is possible may be extracted from the wet pulpy paper without injury to the web or felt that carries it.

Particular objects are in removing the water to avoid rubbing the felt, also to avoid stretching it, and also to avoid the use of squeeze or wringer rolls in pairs that would require special gearing for their operation.

My invention consists in the application of squeeze-rolls to the under side of the felt, so that the felt and the paper thereon may be forced against the upper press-roll in cylinder-machines or against the upper couch-roll in other machines, such as the Fourdrinier type, before passing between the upper and lower rolls, the squeeze-rolls being driven by means of contact with the felt cooperating with the other rolls.

The invention consists also in a novel water-extracting roll and supports therefor; and it consists, further, in the novel parts and in the combination and arrangement of parts as hereinafter particularly described, and pointed out in the appended claims.

Referring to the drawings, Figure 1 is a diagrammatic elevation view illustrating the path of the felt and the general arrangement of a well-known type of cylinder paper-making machine and showing my invention in connection therewith, the usual arrangement of

the felt being altered slightly to conform to the requirements of the invention, the near parts of the machine being omitted for the sake of clearness of illustration and such parts only being shown as may be necessary to a correct understanding; Fig. 2, a fragmentary side elevation of the framework for supporting the first press-rolls, showing my improvements in connection therewith; Fig. 3, a fragmentary elevation showing an end of one of the water-extracting rolls and the mountings therefor; Fig. 4, a front view of one of the improved water-extracting rolls; Fig. 5, an end view of one of the improved rolls and its shaft; Fig. 6, a transverse sectional view of the improved roll; Fig. 7, a longitudinal sectional view of the improved roll, showing also its shaft and mountings thereof; and Fig. 8, a fragmentary diagrammatic elevation view illustrating the application of the invention to the well-known Fourdrinier type of paper-making machine, the water-extracting roll being situated so as to coact with the upper couch-roll in substantially the same manner as in a cylinder-machine at the upper press-roll, the near side of the frame being omitted in this view.

Similar reference characters designate corresponding parts in the several figures of the drawings.

In the drawings, *a* designates the pulp-vat, in which is mounted the paper-making roll *b*, the couch-roll *c* being mounted so as to cooperate with the roll *b*, and a guide-roller *d* is provided for guiding the felt. The frame *e* of the machine supports suitable rollers *f* and *g* for squeezing the water from the felt and rollers *h i j* for carrying or supporting the same. A beater *k* and a spray-pipe *l* are usually employed for cleaning the felt *m*, which extends partially about the couch-roll *c*, between the first press-rolls *p* and *q*, partially about the roller *j*, over the roller *i*, (if such is employed,) under the roller *h*, between the rolls *f* and *g*, and over the roller *d* and the roll *b*, the paper web *n* being carried upon the felt from the roll *b* until it passes between the rolls *p* and *q*, as will be understood.

In practically carrying out my invention I construct suitable press-roll frames A, on

which I mount a suitable number of squeeze-rolls or water-extracting rolls, as B B' B², so as to operate against the under side of the felt and force the paper on the felt against the upper press-roll *q*, the press-rolls being suitably mounted on the frames A, the frames usually supporting a guide-roller C and being provided with suitable housings, as D D' D², for supporting the squeeze-rolls. In some cases the housings may be made separately and attached to existing machine-frames A. The rolls B B' B² may have smooth imperforate surfaces or their shells may be perforated in some cases. It is preferable to employ as many squeeze-rolls as may be conveniently applied with respect to the portion of the roll *q* that faces toward the roll *c*.

As preferably constructed, each housing, as D or D', has an open way in which a suitable journal-box E is slidingly mounted, a spring F being seated against the outer side of the box and compressed by means of an adjusting-screw G, mounted in the housing, preferably in a removable cap *r*, extending across the open way, the screw having a hand-wheel *s* secured to its outer end and a follower *t* connected to its inner end. The housing may have guide-ribs *u* in the open way, in which case the box E will have grooves *v* to receive the ribs, or other suitable means may be employed for preventing movements of the box laterally in the housing. Any suitable housings H are attached to the frames A in a plane above the roll *q* for rotatively supporting the guide-roller C when employed. When the roller C is dispensed with, the felt will run over the uppermost squeeze-roll, as B, Fig. 1, as indicated by the broken line *m'*. The housings for the squeeze-rolls project from the sides of the frames A toward the end of the machine at which the paper is made, so that the squeeze-rolls may normally be spring-pressed adjustably against the press-roll *q* with the felt and the paper between. The roller C is preferably employed in order to prevent the upper squeeze-roll B from crowding the paper off of the felt if the paper be comparatively thick.

When imperforate squeeze-rolls are employed, their shafts may be rotative in the journal-boxes E or they may rotate on their shafts, as may be desired. Preferably the shells of the rolls, as B, have perforations *w*, in which case it is preferable that the rolls rotate on their shafts I and that the journals I' thereof be secured against rotation in the boxes E by suitable means. In this case the journals I' may be of less diameter than the main parts of the shafts, so that shoulders *x* are formed, against which the boxes E may be forced by means of nuts J engaging threads *y* on the shafts, the ends of which have squares K to receive wrenches or levers for holding the shafts against rotation while operating the nuts. The rolls each have

hubs L and connecting-spokes M at their ends, the hubs rotative on the shaft I. A water-trough N is supported in the roll, which is hollow, independently thereof, by means of hubs O, mounted on the shaft I and secured adjustably thereto, as by set-screws P. The trough is as long as may be between the spokes M and has a free edge *l* extending close to the inside of the shell of the roll when in use just below the plane of contact of the roll with the felt, so that the water entering the perforations will be gathered by the trough and prevented from flowing again through the perforations onto the felt or onto the lower rolls. The lower roll may be imperforate, if desired. A drip-pan Q, having a suitable outlet 9, may be employed to advantage below the set of squeeze-rolls.

It will be seen that if the shaft I be secured in the boxes E the trough will be held in the desired position in which it may be set and the boxes may move in the housings, but having straight parallel sides cannot rotate in the housings.

Referring to Fig. 8, in which the near side of the frame is lacking, 2 indicates the frame, 3 and 4 the first press-rolls, and 5 the paper-carrying web or felt, 6 and 7 the lower and upper couch-rolls, respectively, and 8 the paper-carrying web, which runs about the lower couch-roll 6 and carries the paper between the couch-rolls, delivering it to the web 5. In this type of machine the squeeze-roll or water-extracting roll B³ is suitably mounted under the web 8 partially below the upper couch-roll 7, so that much of the water may be forced out of the paper before it passes between the couch-rolls. The supports and mountings for the roll B³ may be similar to those above described for the like rolls of the cylinder-machine, and the roll B³ may be either imperforate or perforate, as may be desired, the latter being preferable. It will be understood that weights may be substituted for the springs F and screws as equivalents thereof.

In practical use the roll *q* or the roll 7 will impart its motion to the squeeze or water extracting rolls through the medium of the paper and the carrying webs therefor as a result of the action of the springs F, the paper being pressed against the roll *q* or 7 and the water forced or extracted therefrom to the desired extent, thus obviating the difficulties that have been experienced where the felt has been drawn slidingly over a suction-box with the paper upon it. When imperforate squeeze-rolls only are used, a drip-pan may be placed beneath each roll, as will be obvious. When the perforate extracting-rolls are employed, the water will flow in the troughs N to the ends thereof and out between the spokes or arms M, clear of the operative portions of the lower rolls, into the drip-pan, if the latter be supplied. It will be understood that each trough N may be ad-

justed so that the thin edge 1 will be properly situated to gather the water flowing through the perforations *w*.

Having thus described my invention, what I claim is—

1. A paper-making machine including a water-extracting roll comprising a fixed shaft, a hollow roll mounted on the shaft and having perforations in its shell, and a trough attached to the shaft and extending therefrom downwardly and then upwardly to the inner surface of the shell and provided with a thin edge at its extremity.

2. A paper-making machine including a press-roll, a perforate water-extracting roll, a fixed shaft supporting the roll, and a trough in the roll fixed adjustably therein on the shaft so as to be movable about the axis of the shaft, and a paper-carrying web extending between the press-roll and the water-extracting roll.

3. A paper-making machine including a main frame, a press-roll, a pair of housings, a pair of bearings mounted slidably in the housings, means whereby the bearings may be elastically pressed toward the press-roll, a shaft mounted in the bearings so as to be movable rotatively, means for binding the shaft to the bearings, a perforate hollow water-extracting roll having spokes attached to the ends of the shell thereof and hubs attached to the spokes and rotative on the shaft, a trough in the roll attached to the shaft and having an edge at the inner surface of the shell of the roll, and a paper-carrying web extending between the press-roll and the water-extracting roll.

4. A paper-making machine including a main frame, a pair of press-roll frames, a press-roll mounted in the press-roll frames, a paper-carrying web, a plurality of housings attached to the press-roll frames, a water-extracting roll mounted in a pair of the housings and cooperating with the press-roll, and a guide-roll for the web mounted in a pair of the housings above the press-roll with its axis in a vertical plane between the axes of the water-extracting roll and the press-roll.

5. A paper-making machine comprising a main frame, a pair of press-roll frames mounted on the main frame, a press-roll mounted in the press-roll frames, a water-extracting roll mounted in the press-roll frames, a paper-carrying web extending between the press-roll and the water-extracting roll, and a guide-roll mounted in the press-roll frames in a plane above the water-extracting roll and carrying the web free from the press-roll in advance of the water-extracting roll.

6. A paper-making machine comprising a main frame, a pair of press-roll frames mounted on the main frame, a press-roll mounted in the press-roll frames, a plurality of hollow perforate water-extracting rolls mounted in the press-roll frames in different vertical

planes and having each a trough therein that has an edge at the inner surface of the shell of the roll, a paper-carrying web extending between the water-extracting rolls and the press-roll, and a guide-roll mounted in the press-roll frames in a plane above the uppermost one of the plurality of water-extracting rolls and leading the web gradually to the press-roll in advance of the water-extracting rolls.

7. A paper-making machine comprising a main frame, a pair of press-roll frames mounted on the main frame and provided with a plurality of housings, a press-roll mounted in the press-roll frames, a plurality of hollow perforate water-extracting rolls mounted in the housings in different vertical planes and having each a trough that has an edge at the inner surface of the shell of the roll, and a paper-carrying web extending between the press-roll and the plurality of water-extracting rolls.

8. In a paper-making machine, the combination with the pair of press-roll frames and the press-roll mounted therein, of a pair of housings attached to the press-roll frames, bearings slidably mounted in the housings, shafts mounted in the bearings so as to be movable rotatively, means for binding the shafts to the bearings, perforate hollow rolls each having spokes attached to the ends of the shells thereof and hubs attached to the spokes and rotative on a shaft, a trough in each roll attached to the shaft thereof and extending to the shell of the roll, a guide-roll mounted in a plane above the hollow rolls slightly removed from the press-roll, a pan mounted below the lower one of the rolls, and the paper-carrying web extending over the guide-roll near the press-roll without contact therewith and thence between the hollow rolls and the press-roll.

9. In a paper-making machine, the combination of a pair of press-rolls, a web extending between the press-rolls, a perforate water-extracting roll having a trough therein receiving the water from the perforations therein and discharging the same through opposite ends of the roll, and a pan below the water-extracting roll.

10. In a paper-making machine, the combination of a press-roll, a water-extracting roll adjacent to the press-roll, a web extending between the press-roll and the water-extracting roll, a guide-roll mounted in a plane above the press-roll and the water-extracting roll and carrying the web free from the press-roll and also from the water-extracting roll.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT M. SCANLAN.

Witnesses:

FRANK BRODHECKER,
RALPH B. APPLEWHITE.