

(No Model.)

5 Sheets—Sheet 1.

R. W. SCOTT.
KNITTING MACHINE.

No. 539,649.

Patented May 21, 1895.

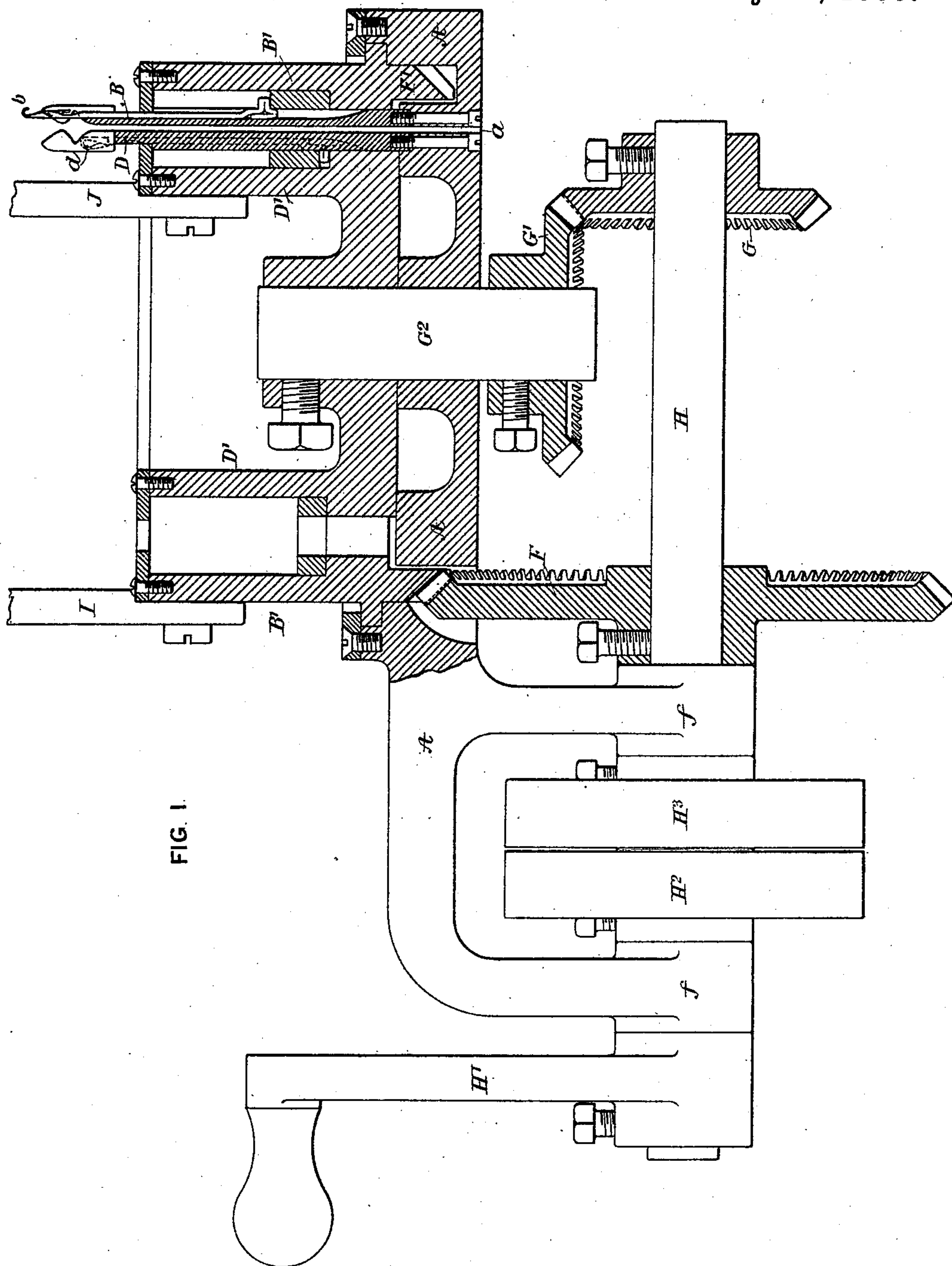


FIG. 1.

WITNESSES

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Frank E. Bechtold

INVENTOR

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By his Attorneys

Howson & Howson

(No Model.)

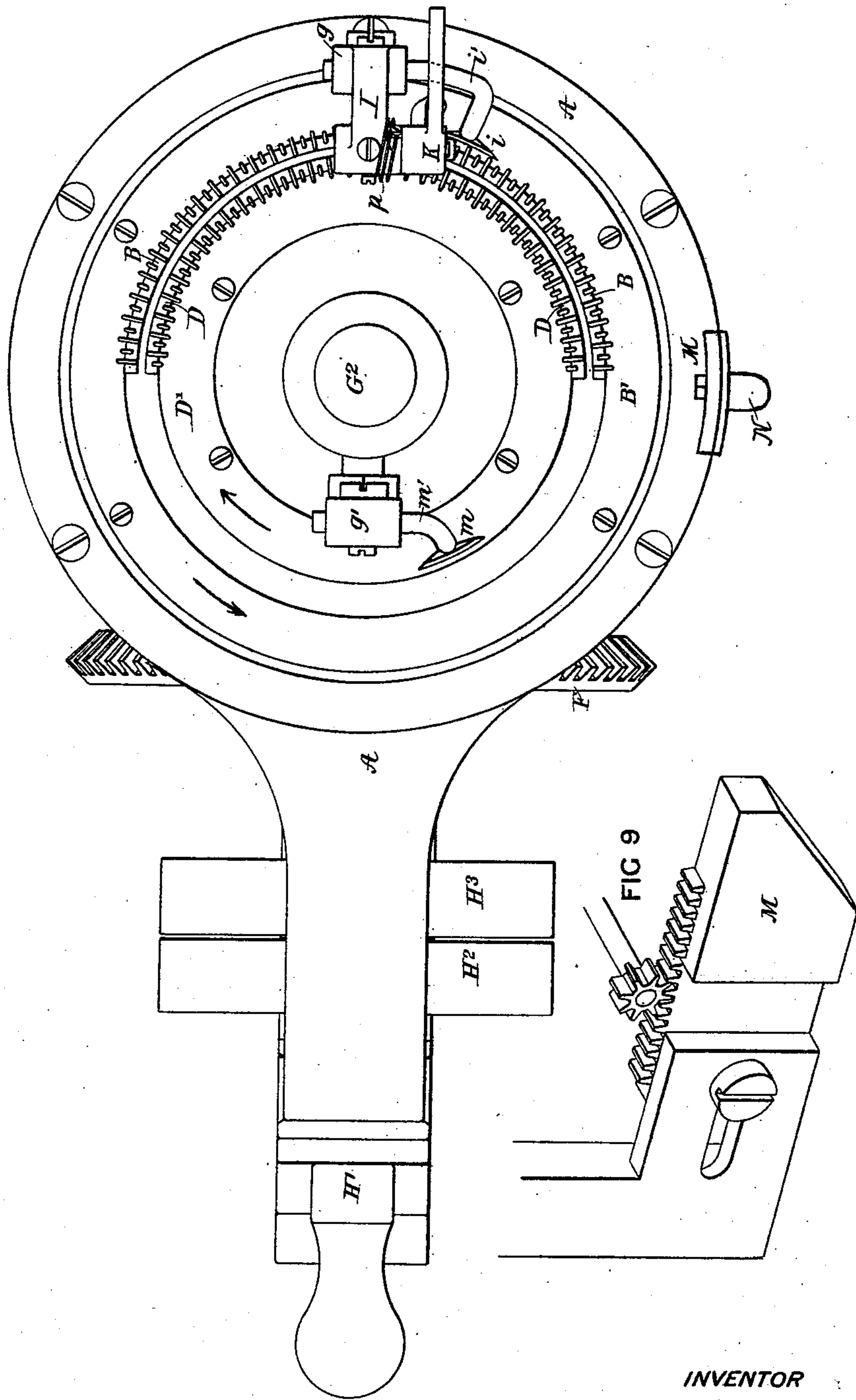
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FIG. 2.



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FIG. 5.

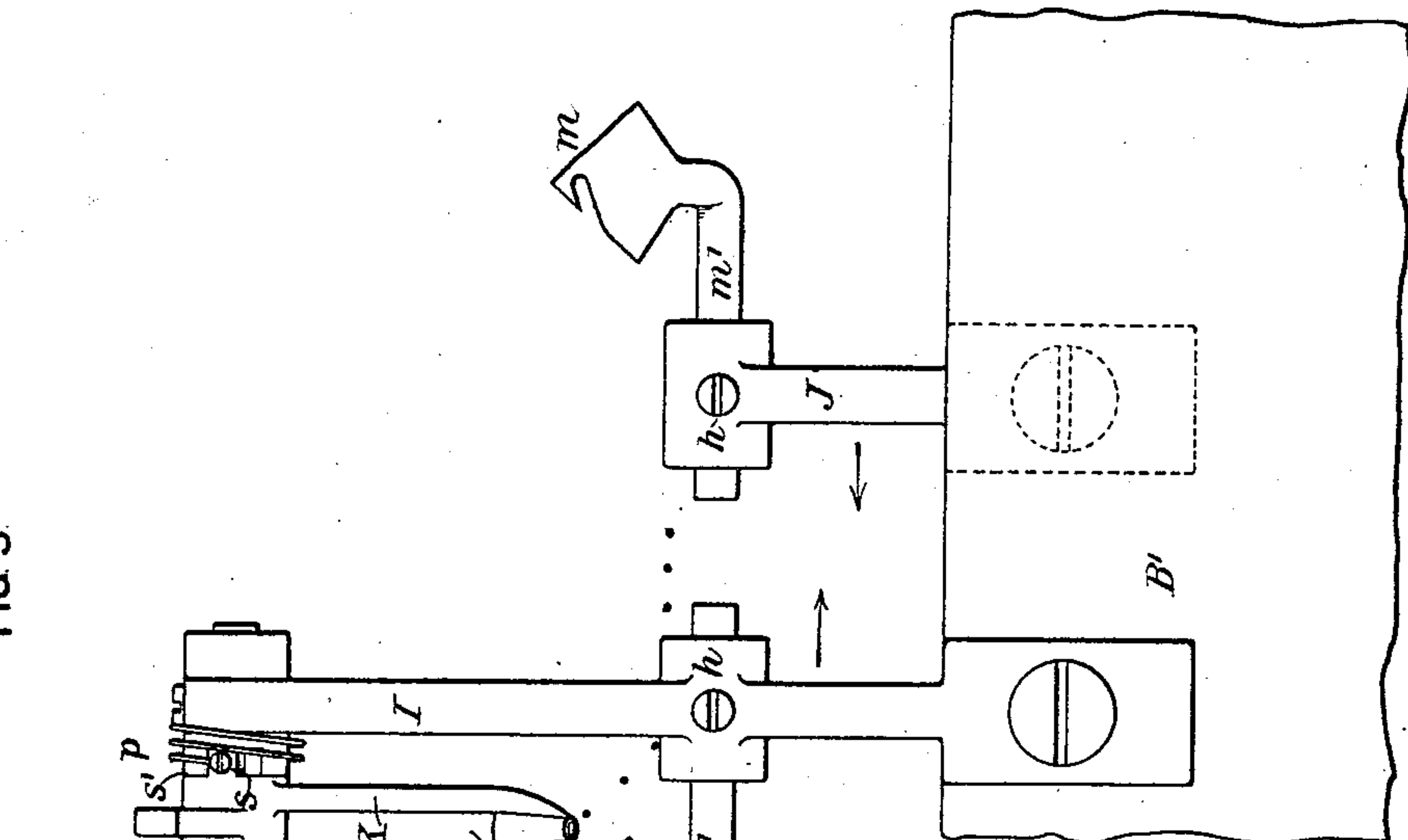


FIG. 4.

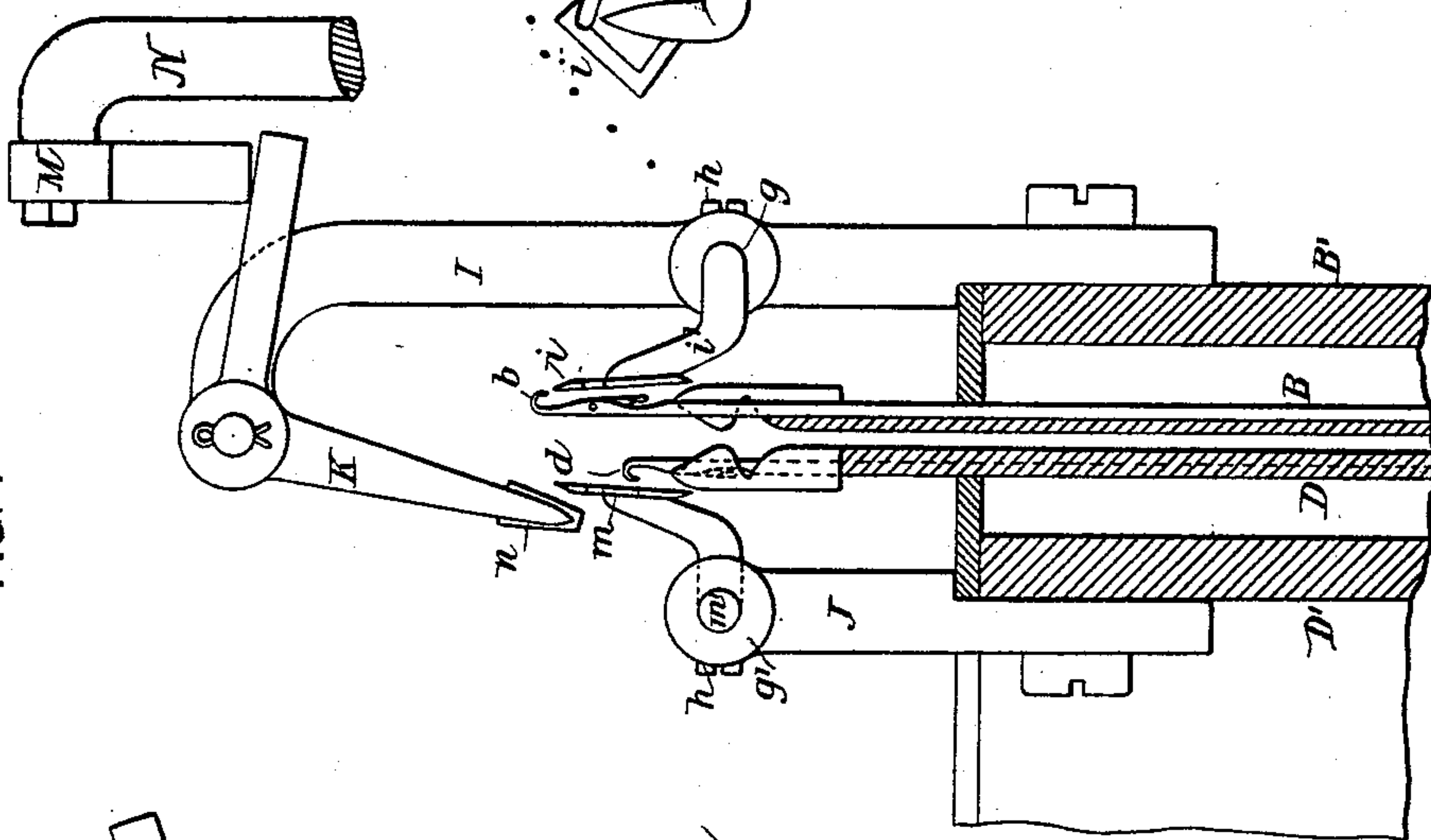
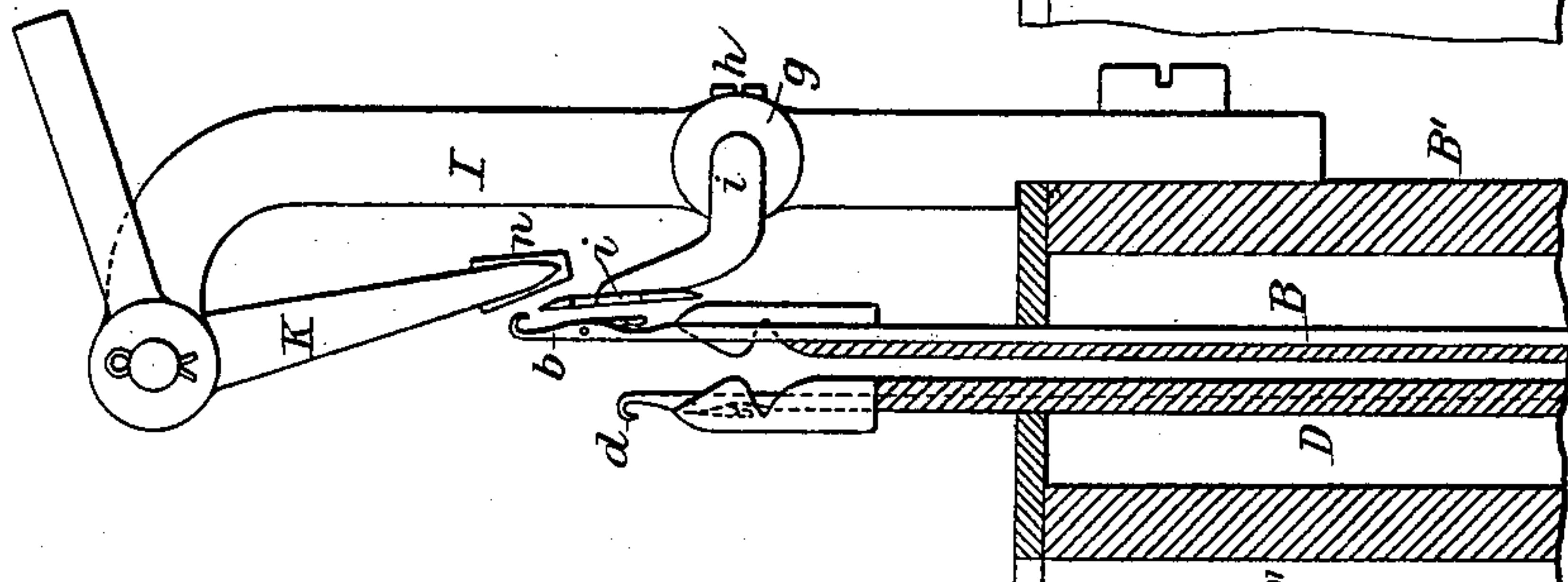


FIG. 3.



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FIG 7

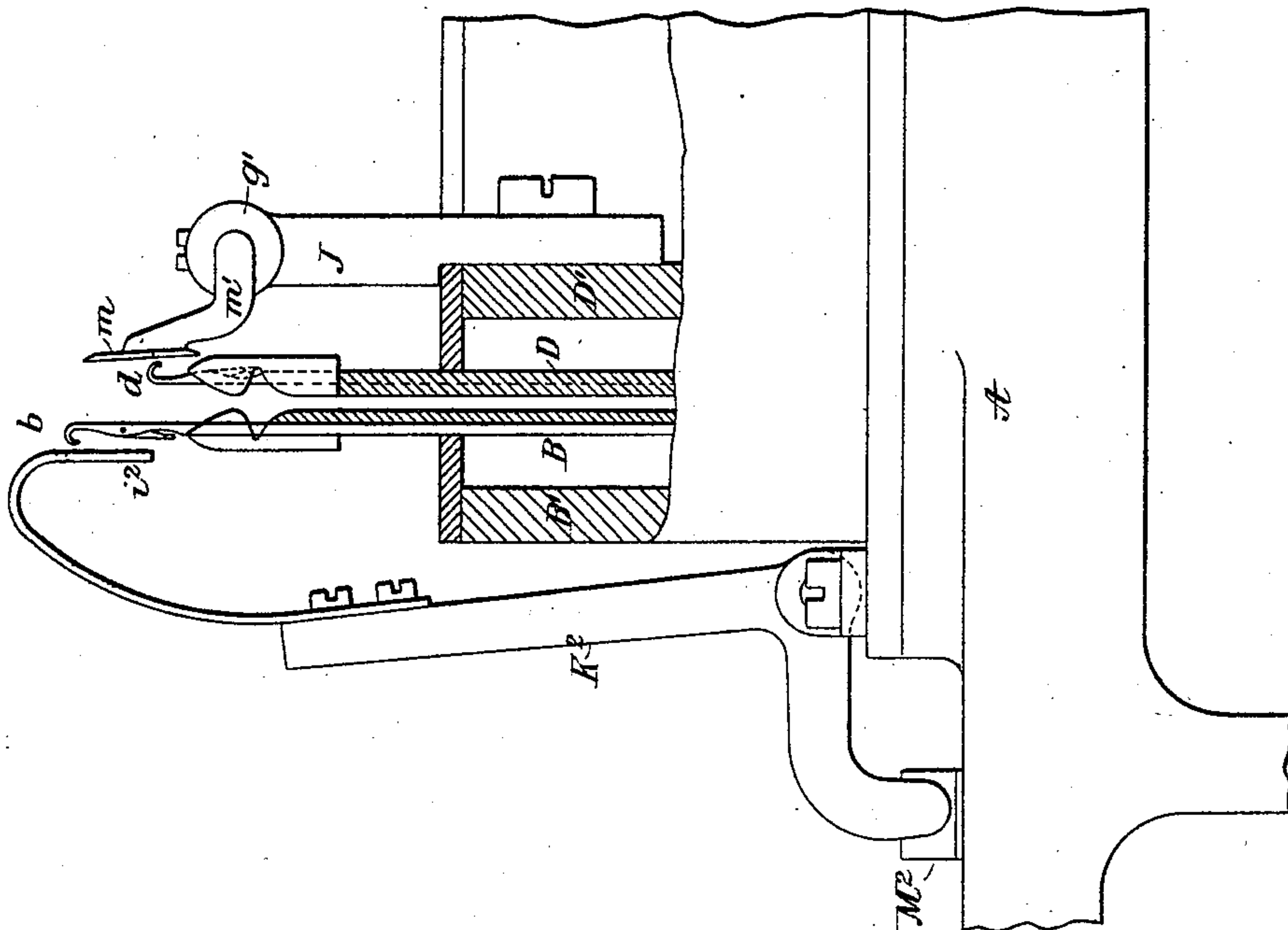
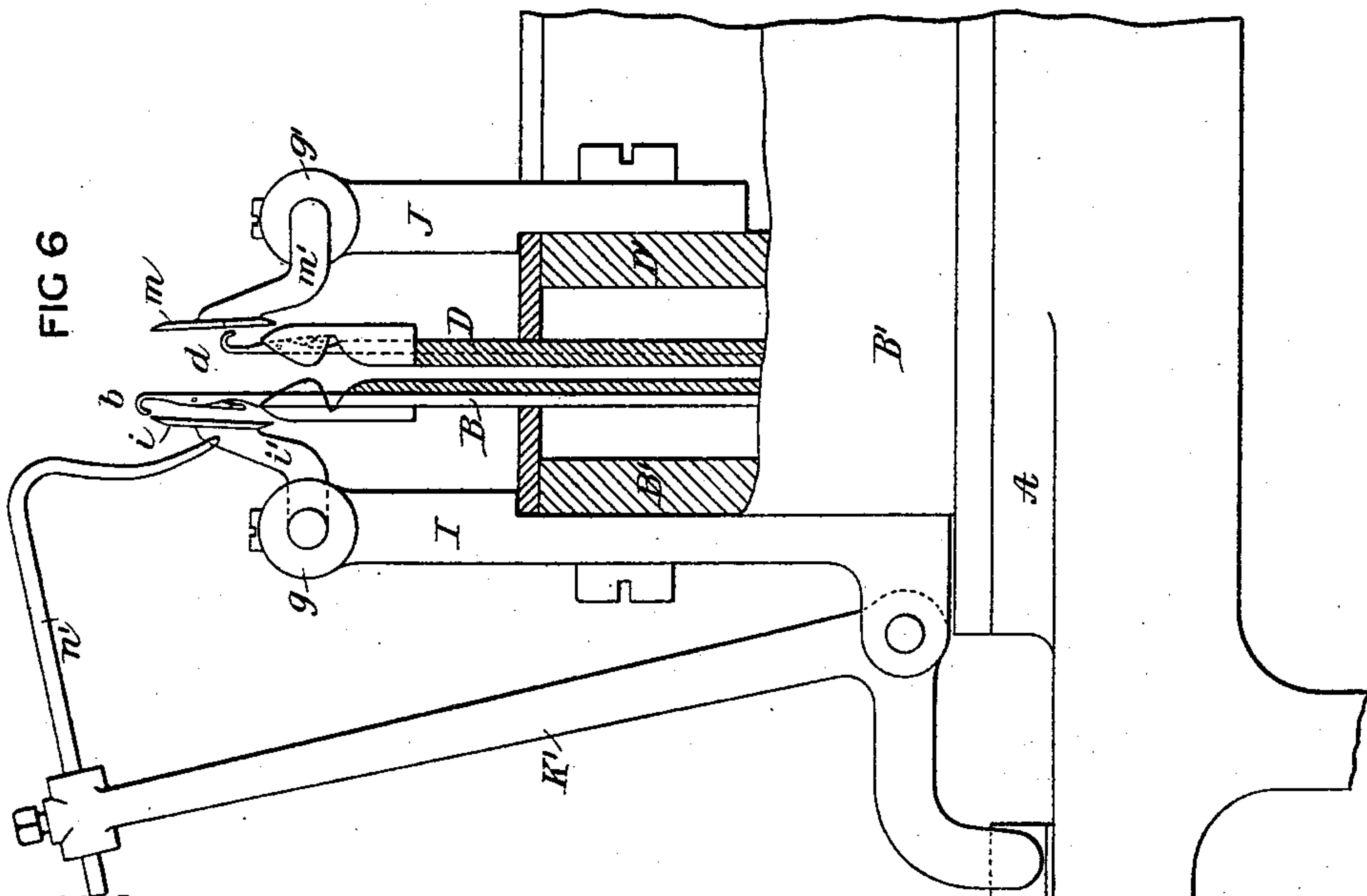


FIG 6



WITNESSES

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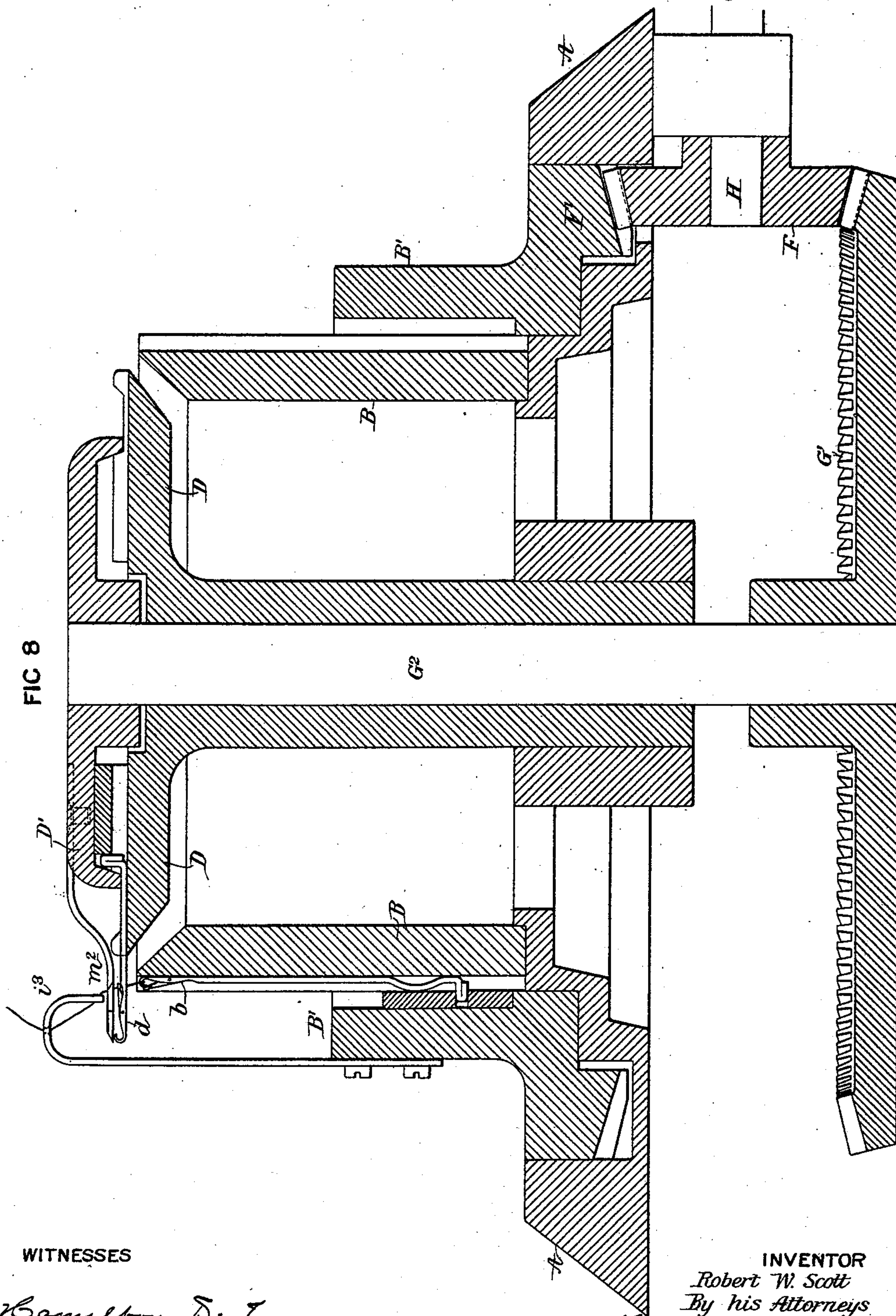
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UNITED STATES PATENT OFFICE.

ROBERT W. SCOTT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-HALF TO LOUIS N. D. WILLIAMS, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 539,649, dated May 21, 1895.

Application filed May 8, 1894. Serial No. 510,511. (No model.)

To all whom it may concern:

Be it known that I, ROBERT W. SCOTT, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Knitting-Machines, of which the following is a specification.

The object of my invention is to construct a knitting machine in which are combined the rapidity of production of a rotary machine and the facility for shaping the web possessed by a straight machine having opposite rows of needles and reciprocating cam boxes and thread guides. This object I attain by disposing the two rows of needles in segmental form and using in connection therewith two sets of rotating thread guides and stitch forming devices, one set moving in one direction and acting in conjunction with one segmental row of needles, and the other set moving in the opposite direction and operating in conjunction with the other row of needles, the thread being transferred from one thread guide to the other at each end of the acting set of needles so that while the thread guides continuously rotate, the knitting operation is a back and forth movement, the thread being laid in one set of needles while its guide is traveling in one direction and in the other set of needles while its guide is traveling in the opposite direction, so that needles can be brought into action at the end of the acting set in either row in order to widen the web, or can have their stitches transferred and be thrown out of action with the same facility as in the case of straight machines having opposite rows of needles.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a knitting-machine embodying my present invention. Fig. 2 is a plan view of the same. Figs. 3 and 4 are sectional views illustrating the operation of the shifting thread-feeder. Fig. 5 is a side view illustrating the shifting thread-feeder and the rotating thread-guides. Figs. 6 and 7 are views illustrating other means of shifting the thread from one guide to the other. Fig. 8 is a sectional view illustrating the application of my invention to a machine in which the needle-beds are at right angles to each other instead of being parallel, and

Fig. 9 is a diagram illustrating a modification of part of the invention.

In Fig. 1, A represents the fixed table or bed of the machine to which are permanently secured two segmental needle beds B and D concentric with each other and separated to such an extent as to provide for the passage of the knitted web down between them and through a segmental opening *a* formed in the bed A.

The outer segment B is grooved externally for the reception of the usual vertical reciprocating latch needles *b* and the inner segment is grooved internally for the reception of like needles *d*, the needles of the outer segment being vertically reciprocated by cams contained in the outer cam box B', and the needles of the inner segment being reciprocated by like cams carried by the inner cam box D'.

The cam boxes B' and D' are of circular form and are suitably mounted upon the table A so as to be rotated thereon, the rotation of the outer cam box B' being effected by a bevel wheel F which meshes with a bevel wheel F' formed upon the lower portion of said cam box B', the rotation of the inner cam box D' being effected by means of a bevel wheel G which meshes with a bevel wheel G' secured to a central shaft G² which turns in suitable bearings in the table A and is secured to a central hub on said cam box D'.

Both of the bevel wheels F and G are secured to a driving shaft H which turns in depending bearings *f* on the table A and is operated in any suitable manner, the shaft being in the present instance provided with a crank H' and with two pulleys H² and H³, so that it can be driven in either direction.

The bevel wheel F meshes with the bevel wheel F' of the outer cam box B' on one side of the axis of the machine, while the bevel wheel G meshes with the bevel wheel G' of the inner cam box D' on the opposite side of said axis. Hence the two cam boxes are caused to rotate in opposite directions, the wheels being so proportioned that the cam boxes travel at the same speed.

Mounted upon the outer cam box B' is a post I having a boss *g* to which is adapted a

stem i' on a thread guide i adapted to feed the thread to the needles of the outer segment, and upon the inner cam box D' , is mounted a post J having a boss g' to which is adapted the stem m' of a thread guide m which serves to feed the thread to the needles of the inner segment, each of the thread guides i and m being notched in its forward or advancing edge so as to catch the thread and feed the same to the needles when moving forward, but so as to permit of the ready release of the thread therefrom. Each thread guide is adjustable laterally in the boss g or g' and is capable of being swung toward or from the needles by the turning of its stem in said boss, a set screw h serving to secure the thread guide in position after adjustment.

To the upper end of the post I is hung a lever K which has at the lower end an eye n for the passage of the thread, this lever being so acted upon by a spring p that its normal position is outside the needles of the outer segment, as represented in Fig. 3, this position being determined by the contact of a lug s on the hub of the lever with a lug s' upon the post I .

Suitably mounted on a post N projecting upward from the fixed frame of the machine at a point adjacent to one end of the segmental needle beds is a cam plate M which, at certain times, acts upon an outwardly projecting arm of the lever K so as to move the thread guiding eye n at the lower end of the guide of the inner set of needles as shown in Fig. 4.

The posts I and J are so located that when the thread guide i after feeding the thread to the needles of the outer segment B is leaving the last needle of the set the thread guide m on the post J is approaching in the opposite direction the first or corresponding end needle of the inner set carried by the segment D , and before the guide reaches said end needle the lever K is shifted by the action of the cam M to the position shown in Fig. 4 so as to lay the thread in front of said advancing guide by which it is caught and carried forward to the needles of the inner set, the lever K then passing from under the control of the cam M and resuming its normal position, which it retains while it is being carried around the inoperative half of the machine.

When the thread guide m has passed half way round the inner set of needles the guide eye n of the lever K is diametrically opposite the same, the post I having gone half way round the inoperative half of the machine and the knitting thread therefore, extends across the top of the machine over the top of the post J from the guide m to the eye n . While the guide m is applying the thread to the last half of the inner set of needles said guide and the eye n are approaching each other and consequently the knitting thread is being slackened. Hence any of the usual forms of spring take-up may be employed for compen-

sating for this slack and insuring the proper tension upon the threads fed to the needles. The thread guide m continues to feed the thread to the needles of the inner set until it reaches the end of the same, by which time the guide eye n occupies such relation to said guide m as to withdraw the thread therefrom, and permit it to be caught by the outer guide i by which it is again fed to the needles of the outer segment, these operations being repeated indefinitely.

When the web is to be fashioned by widening the same, all of the needles of the segments are not in action when the knitting operation is begun, but needle after needle, at one or both ends of each set can be moved into operative position by hand or otherwise until the desired widening has been effected, while if the fashioning of the web is to be effected by narrowing the same, the full number of needles for the desired maximum diameter of tube can be used in starting the knitting operation and the stitches can be transferred from needle to needle of each set, at one or both ends, and these needles can be moved out of action until the desired narrowing has been effected, or the cam M may, as shown for instance in Fig. 9, be constructed in two parts, movable one in respect to the other, so that said cam can be increased or diminished in length, or its relation to the lever K can be changed so as to move the latter after it has passed any desired needle of the set, whereby the knitting thread can be carried from one set of needles to the other at any desired point in the segment.

It will be observed that the thread guides i and m are pointed in front and have their outer edges beveled so that they act as latch guards and turners, the pointed and beveled front edge of each guide catching any latch which may be elevated or partly elevated and turning the same down to its proper position so as to insure the proper insertion of the yarn in the hooks of the needles.

It will be evident that various means may be resorted to in order to effect the transfer of the knitting thread from one guide to the other. For instance, in Fig. 6, I have shown a lever K' hung to the outer cam box and acted upon by a cam M' on the fixed bed, the upper end of this lever carrying a bent finger n' which catches the thread and lays it in front of the inner guide m , the latter passing outside of the depending portion of the finger, and in Fig. 7 I have shown a construction in which a separate thread shifter is dispensed with altogether, the outer thread guide i^2 being carried by a lever K^2 which is acted on by a cam M^2 so that the guide itself is thrown inward at the proper time in order to lay the thread into position to be caught by the inner guide m . In the construction shown in Fig. 6 the primary guide eye for the thread will be located above and outside of the outer guide so that the thread will have a natural tendency to draw across the advancing end

of said outer guide as soon as it is released from the inner guide.

When the invention is applied to a machine in which the needle beds are at right angles to each other, as in Fig. 8, the shifting movement of either guide will be unnecessary as the thread extending from the end of the needle of the vertical set to the thread guide i^3 , will lie in the path of the guide m^2 for the horizontal needles.

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

1. A knitting machine in which two sets of segmentally disposed needles are combined with two thread feeding devices, one operating in conjunction with one set of needles, and the other in conjunction with the other set of needles, and means for rotating one thread feeding device in one direction, and the other in the opposite direction.

2. A knitting machine in which two sets of segmentally disposed needles are combined with two thread feeding devices, one operating in conjunction with one set of needles, and the other in conjunction with the other set of needles, a thread shifter for carrying the knitting thread back and forth from one thread feeding device to the other, means for rotating said thread feeders in opposite directions, and means for operating said thread shifter.

3. A knitting machine in which two sets of segmentally disposed needles having a space between them for the passage of the fabric, are combined with two sets of knitting cams and two thread guides, one guide and set of cams operating in conjunction with one set of needles, and the other in conjunction with the other set of needles; and means for rotating the cam boxes and guides in opposite directions.

4. A knitting machine in which two sets of segmentally disposed needles having a space between them for the passage of the fabric, are combined with two sets of knitting cams and two thread guides, one guide and set of cams operating in conjunction with one set of needles, and the other in conjunction with the other set of needles, a thread shifter for carrying the yarn from one guide to the other, and means for rotating the cam boxes and guides in opposite directions and for moving said thread shifter.

5. A knitting machine in which two sets of needles segmentally arranged and having between them a space for the passage of the knitted web, are combined with two sets of knitting cams, and two thread guides, one thread guide and set of knitting cams acting in conjunction with one set of needles, and the other in conjunction with the other set of needles, a thread guide carried by a shifting lever mounted upon one of the cam boxes, a cam for operating said shifting lever, and means for rotating the two cam boxes in opposite directions, substantially as specified.

6. The combination of the segmentally arranged sets of needles, the thread guide and knitting cams for each set of needles, a lever mounted upon one cam box and acted upon by a spring tending to move it in one direction, stops for limiting such movement, a cam acting upon the lever to shift the same, and means for rotating the cam boxes in opposite directions, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ROBERT W. SCOTT.

Witnesses:

FRANK E. BECHTOLD,
JOSEPH H. KLEIN.