

No. 649,688.

Patented May 15, 1900.

A. B. DISS.
BRAIDING MACHINE.

(Application filed Dec. 27, 1898. Renewed Oct. 17, 1899.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 5.



Fig. 6.

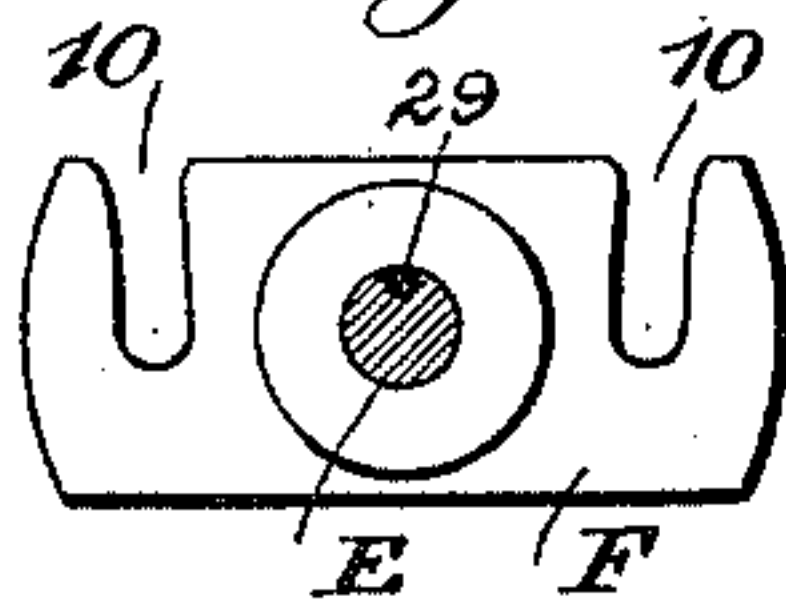
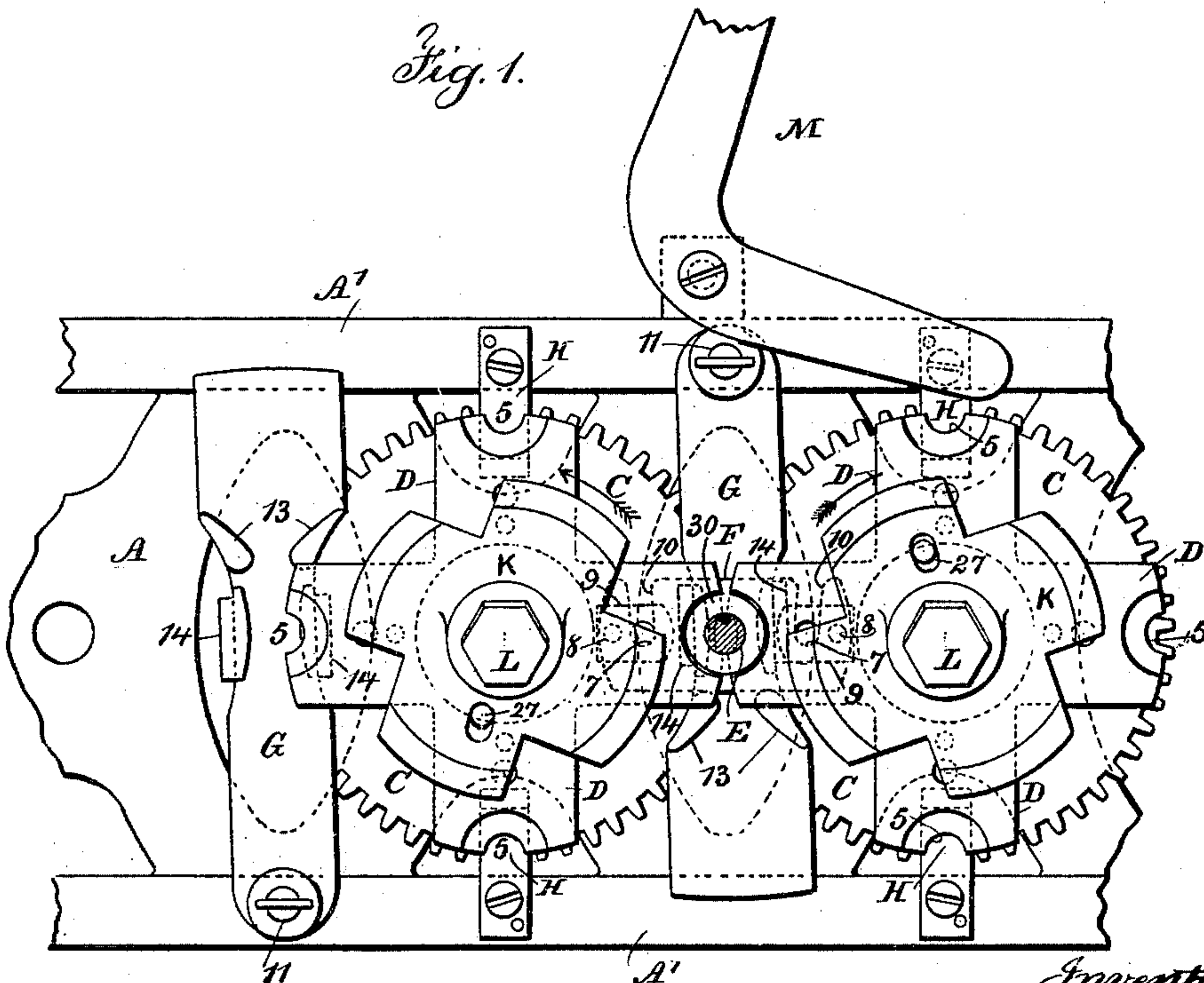


Fig. 1.



Witnesses

Chas. H. Smith
J. Stait

Inventor

Albert B. Diss
per L. W. Surrell & Son
attys

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Fig. 4.

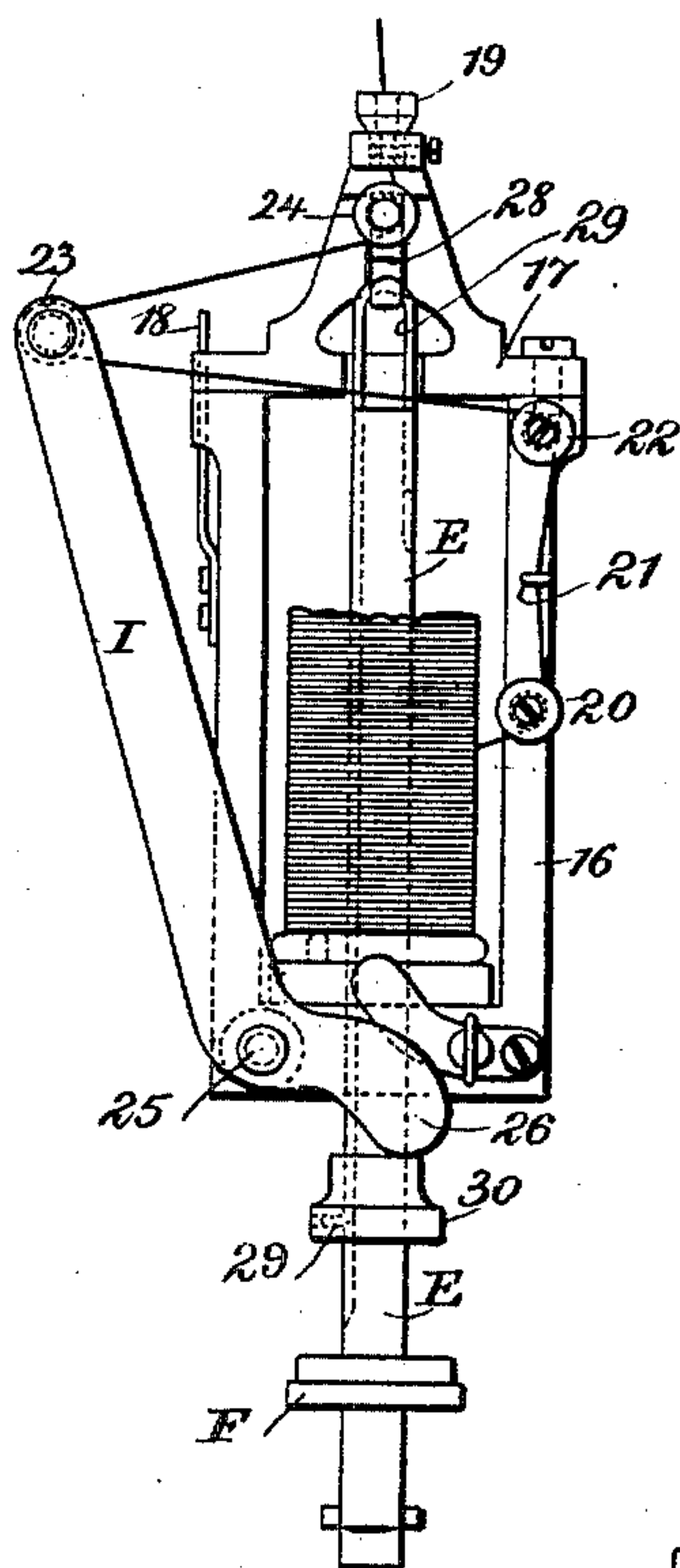
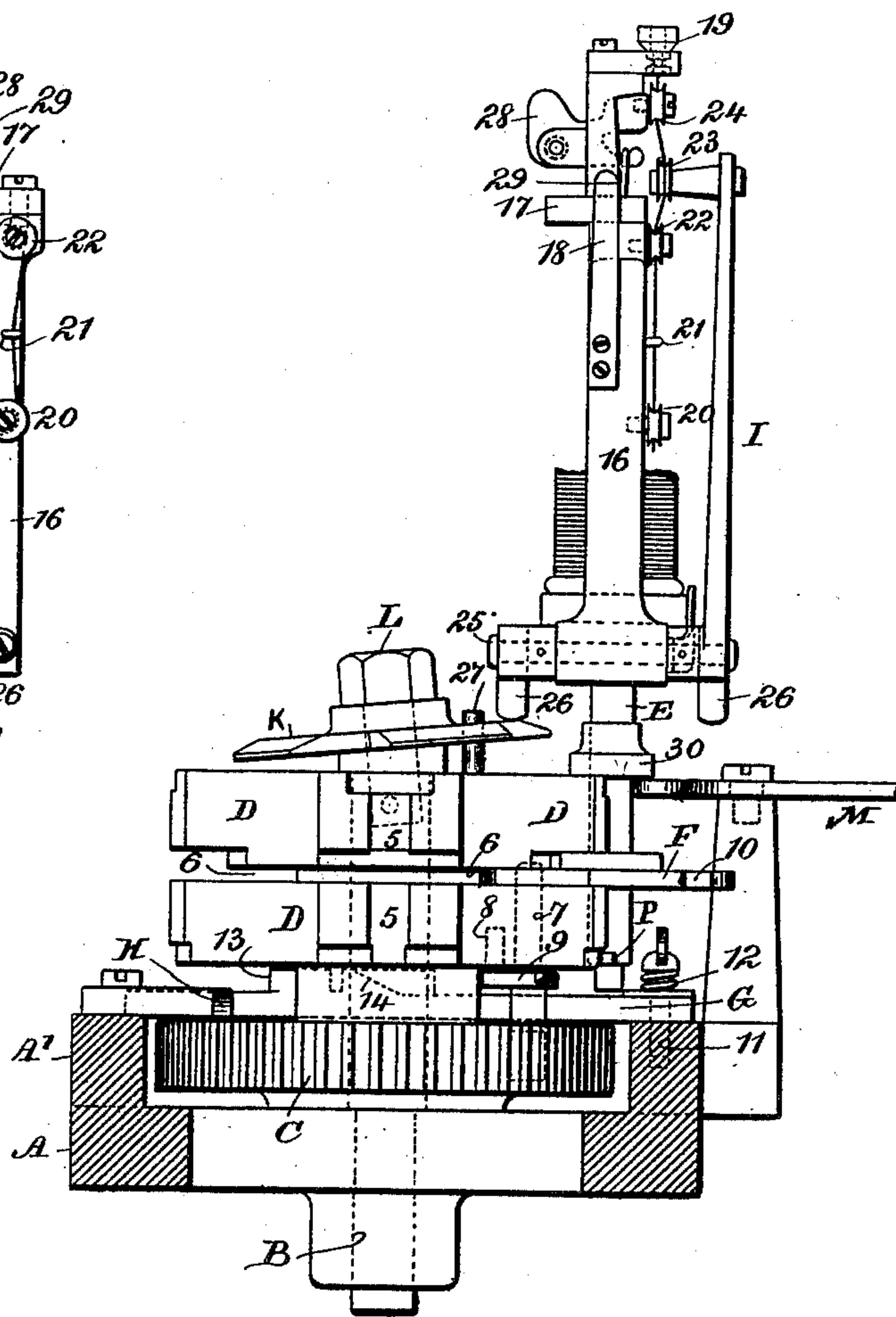


Fig. 2.



Witnesses

Chas. H. Smith
J. Stair

Inventor

Albert B. Diss
by L. W. Terrell & Son

attys

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3 Sheets—Sheet 3.

Fig. 7.

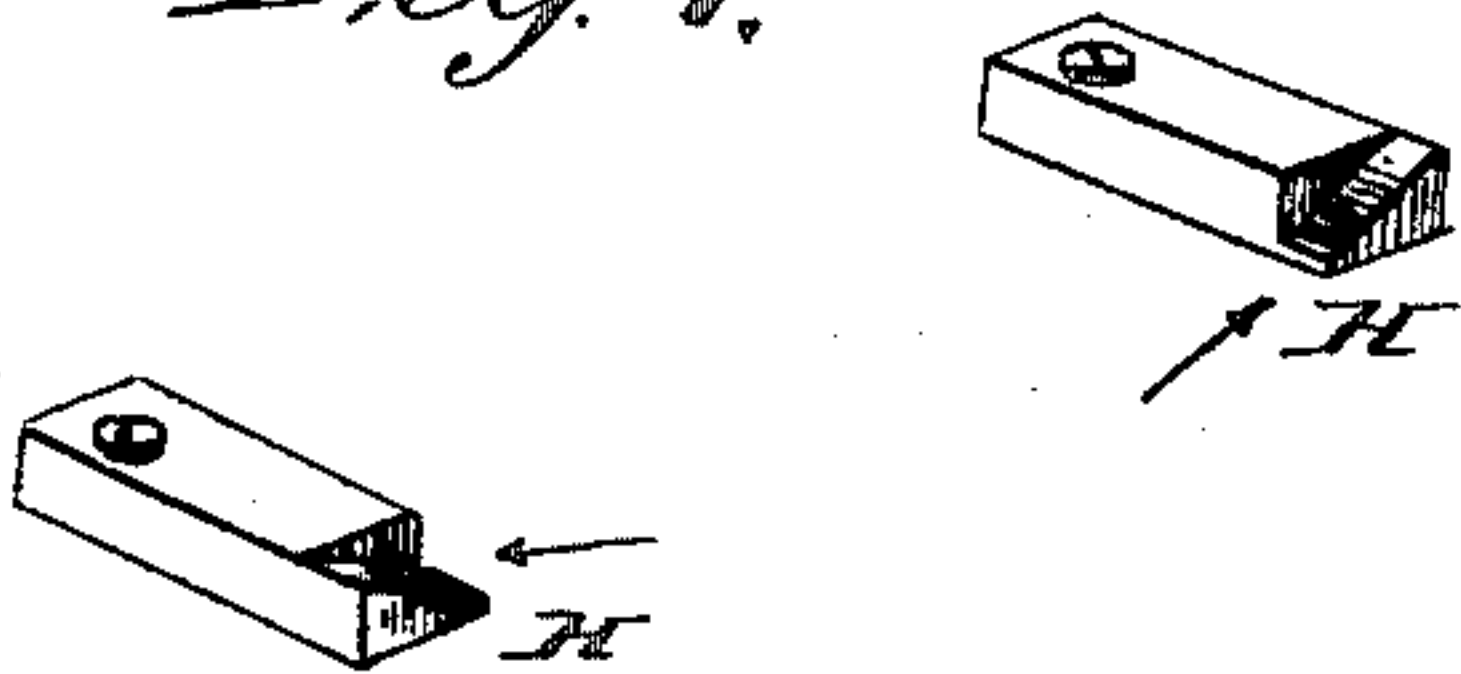
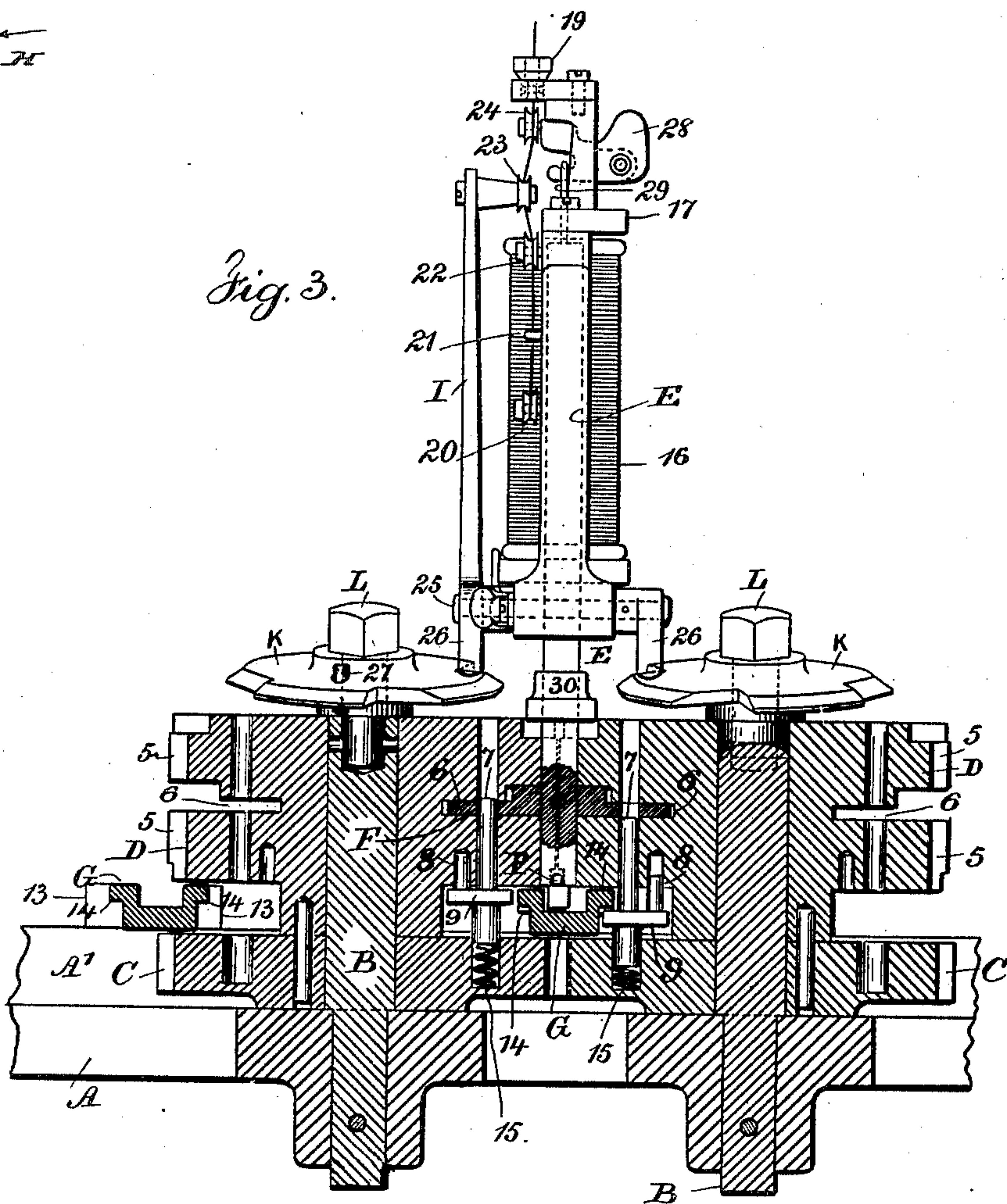


Fig. 3.



Witnesses

Chas. H. Smith
J. Stair

Inventor

Albert B. Diss
per L. W. Serrell & Son
attys

UNITED STATES PATENT OFFICE.

ALBERT B. DISS, OF NEW YORK, N. Y.

BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 649,688, dated May 15, 1900.

Application filed December 27, 1898. Renewed October 17, 1899. Serial No. 733,933. (No model.)

To all whom it may concern:

Be it known that I, ALBERT B. DISS, a citizen of the United States, residing in the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented an Improvement in Braiding-Machines, of which the following is a specification.

Braiding-machines have been constructed with revolving heads and with spindles carrying the bobbin of thread, and transfer devices have been employed, so as to take the spindle from one revolving head into another in order that the path of the spindle may be reversed, such spindle moving around a half-circle and being taken and carried around another half-circle standing in the opposite direction. A machine of this character is represented in Letters Patent No. 572,357, granted to me December 1, 1896. The present invention gives to the spindle a similar movement; but the devices which liberate the spindle from one revolving head and lock it rigidly to the next revolving head are positive in their operations and are very simple and not liable to get out of repair. The range of carrier-jaws may be an arc of a circle or nearly so when weaving a braid, or they may be in a circle when braiding a tubular fabric, and the present machine is adapted to use with cords or threads or with wires, and each spool-carrier has an exchange-plate that passes in between the jaws, and it is provided with curved slots, and there are exchange-locks in the carrier-jaws that are actuated by cams in liberating the locks, and as the carrier, with the exchange-plate, is taken by one of the revolving jaws and brought around to coincide with the adjacent revolving jaw the exchange-plate hooks around the locking-pin and is thereby firmly connected, and the switch-cam which has been swung automatically by the action of the spool-carriers simultaneously disengages the lock-pin, so as to liberate the plate and carrier from the first revolving carrier-jaw and allow such spool-carrier to be taken around the half-circle by the next of the carrier-jaws and from there delivered to the adjacent carrier-jaw, and so on the respective carriers are taken either in an arc of a circle or around in a circle, and one set of carriers is going in one direction and the other set is going in the other direction, and where

the range of carrier-jaws is substantially an arc of a circle the spool-carriers at the end of the range are brought around and reëntered in the carrier-jaw, so as to travel back in the opposite direction. 55

In the drawings, Figure 1 is a plan view. Fig. 2 is an elevation. Fig. 3 is a section through the carrier-heads and an elevation of the spool-carrier and the spindle thereof, partially in section. Fig. 4 is an elevation of the spool-carrier separately. Fig. 5 is a side view of the switch. Fig. 6 is a detached plan of the transfer-plate with the spindle in section, and Fig. 7 shows by perspective views the safety-cams. 60 65

I have represented in the drawings two of the revolving carrier-jaws which will illustrate the present improvement, as the machine is provided with any desired number of these carrier-jaws, according to the number of threads or wires employed in the tubular braid or in the flat braid, and this feature being well known in braiding-machines does not require further elaboration. 70 75

A portion of the bed of the machine is represented at A and it is advantageous to provide side rails A'. The pivots B are supported by the bed, which advantageously is below the operative parts of the machine, and these pivots B stand either vertical or at an inclination, according to the character of the machine, it being preferable in a circular machine to place these pivots at an inclination. The gears C surround the respective pivots, and these gears interlock and are driven by any suitable power, one gear going in the opposite direction to the adjacent gears. Upon each gear there are the carrier-jaws D, there being preferably four jaws on each head, and each jaw has at its end recesses 5, adapted to receive the spool-carrier E, and it is to be understood that the recesses 5 are substantially half-cylindrical, so that when two jaws come opposite to each other the opening between them formed by the recesses will correspond to the spindle or cylindrical portion of the spool-carrier, and there are in the carrier-jaws top and bottom portions, so that the slots 6 or openings between the upper and lower portions of the jaws are adapted to receive the exchange-plate F of the spool-carrier, such exchange-plate fitting between the 80 85 90 95 100

parts of the jaws without looseness and preferably with a slight friction upon the surfaces of the exchange-plate by contact with the upper and lower portions of the jaw, and it is to be understood that in the ordinary circumstances under which the machine is used there will be in each of the revolving carrier-jaws two of the spool-carriers and one will be going in one direction and the other going in the other direction, and the transfer will be made according to the direction in which the spool-carrier is traveling, and for these reasons the parts that control the exchange of the carrier and its plate from one of the revolving carrier-jaws to the other must be constructed so as to work in either direction, and as all of the carrier-jaws and the spool-carriers are constructed alike it is only necessary to describe in detail one of such spool-carriers and one of the jaws upon the revolving carrier.

Each of the carrier-jaws has an exchange-lock 7, preferably in the form of a parallel-sided round pin, the lower end of which goes into a hole in the gear C, and a spring is employed to raise the exchange-lock, and this spring is advantageously placed in the hole in the gear, and the upper end of this exchange-lock passes across the slot or opening 6 between the jaws, and it is advantageous to provide a guide to prevent the exchange-lock revolving.

I have shown a pin at 8 upon a head 9 or lock-trip, which pin passes into the under side of the revolving carrier-jaw, and this head 9 is acted upon by a cam, as hereinafter described, to pull it down for unlocking the exchange-plate. Referring now to this exchange-plate F, it will be seen by Figs. 1 and 6 that there are curved slots 10 coming in from the side and near each end of the exchange-plate, and these curved slots are such that as one carrier-jaw moves around and carries with it the exchange-plate and moves the exchange-plate into the jaw of the adjacent carrier the slot allows the exchange-plate to go into position with the exchange lock-pin in its elevated position, so that such exchange-plate is firmly locked into the adjacent jaw by the act of the exchange-plate being carried into position, and it is necessary to draw down the exchange-lock by a lock-trip, hereinafter described, to allow the exchange-plate to separate from the first jaw that was carrying it and pass off with the second jaw. In consequence of the change of position and of the direction of motion the inertia of the spool-carrier will tend to make the hook ends of the exchange-plate bind more firmly against the exchange-lock, and hence there will be no possibility of the spool-carrier or the exchange-plate separating from the carrier-jaw that receives it and carries it on during a half-circle of the movement of the carrier-jaw.

I find it advantageous to employ a circular hub upon the carrier-plate and surrounding

the spool-spindle and fitting into corresponding recesses in the ends of the carrier-jaws, so as to aid in directing the spool-carrier accurately into position and lessening the possibility of the spindle of the spool-carrier becoming misplaced. Any suitable mechanism may be employed for actuating the exchange-locks, but I prefer to employ the switch G, which is pivoted at 11, there being a spring 12 around the pivot-screw and bearing upon the switch to apply the desired friction for holding the switch in position, or any other suitable friction may be made use of, as the switch has to be moved first one way and then the other way, and I also remark that it is advantageous to place these switches in the manner illustrated in the plan view Fig. 1, with the pivot 11 for one switch upon one rail A' and a pivot for the next switch on the opposite rail, so that the switches stand in opposite directions, and it will be apparent that in consequence of placing the switches in this manner the pivot of each switch is in the direction toward which the jaws at this side of the carriers are moving, and by placing the switches in this manner I am able to use switches that are all identically the same in construction and operation. The lower end of the spool-spindle projects below the lower surface of the carrier-jaw and moves slightly above the surface of the switch G, and upon this switch G are converging cams 13, that stand above its upper surface, and there are cams 14 on the opposite edges and closely adjacent to but in the rear of the cams 13, and the positions of these converging cams 13 are such that the lower end of the spool-carrier spindle E acts upon one of the cams 13 and moves the switch G in one direction, and this motion is given to the switch before the jaws come exactly in line and before the transfer is made, and hence the cam 14 at one side is in position to act upon the trip 9 of the exchange-lock and pull the same down, the cams 14 being downwardly inclined, so that the trip passing against one of the cams 14 and underrunning it is drawn down, and in so doing the exchange-plate is unlocked from the carrier that had been moving it, allowing the carrier that has taken the exchange-plate to carry it off for describing a half-circle in the opposite direction. When the next spool-carrier comes around, the lower end of its spindle coming into contact with the other converging cam 13 upon the switch G moves such switch in the other direction and brings the opposite cam 14 in position for acting upon the trip 9 of the exchange-lock to unlock the exchange-plate that had been carried by that revolving jaw by the trip underrunning the cam 14. The spool-carrier that is going in the other direction passes around the other side of the carrier-jaws, and in each movement of the switch such switch is left in a position ready to be acted upon and moved the other way by the lower end of the spindle of the spool-carrier coming in the other direction. In this

way the switch is caused to act in first one direction and then in the other direction; but the two sides of the switch being exactly alike the action is similar, but in the opposite direction, and by the devices thus far described the spool-carrier and the exchange-plate are taken automatically and reliably from the jaws of one revolving carrier to the jaws of the adjacent revolving carrier as these jaws come together, so that the carriers are moved in one direction by one revolving jaw and in the opposite direction by the other revolving jaw. Hence these spool-carriers can be progressed around the machine or from one end to the other and back again by the transfer from one revolving jaw to the other, such transfers being made in opposite directions, as before indicated.

It is advantageous to make the upper surfaces of the cams 14 at the same height as the top surfaces of the converging cams 13 and to make the inner vertical surfaces of the projections forming the cams 14 in the proper positions, so that these vertical surfaces of the cams 14 may come against the lower end of the spool-carrier spindle to prevent the switch moving too far by inertia, and the cam-surfaces that act upon the lock-trip being at a downward inclination, as shown in Fig. 5, should terminate at a horizontal surface, as indicated, so as to hold down the trip after it has been drawn down until the exchange-plate separates from the jaw so completely as to prevent the possibility of the exchange-lock springing up again and catching the end of the exchange-plate that has been unlocked.

The springs 15, that act to lift the exchange-locks, are protected from injury in consequence of being in holes in the gears C. In case, however, of the parts not being properly lubricated or of any spring not being sufficiently strong to raise the exchange-lock it is important that such exchange-lock should be lifted to avoid any injury to the parts and to prevent either of the spool-carriers falling out, and with this object in view the safety-cams H are applied upon the rails A' of the frame, and each safety-cam is made with an inclined end, against which the lock-trip will run to raise up the exchange-lock into its elevated position ready for receiving the slot of the exchange-plate, and these safety-cams H are advantageously placed at opposite sides of the respective revolving carrier-jaws, and hence in case any spring is not fully operative the safety-cam raises the exchange-lock properly into position. As the heads revolve in opposite directions, the safety-cams have to be inclined, as illustrated in Fig. 7, one cam being adapted to act on the lock-trip moving in one direction and the other safety-cam acting with the lock-trip that moves the other way.

Upon each spool-carrying spindle E there is a frame 16, with a cross-piece 17 at the top, that is hinged or pivoted to one side of the

frame 16, so as to be opened to allow a spool to be placed over the upper end of the carrier E or removed therefrom, after which the cross-piece 17 is closed and held by a spring 18. These parts can be of any desired character, and through an arm on the cross-piece 17 there is an eye or guide 19, through which the thread, cord, or wire passes off to the point where the braiding takes place; but such thread, cord, or wire is led from the spool below a grooved roller 20, through an eye 21, over a grooved roller 22, around a grooved roller 23, upon the take-up lever I, and thence below the grooved roller 24, and up through the eye or guide 19. This take-up lever I is pivoted at 25, and it is provided with crank-arms 26, one at each end of the pivot, and hence at opposite sides of the frame 16, and one of these crank-arms can be made integral with the take-up lever I, as shown, and these crank-arms 26 are similar and project toward the spool-carrier E, and hence when the outer end of either crank-arm is raised the take-up lever I carries the roller 23 away from the grooved rollers 22 and 24 and takes up slack in the cord, thread, or wire and applies the proper tension at the point where the cords, threads, or wires are laid up in the braiding operation, and in order to give motion to this take-up lever when the spool-carrier is moving at one side or at the other side of either of the revolving carrier-jaws I make use of an inclined disk K above each carrier-jaw, and such inclined disk is upon an inclined axle or arbor L, which is at the top end of the pivot-stud B and is revolved around such arbor L by a pin 27, passing up into a slot in the inclined disk K, so that the inclined disk rotates with the carrier-jaws, but remains in the inclined position, and one of the crank-arms 26 on each spool-carrier passes over the edge of the inclined disk as the jaws come together for the transfer of the spool-carrier, and hence as the spool-carrier is moved around by the jaw into which it has been received the crank-arm is acted upon by the edge of the disk that is beneath it coming to the place where the inclined disk is the highest and the highest side of the disk is toward the center of the machine, where the threads are laid together to form the braid. Hence the take-up or tightening of the cord, thread, or wire is effected at the proper time, and then the further rotation of the spool-carrier along with the jaw allows the take-up lever to move in the other direction in consequence of the crank-arm resting upon a portion of the disk that is in a lower position. Hence in this manner the take-up is operated as the spool-carriers are carried around by the jaws. At the place where the spool-carrier is transferred from one carrier-jaw to the other the arm 26 passes off one of the inclined disks K, and the other arm 26 at the other end of the pivot I passes upon the adjacent disk, and to prevent rubbing action the disks K are notched slightly in front of the portion

upon which the end of the crank-arm rests, so that as the spool-carrier is taken from one revolving jaw to the other the arm 26 which is leaving one of the inclined disks passes
 5 off the said disk where it is notched, and the corresponding crank-arm at the other end of the pivot, resting upon the disk at the carrier-jaws that have received the exchange-plate and disk, is held in a corresponding position,
 10 so that the take-up lever is not changed in its position by the act of transfer, and the tension is maintained upon the thread, cord, or wire, and the take-up is operative reliably notwithstanding the transfer of the spool-
 15 carrier from one set of jaws to another.

In consequence of the aforesaid device for operating the take-up lever there is no rubbing friction of the parts, and there is simply the friction due to revolving the inclined disk
 20 around its arbor, and any desired extent of power can be obtained to act upon the take-up, so that the same is adapted to wire or other comparatively stiff filaments.

In braiding-machines it is necessary to provide a stop mechanism that is brought into action when either of the cords, threads, or wires breaks, and I make use of the grooved roller 24 and a lever 28, upon which it is supported, to bring into action the stop-motion.
 30 This lever 28 is pivoted at the back end, and there are slings or connections 29 between the said lever 28 and the drop-collar 30 that surround the spindle of the spool-carrier.

I find it advantageous to employ a wire in
 35 a groove at one side of the spool-carrier spindle to form the connection to the drop-collar, and this at the upper end is bent in the form of a loop passing over the lever 28 to form the sling by which the drop-collar can be
 40 raised when the roller 24 is elevated and in its normal position; but when the cord, thread, or wire breaks the grooved roller 24 drops, and along with it the lever 28, sling 29, and drop-collar 30, and it is advantageous to have
 45 a recess in each jaw D, so that when this collar drops it passes into the recess, and a lever M, adjacent to each of the revolving carrier-jaws, is in such a position that when the parts are in their normal operative condition the
 50 drop-collar 30 passes over the lever M; but when the thread breaks and the collar drops it engages the lever M to operate any desired stop-motion, which, being well known, is not shown in the drawings, and when the break
 55 in the thread or cord has been mended or the filament properly replaced the tension upon the same lifts the grooved roller 24, and with it the drop-collar, so that the latter is not in the path of the stop-lever.

60 The pin P, that passes through the lower part of the spindle E, has projecting ends, and these rest against the surfaces of the metal adjacent to the half-circle recesses in the jaws to lessen the risk of the spindle turning or becoming misplaced.

I claim as my invention—

1. The combination with the spool-carrier

and an exchange-plate therewith connected, of revolving carrier-jaws recessed on their ends to receive the spindle of the spool-carrier and slotted for the reception of the exchange-plate and an exchange-lock for holding the exchange-plate, and a switch to automatically move the exchange-lock in the revolving carrier-jaws that have held the exchange-plate so that such exchange-plate and the spool-carrier may be taken off by the second jaw, substantially as set forth.

2. The combination with the spool-carrier and an exchange-plate therewith connected, of revolving carrier-jaws recessed on their ends to receive the spindle of the spool-carrier and slotted for the reception of the exchange-plate and an exchange-lock formed of a vertical pin and a lock-trip thereon, a switch having converging cams acted upon by the lower end of the spool-carrier spindle to move the switch and edge cams to act upon the lock-trip, substantially as set forth.

3. The combination with the spool-carrier and an exchange-plate therewith connected, of revolving carrier-jaws recessed on their ends to receive the spindle of the spool-carrier and slotted for the reception of the exchange-plate and an exchange-lock formed of a vertical pin and a lock-trip thereon, a switch having converging cams acted upon by the lower end of the spool-carrier spindle to move the switch and edge cams to act upon the lock-trip, and frictional pivots whereby the switches are held upon the frame of the machine in opposite positions, substantially as set forth.

4. The combination with the spool-carrier and an exchange-plate therewith connected, of revolving carrier-jaws recessed on their ends to receive the spindle of the spool-carrier and slotted for the reception of the exchange-plate and an exchange-lock and a pivoted switch having two sets of cams, one set being used for moving the switch and the other set for unlocking the exchange-locks, substantially as set forth.

5. The combination with the spool-carrier and an exchange-plate therewith connected, of revolving carrier-jaws recessed on their ends to receive the spindle of the spool-carrier and slotted for the reception of the exchange-plate and an exchange-lock in each jaw normally occupying an elevated position, the exchange-plate being slotted so as to engage the exchange-lock and mechanism for liberating the exchange-lock in the jaw that has held the exchange-plate so as to allow such exchange-plate and the spool-carrier to be taken by the second jaw, substantially as set forth.

6. The combination with the spool-carrier and an exchange-plate therewith connected, of revolving carrier-jaws recessed on their ends to receive the spindle of the spool-carrier and slotted for the reception of the exchange-plate and an exchange-lock in each jaw having a lock-trip and a switch piv-

oted upon the frame and having cams acted upon by the spool-carrier to move such switch and cams acting upon the lock-trip for withdrawing the lock in the jaws that have been holding the exchange-plate, there being upon the switch flanges that prevent the switch being moved too far by inertia, substantially as set forth.

7. The combination with the jaws and spool-spindle and the mechanism for locking the spool-carrier to the jaws in succession as the exchange from one set of jaws to the other is effected, of an inclined stud and disk and a connection from the disk to the revolving carrier for causing the parts to revolve together, and a take-up lever upon the spool-carrier and acted upon by the inclined revolving disk to take up the thread or wire, substantially as set forth.

8. The combination with the jaws and spool-spindle and the mechanism for locking the spool-carrier to the jaws in succession as the exchange from one set of jaws to the other is effected, of a take-up lever and its arms and an inclined disk above each set of revolving carrier-jaws, for acting upon the arms of the take-up lever as the spool-carrier is moved, a pin for connecting the inclined disk with the revolving carrier-jaws so that they revolve together, the inclined disk being upon an axis at an inclination, substantially as set forth.

9. The combination with the jaws and spool-spindle and the mechanism for locking the spool-carrier to the jaws in succession as the exchange from one set of jaws to the other is effected, of a take-up lever and its arms and an inclined disk above each set of revolving carrier-jaws, for acting upon the arms of the take-up lever as the spool-carrier is moved, a pin for connecting the inclined disk with the revolving carrier-jaws so that they

revolve together, the inclined disk being upon an axis at an inclination, there being notches in the inclined disk adjacent to the place upon which the end of the take-up-lever arm rests, so that such arm passes off the disk at the notch as the carrier is transferred, substantially as set forth.

10. In a braiding-machine having revolving jaws and spool-carriers and mechanism for holding the spool-carrier as transferred from one set of jaws to another, of a drop-collar upon the spindle of the spool-carrier, a lever and a grooved roller around which the thread, cord or wire passes for holding the same up, and a connection from the lever to the drop-collar, whereby the drop-collar falls into a position to actuate a mechanism for stopping the machine when either thread breaks, substantially as set forth.

11. In a braiding-machine having revolving carrier-heads with jaws and spool-carriers and exchange-plates, of locks and safety-cams for raising such locks into a normal position to hold the exchange-plates and a switch to withdraw the exchange-locks, substantially as set forth.

12. In a braiding-machine having revolving carrier-heads with jaws and spool-carriers and exchange-plates, of exchange-locks and springs for raising such locks into a normal position to hold the exchange-plates and a switch to withdraw such exchange-locks and stationary safety-cams for raising the exchange-locks if they are not raised by the springs, substantially as set forth.

Signed by me this 21st day of December, 1898.

ALBERT B. DISS.

Witnesses:

GEO. T. PINCKNEY,
S. T. HAVILAND.