

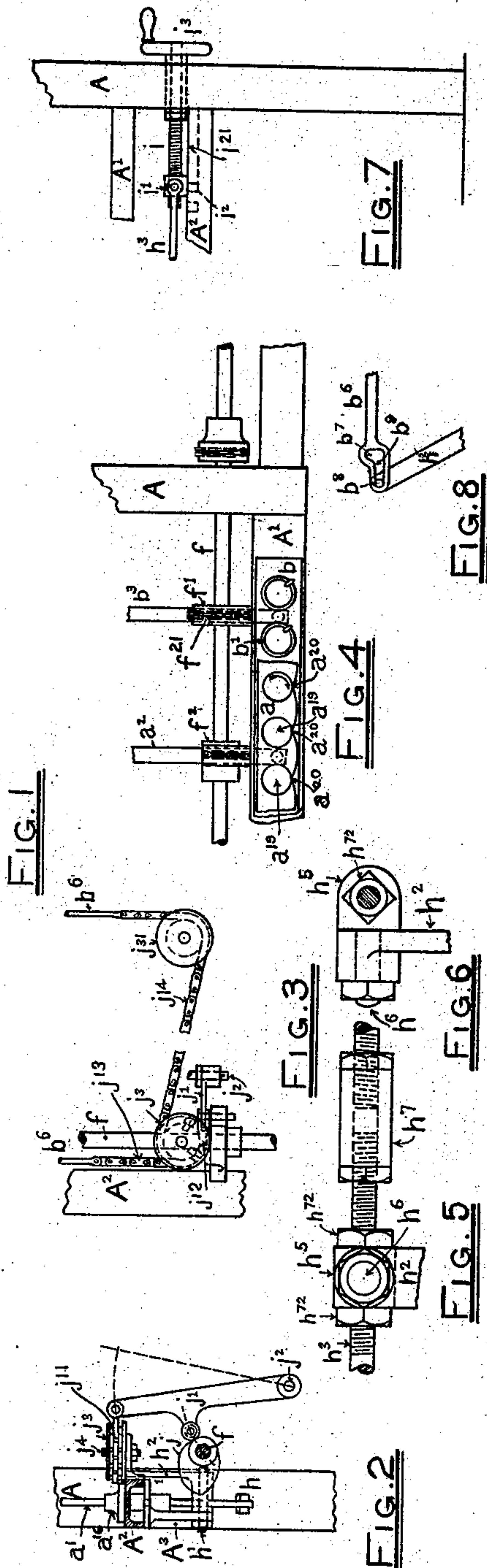
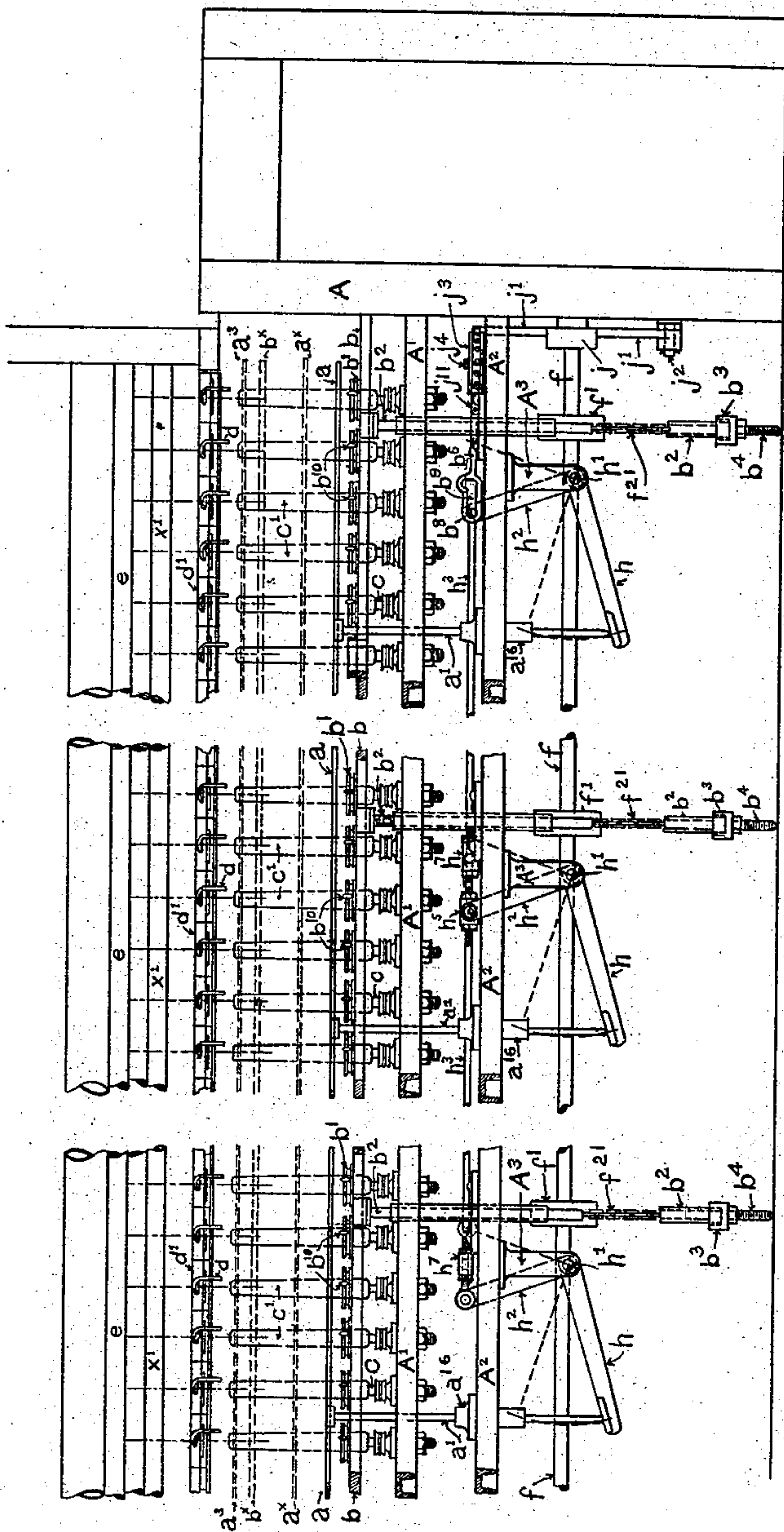
(No Model.)

2 Sheets—Sheet 1.

G. SHEPHERD & H. MIDGLEY.  
RING SPINNING AND DOUBLING FRAME.

No. 501,738.

Patented July 18, 1893.



WITNESSES  
Mary Beverly  
Saml. G. Stephens.

INVENTORS  
George Shepherd and  
Henry Midgley by  
Channing Whitaker  
their attorney.

(No Model.)

2 Sheets—Sheet 2.

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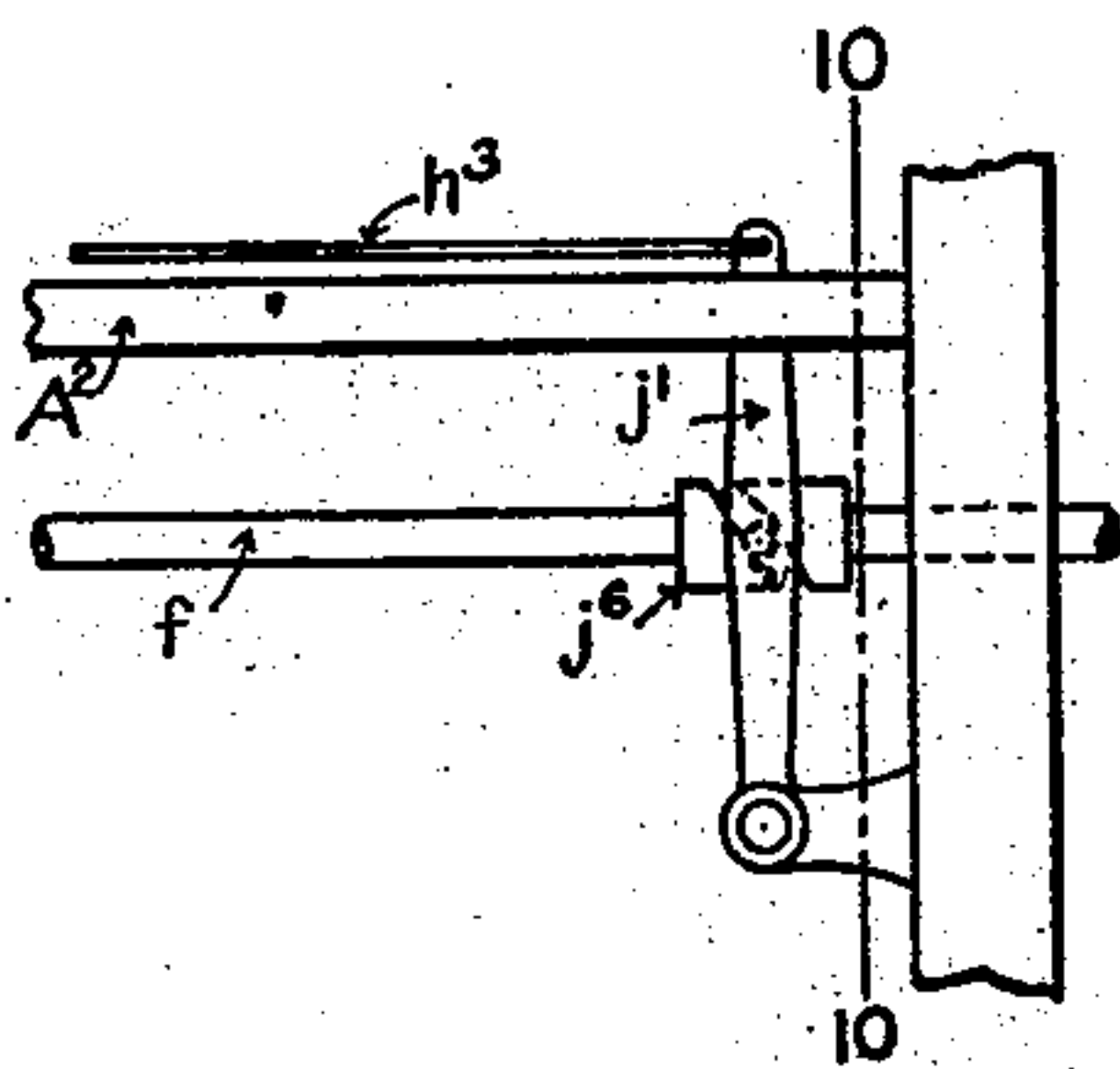


FIG. 9.

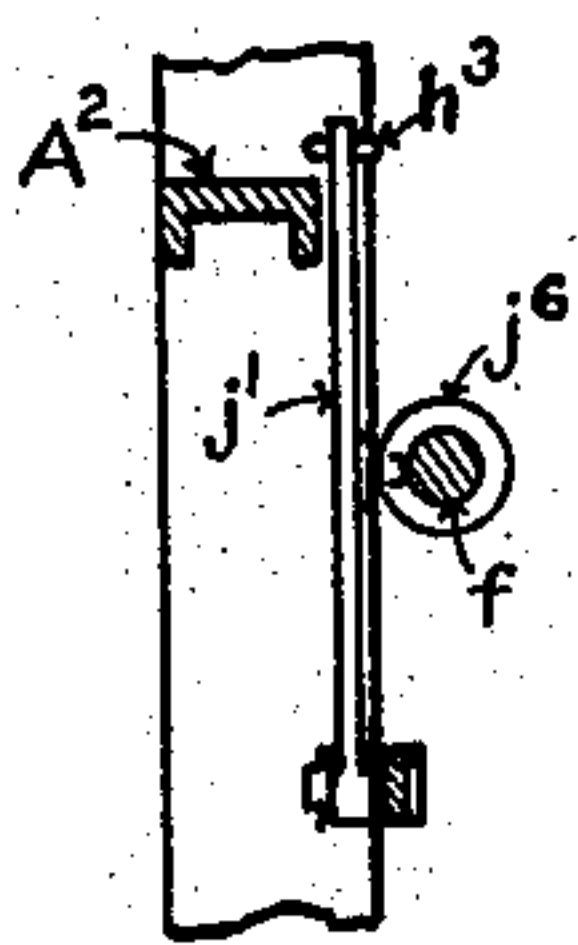


FIG. 10.

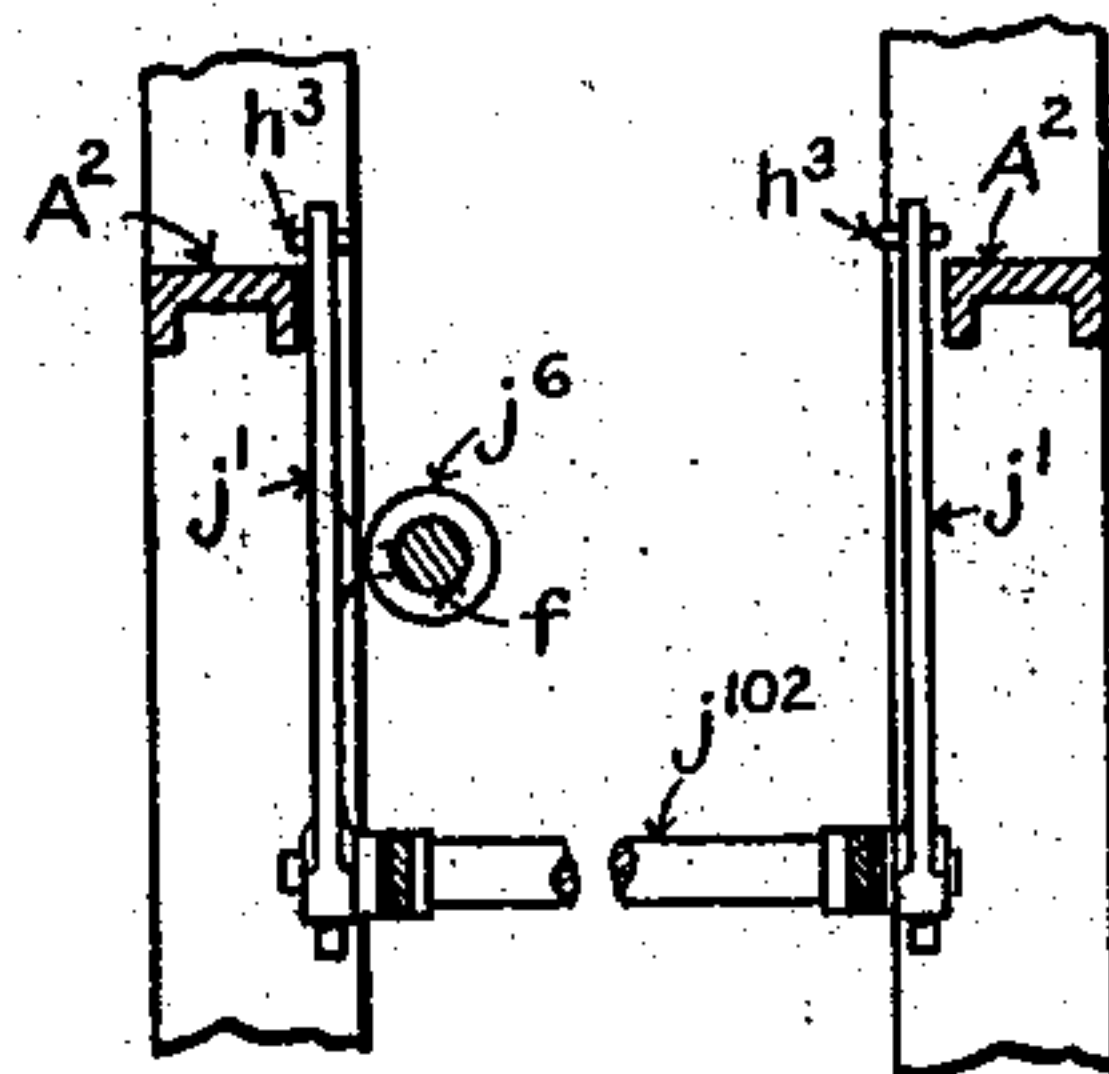


FIG. 13.

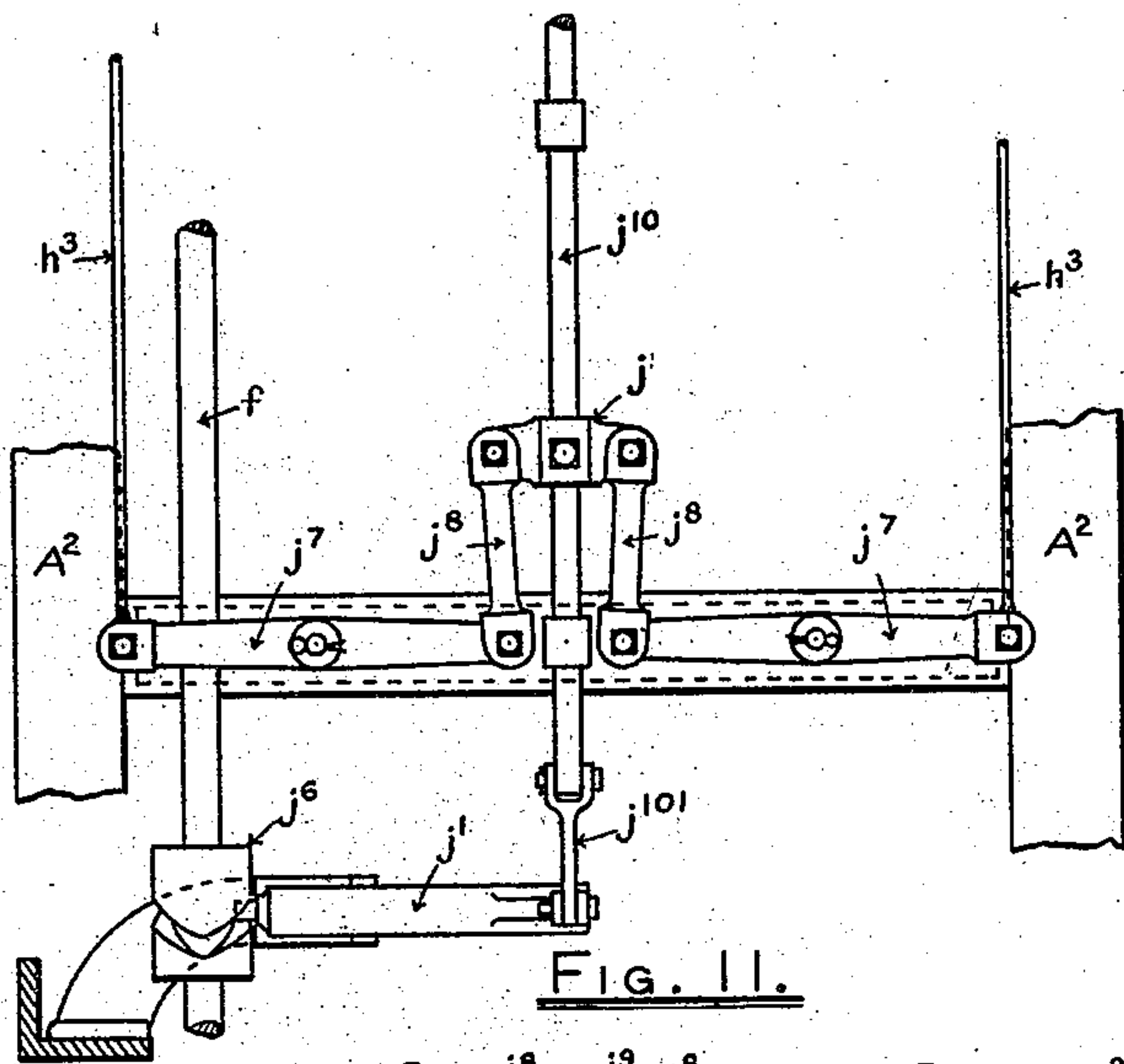


FIG. 11.

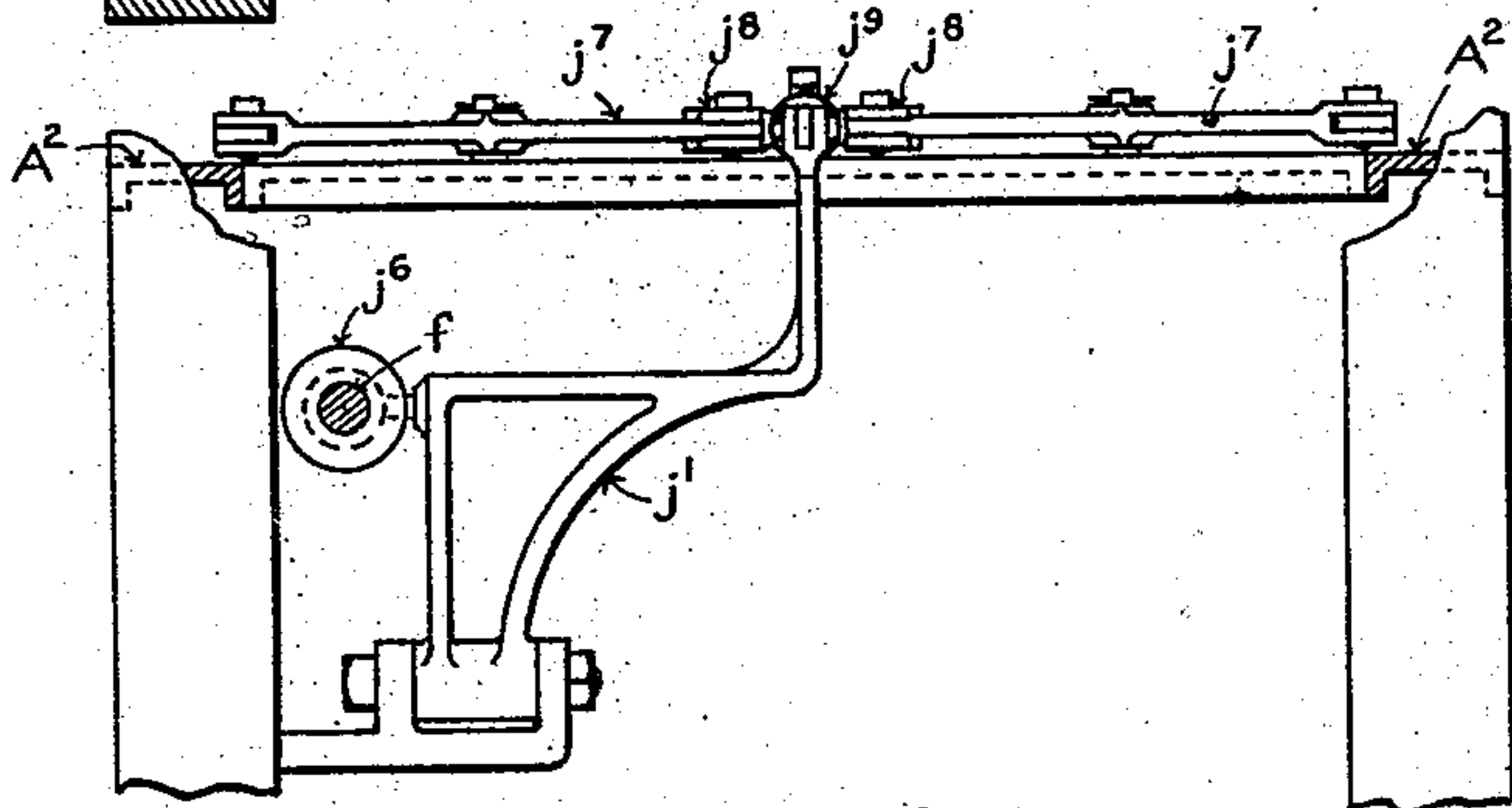


FIG. 12.

WITNESSES.

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George Shepherd and Henry Midgley,  
By  
Channing Whitaker,  
their attorney.



# UNITED STATES PATENT OFFICE.

GEORGE SHEPHERD AND HENRY MIDGLEY, OF BACUP, ENGLAND, ASSIGNORS,  
BY MESNE ASSIGNMENTS, TO THE LOWELL MACHINE SHOP, OF LOWELL,  
MASSACHUSETTS.

## RING-SPINNING AND DOUBLING FRAME.

SPECIFICATION forming part of Letters Patent No. 501,738, dated July 18, 1893.

Application filed March 9, 1893. Serial No. 465,254. (No model.) Patented in England March 8, 1884. No. 4,566.

*To all whom it may concern:*

Be it known that we, GEORGE SHEPHERD and HENRY MIDGLEY, subjects of the Queen of Great Britain, residing at Bacup, in the county of Lancaster, England, have invented certain new and useful Improvements in or Applicable to Ring-Spinning and Doubling Frames, (for which we have received Letters Patent of Great Britain, No. 4,566, dated March 8, 1884;) and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to the means which are employed in ring-spinning frames and doubling-frames for the purpose of limiting the extent of what is known as the "ballooning" of the threads being spun or twisted in such frames, or preventing the yarns, while being spun or twisted, from coming into contact with one another, and it consists in certain improved constructions and arrangements of mechanism for independently supporting and actuating or moving up and down a separate rail, or the like, which is located adjacent to the ring-rail and carries the arrangement or device which may be employed for limiting the said ballooning, or preventing the yarns from striking against one another.

In our application for United States patent filed March 9, 1893, Serial No. 465,252, we have described and claimed an improved anti-ballooning or yarn-separating arrangement consisting of a separate thin metal plate or rail, of any convenient length, or extending the entire length of the side of a ring-spinning or doubling frame if desired, this thin plate or rail being located above the ring-rail and having formed therein a hole of sufficient size for each spindle, the holes being concentric with the spindles and rings, and a narrow groove or slit leading into each hole, at about a tangent to the circle of the hole, being formed in the plate or rail for the thread to pass through. As is indicated in the drawings forming a part of this specification, we may employ this arrangement in connection with the supporting and actuating mechanism

hereinafter presented, or in lieu of the former, we may employ equivalent anti-ballooning or yarn-separating devices, that is to say, other arrangements having suitable known forms and arrangements of devices located besides the spindles in a position to operate by interfering with the tendency of the yarn-balloons to expand during the rotation of the spindles, such, for instance, as the known arrangements in which anti-balloon rings, wires, plates or other guards are mounted on a rail whereby they are sustained in proper positions adjacent to or between the spindles. In reducing our invention to practice, we mount the anti-ballooning or yarn-separating arrangement on rods that will slide freely up and down, and we actuate these rods by the improved and novel means which we presently shall proceed to describe. In the preferred embodiment of our invention we actuate the said rods by self-acting means whereby the anti-ballooning or yarn-separating arrangement is caused automatically to move at the same time as the ring-rail and in the same direction as the latter, but through a traverse which is less in extent than that of the ring-rail, and at a speed different from that of the ring-rail, the distance between the anti-ballooning or yarn-separating arrangement and the ring-rail being reduced as they rise.

Our invention first will be fully described with reference to the accompanying drawings, and then will be particularly pointed out and distinctly defined in the claims appended to this specification and forming a part hereof.

In the drawings, Figure 1 is a view in front elevation showing part of a ring-frame having applied thereto the preferred embodiment of our invention. Fig. 2 is a view showing partly in side elevation and partly in vertical transverse section certain of the parts that are represented in Fig. 1. Fig. 3 is a view in plan of certain of the parts shown in Figs. 1 and 2, it indicating the manner of transmitting motion to the anti-ballooning or yarn-separating arrangements on both sides of a ring-frame or doubling-frame. Fig. 4 is a view in plan showing part of the devices which are shown in Fig. 1. Figs. 5 and 6 are views



showing details. Fig. 7 is a view in front elevation showing an arrangement of devices that may be employed in accordance with a modification of our invention. Fig. 8 is a view showing a detail. Figs. 9, 10, 11, 12 and 13 are views showing modifications herein-after presented.

The front rolls of a ring-frame are shown at  $e$ , the thread-guides or guide-wires at  $d$ , the finger-boards at  $d'$ , the spindles at  $c$ , the bobbins mounted thereon at  $c'$ , the rings at  $b'$ , the travelers mounted on the rings at  $b^{10}$ , the ring-rail at  $b$ , the pokers whereby the ring-rail is sustained at  $b^2$ , the spindle-rail at  $A'$ , and the lower or guide-rail at  $A^2$ . All of these parts are of any known and desired character and construction.

At  $a$ , see particularly Fig. 4, is shown the form of anti-ballooning or yarn-separating arrangement hereinbefore mentioned as one of the forms which may be employed and covered by our application aforesaid. As hereinbefore indicated, it consists of a thin plate or rail of metal with a circular hole  $a^{19}$  cut out of it for each spindle, each hole being concentric with its spindle  $c$  and the corresponding ring  $b'$ , and a little larger in diameter than the inner diameter of the ring so that a full cop or bobbin will pass clear through the hole  $a^{19}$ . The spindles extend upward through the holes  $a^{19}$ , and thus the anti-ballooning and yarn-separating arrangements which the plate or rail  $a$  provides are located beside the spindles in a position to operate by interfering with the tendency of the yarn-balloons to expand during the rotation of the spindles. As shown in Fig. 4, the front edge of the plate or rail is formed with a series of rounded swells and re-entrant angles, and there is a slit  $a^{20}$  through such front edge leading from each of such angles to the adjacent hole  $a^{19}$ , to allow the thread to pass, this slit  $a^{20}$  being made at about a tangent to the circle of the hole  $a^{19}$ . The thread in each case rotates around within the hole in the direction of the arrow shown in Fig. 4, so that it passes freely over and past the opening of the slit and will not escape. If the threads rotate in the direction opposite to that shown by the arrow, the direction of the slits will have to be reversed accordingly. The plate or rail  $a$ , or its equivalent, is mounted at the upper ends of the sliding rods  $a'$ . At  $a^{16}$ ,  $a^{16}$ , are shown guides by which the rods  $a'$ ,  $a'$ , are held in upright position, and through which guides the said rods slide up and down. The rods  $a'$  supporting the rail or plate  $a$  or its equivalent are actuated independently of the ring-rail or coping-rail  $b$  by rockers in the form of bell-crank levers  $h$ ,  $h$ , each having its fulcrum  $h'$  on a bracket  $A^3$  secured to the rail  $A^2$ . The arms  $h^2$ ,  $h^2$ , of the said levers are connected together by a wire or rod  $h^3$  passing from one of said arms to the other thereof, the said rod being composed of parts united by a right-and-left-handed screw coupling  $h^7$  whereby to effect adjustment of the combined

length of such parts and adjust the position of the left-hand lever or levers  $h$  and the level of the plate or rail  $a$ , or its equivalent. The end of the arm  $h^2$  of each lever  $h$  is or may be formed with an arm eye  $h^5$  swiveling on a pin  $h^6$  passing through a hole in the end of the arm, as shown in the case of the second lever  $h$  in Fig. 1, and in enlarged detail in Figs. 5 and 6. The rod or wire  $h^3$  connecting the arms  $h^2$ ,  $h^2$ , of the levers  $h$ ,  $h$ , in this case, is made to pass through the eye  $h^5$ , and there is a screw-nut  $h^{72}$ , on each side of the swivel eye  $h^5$ , so that each bell-crank lever  $h$  may be adjusted separately without disturbing the adjustment of the other levers. The levers  $h$ ,  $h$ , may be moved, for the purpose of moving or adjusting up and down the plate or rail  $a$ , or its equivalent, by various means. The arrangement shown in Fig. 7 may be employed. In the latter figure, the rod  $h^3$  is shown connected at its end with a nut  $i'$  mounted upon a screw-shaft  $i$  held in suitable bearings in the end of the frame  $A$ , the said nut being prevented from revolving with the screw-shaft by a pin  $i^2$  extending from it, which moves freely in a slot  $i^{21}$  in the rail  $A^2$  or in a part carried by that rail. When the screw-shaft  $i$  is rotated by the hand-wheel  $i^3$ , the nut  $i'$ , and consequently the plate or rail  $a$  or equivalent arrangement, will be adjusted into any required position. The arrangement shown in Fig. 7 may be duplicated on the opposite sides of a frame or the levers  $h$  on both sides of a frame may be connected with one such arrangement.

In Figs. 1, 2 and 3, we have shown self-acting means whereby the levers  $h$ ,  $h$ , may be operated to move the plate or rail  $a$ , or equivalent arrangement, up and down. At  $f$  is a shaft extending lengthwise of the frame at one side thereof, and connected in usual manner with the pokers of the ring-rail. The drawings show blocks or pulleys  $f'$  fixed on the said shaft, and chains  $f^{21}$ , each connected at one end with one of such blocks or pulleys, and at the other end with a bar  $b^3$  having a socket formed therein for the reception of the lower end of one of the pokers. At  $b^4$  is shown a stop projecting below each bar  $b^3$ , and intended to arrest the descent of the ring-rail when the latter, in being lowered by hand, has reached a position which is low enough to enable doffing to be effected. In practice, the said shaft  $f$  is caused to rock by suitable known means, and thereby the usual movements of the ring-rail or coping-rail are occasioned. At  $j$  is shown a cam of suitable shape, mounted upon the shaft  $f$  and acting upon a bowl or stud on a lever  $j'$  having its fulcrum on a stud  $j^2$  carried by the framing, or carried by a bracket projecting from the framing. The end of the lever  $j'$  has a short length of chain  $j^{11}$  attached to it that passes partly around a pulley  $j^3$  free to turn on a stud  $j^4$  on a bracket secured to the rail  $A^2$ . The other end of the said short chain is connected with the rod or wire  $b^6$  on the same side of the frame, and thus, as the shaft  $f$  and cam  $j$



oscillate, the plate or rail  $a$ , or equivalent arrangement, will be moved up and down accordingly. When the shaft  $f$  is turned by hand, as it may be to lower the ring-rail to the position for doffing, the shape and arrangement of the cam  $j$  permit of the plate or rail  $a$ , or equivalent arrangement, being lowered also to the proper doffing position. Instead of the disk-cam  $j$  being employed, as shown, a drum-cam  $j^6$  may be used, as shown in Figs. 9 and 10, the action of such cam being in a line with the shaft  $f$ , and when this latter form of cam is used the lever  $j'$  will be changed in position accordingly, and the wire or rod  $b^6$  may be connected directly with the end of the said lever. The pulley  $j^3$  may be a pulley with three grooves, and the short lengths of jointed chain in each groove may be attached thereto, one chain  $j^{12}$  extending between the lever  $j'$  and its groove, say the middle groove, another chain  $j^{13}$  extending from the lower groove to the wire or rod  $b^6$ , and another  $j^{14}$  extending from the third groove to and around a pulley  $j^{31}$  on the other side of the frame, where it is connected with the wire or rod  $b^6$  on the latter side. Thereby, the anti-ballooning or yarn-separating arrangements on both sides of the frame may be simultaneously actuated from the same cam. It is obvious that instead of chains and pulleys levers may be used, and a shaft may be used to connect the mechanism of one side of the frame with that on the other side, if desired.

Figs. 11 and 12 show one of the arrangements of levers and connections that may be employed as just mentioned, if desired. It is to be understood, however, that no particular form and arrangement of the levers and their connections is regarded by us as especially important. Fig. 11 is a plan view illustrating sufficient to make clear the modification intended to be represented therein. Fig. 12 is a partly sectional elevation of the parts which are shown in Fig. 11. At  $j^7, j^7$ , in these figures, are represented horizontal levers having their outer ends joined or connected to the wires or rods,  $h^3, h^3$ , and their inner ends connected by short rods or links,  $j^8, j^8$ , to a cross-piece or head,  $j^9$ , on a sliding rod,  $j^{10}$ , that is joined by a short rod or link,  $j^{101}$ , to the lever  $j'$ , the latter being actuated by a drum-cam,  $j^6$ , on the shaft,  $f$ . Fig. 13 is a sectional elevation showing an arrangement in which a shaft is used to connect the mechanism on one side of the frame with that on the other side, if desired, as stated above. In this figure the levers,  $j', j'$ , on opposite sides of the frame are made fast upon a rock-shaft,  $j^{102}$ , one of the said levers being engaged and actuated by the drum-cam,  $j^6$ , on the shaft,  $f$ .

In place of lowering the plate or rail  $a$ , or its equivalent, in the arrangement shown in Figs. 1, 2 and 3, by turning shaft  $f$  by hand, the lowering and subsequent raising may be effected through the aid of a lengthening and shortening or releasing arrangement such as

that shown in detail in Fig. 8. In Figs. 1 and 8 the rod or connection  $b^6$  between the lever  $j'$  and the arm  $h^2$  of the first lever  $h$  is shown formed with a slot  $b^9$  in an enlarged part thereof, the said slot having at one end thereof a notch or offset  $b^7$  in which fits normally the pin  $b^8$  on the said arm  $h^2$ . By lifting the end of the wire or rod  $b^6$  the notch  $b^7$  is released from the pin  $b^8$ , and the arm  $h^2$  is then allowed to turn until the pin reaches the end of the slot, so as to occasion the lowering of the plate or rail, or its equivalent. By moving the arm  $h^2$  to lift the plate or rail, or its equivalent, the notch  $b^7$  at the end of the slot will again catch upon the pin  $b^8$ .

Other known and equivalent lengthening and shortening, or releasing, arrangements may be used.

We do not lay broad claim herein to mounting the plate or rail, or its equivalent, on rods and operating the same by means whereby it is caused to move in unison with the ring-rail but at reduced speed, and through a traverse of diminished extent, or to the stop for determining the limit to which the ring-rail may descend when being lowered for doffing, for we have laid such claim in our application for patent hereinbefore mentioned. Nor do we lay broad claim herein to operating the said rod and plate or rail by means of an arm which engages with the said rod to actuate the same, and is provided with means for moving it up and down, or any claim to providing the said arm with operating connections having lengthening and shortening means, for such claim we have laid in our other application for patent for ring-spinning and doubling frames, filed March 9, 1893, Serial No. 465,253.

We claim as our invention—

1. The combination with the ring-rail, and means for actuating the ring-rail, of a rail or plate having anti-ballooning or yarn-separating arrangements located beside the spindles, a lever operating to actuate the said rail, or plate independently of the ring-rail, and separate means for moving the said lever to raise and lower the said rail or plate, substantially as described.

2. The combination with the ring-rail, and means for actuating the ring-rail, of a rail or plate having anti-ballooning or yarn-separating arrangements located beside the spindles, a rod by which said rail or plate is supported, a guide for the said rod through which the latter moves up and down, a lever operating upon the said rod to actuate the said rail or plate independently of the ring-rail, and separate means for moving the said lever to raise and lower the said rail or plate, substantially as described.

3. The combination with the ring-rail, and means for actuating the ring-rail, of a rail or plate having anti-ballooning or yarn-separating arrangements located beside the spindles, rods by which the said rail or plate is supported, levers whereby the said rods are op-



erated, separate actuating means for the levers, and a wire or rod connecting the levers, substantially as described.

4. The combination with a rail or plate having an anti-ballooning or yarn-separating arrangement, of rods by which the said rail or plate is supported, levers whereby the said rods are operated, actuating means for the levers, and a wire or rod connecting the levers and having an adjusting device whereby its length may be varied, substantially as described.

5. The combination with a rail or plate having an anti-ballooning or yarn-separating arrangement, of rods by which the said rail or plate is supported and operated, levers whereby the said rods are operated, actuating means for the levers, and a wire or rod connecting the levers composed of parts having a right-and-left-handed screw coupling whereby to effect adjustment of the combined length thereof, substantially as described.

6. The combination with a rail or plate having an anti-ballooning or yarn-separating arrangement, of a rod by which the said rail or plate is supported and operated, a lever whereby the said rod is operated, a swiveling eye carried by said lever, a connecting wire or rod passing through the said eye, nuts on the said wire or rod on opposite sides of the swiveling eye, and actuating means with which the said wire or rod is connected, substantially as described.

7. The combination with a rail or plate having an anti-ballooning or yarn-separating arrangement, of rods by which the said rail or plate is supported and operated, levers whereby the said rods are operated, a swiveling eye carried by one of the said levers, a connecting wire or rod passing through said eye and

composed of parts having a right-and-left-hand screw coupling, nuts on the said wire or rod on opposite sides of the swiveling eye, and actuating means with which the said wire or rod is connected, substantially as described.

8. The combination with a rail or plate having an anti-ballooning or yarn-separating arrangement, of rods by which the said rail or plate is supported and operated, levers whereby the said rods are operated, an actuating lever connected with said levers, and a cam for operating said actuating lever, substantially as described.

9. The combination with the rails or plates on opposite sides of a frame, having anti-ballooning or yarn-separating arrangements, of rods by which the said rail or plate at each side is supported and operated, levers for operating the rods at each side, an actuating lever connected with the levers on both sides of the frame, and means for operating said actuating lever, substantially as described.

10. The combination with the rails or plates on opposite sides of a frame, having anti-ballooning or yarn-separating arrangements, of rods by which the said rail or plate at each side is supported and operated, levers for operating the rods at each side, an actuating lever connected with all the levers on both sides of the frame, and a cam for operating said actuating lever, substantially as described.

In testimony whereof we have hereunto affixed our signatures in the presence of two witnesses.

GEORGE SHEPHERD.  
HENRY MIDGLEY.

Witnesses:

JAMES S. BROADFOOT,  
HERBERT R. ABBEY.