(No Model.)

2 Sheets—Sheet 1.

G. SHEPHERD & H. MIDGLEY.

RING SPINNING AND DOUBLING FRAME.

No. 501,737. Patented July 18, 1893.

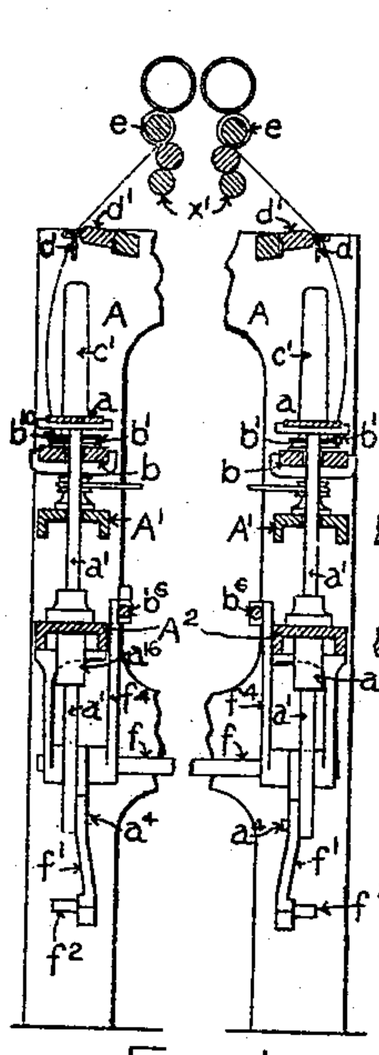

FIG. 1a.

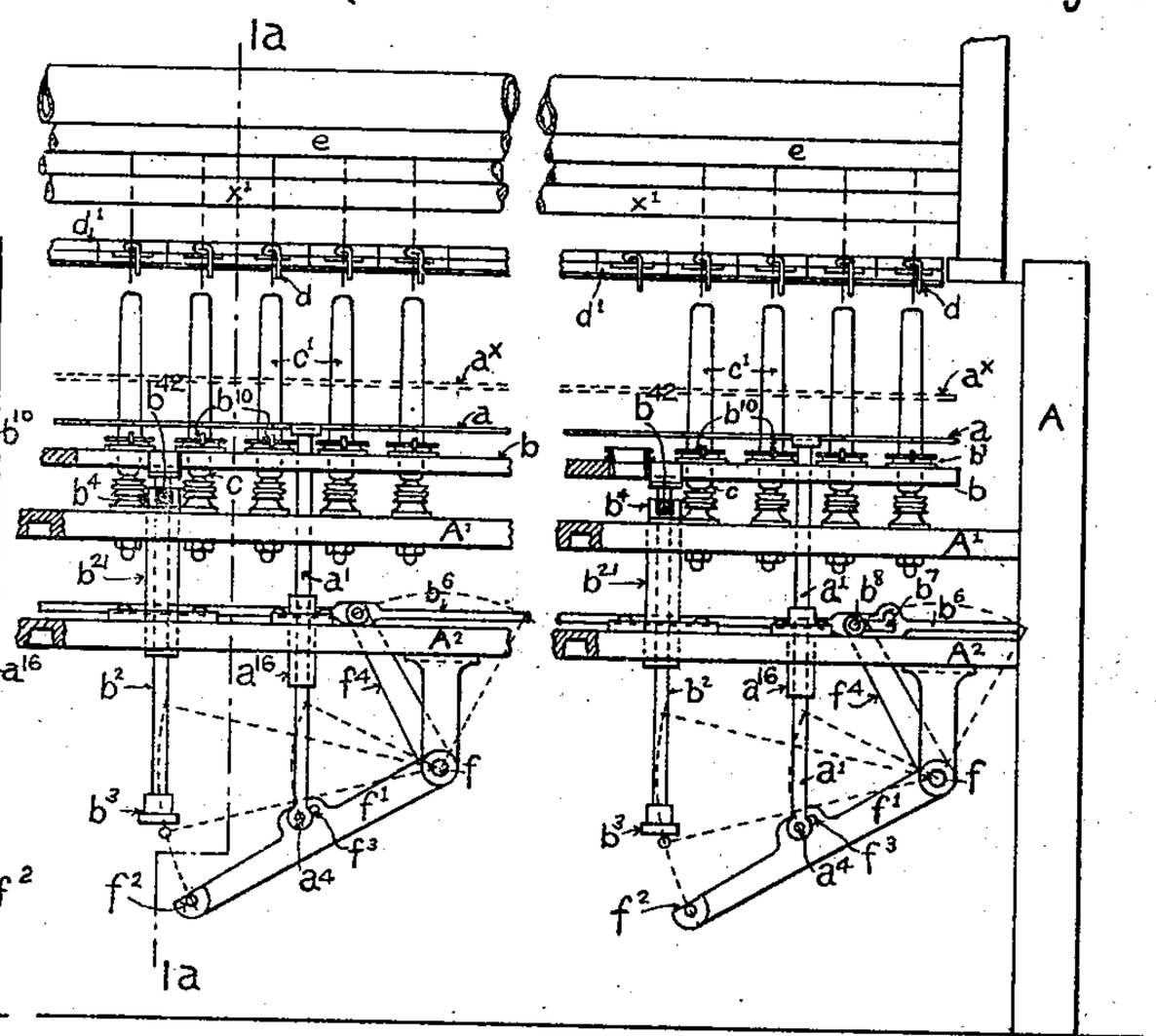

FIG. 1.

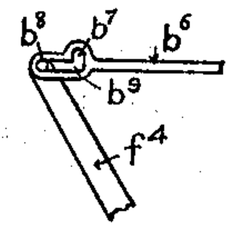

FIG. 2.

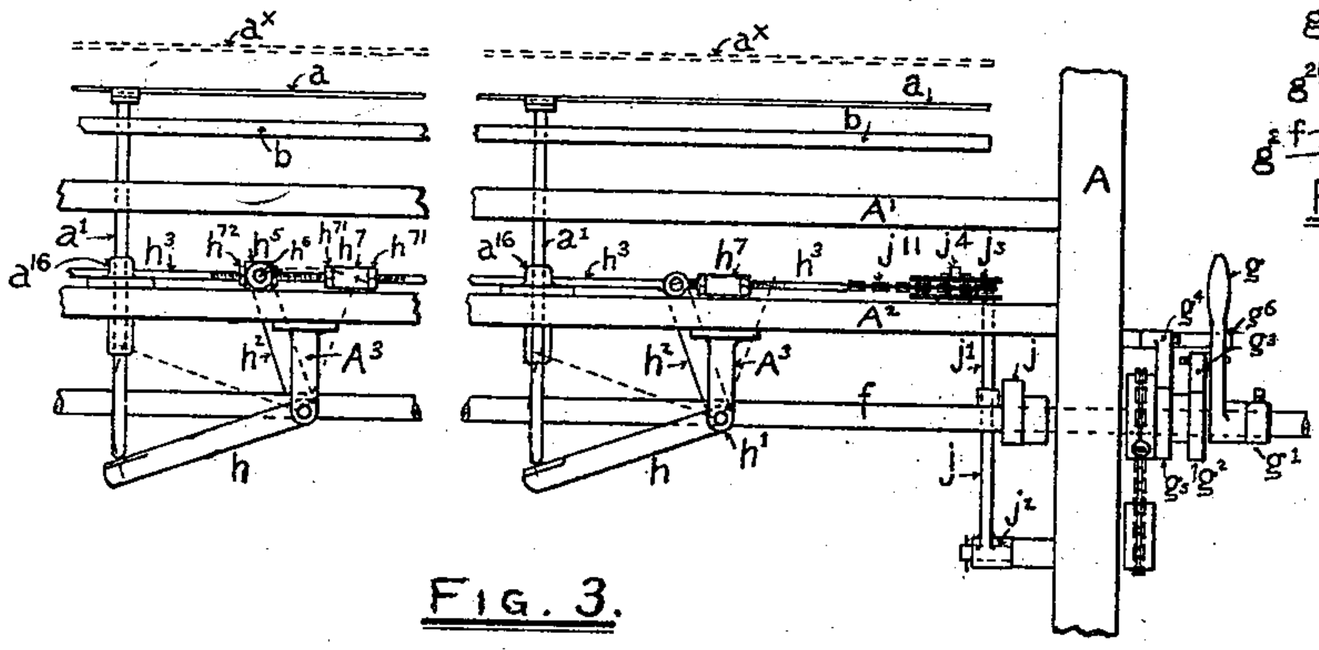

FIG. 3.

FIG. 10.

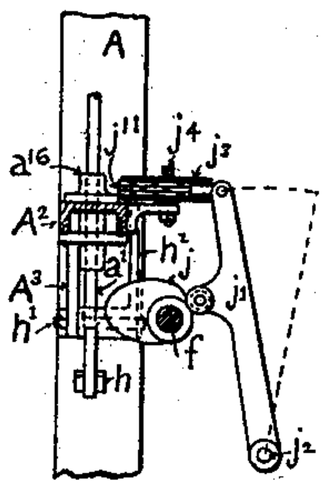

FIG. 4.

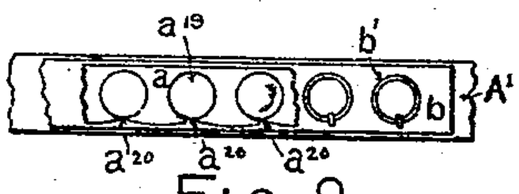

FIG. 9.

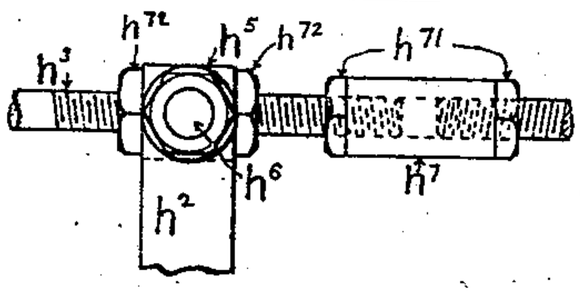

FIG. 7.

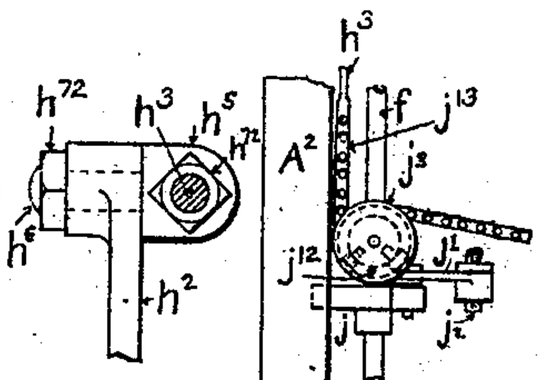

FIG. 8.

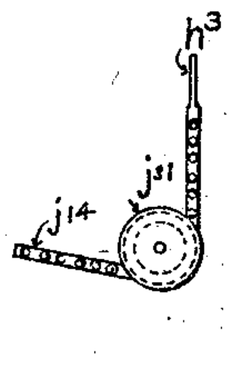

FIG. 5.

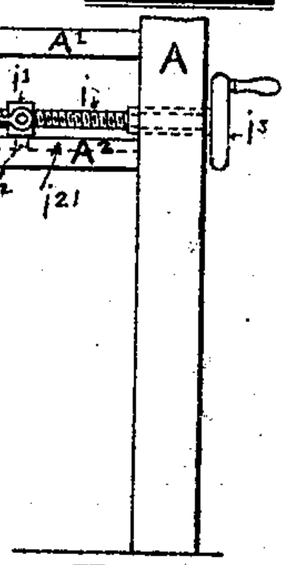

FIG. 6.

WITNESSES.

Mary Caverly.

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INVENTORS.

George Shepherd and Henry Midgley by Channing Whitaker their attorney.

(No Model.) 2 Sheets—Sheet 2.

G. SHEPHERD & H. MIDGLEY.

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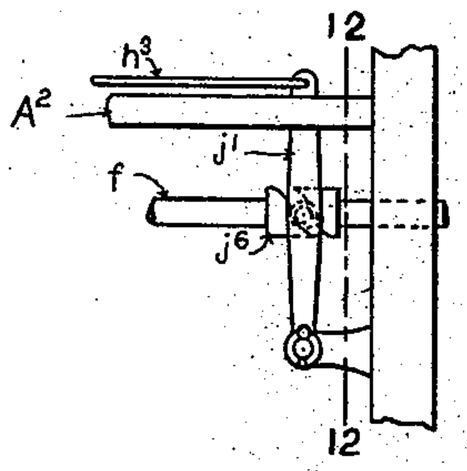

FIG. 11.

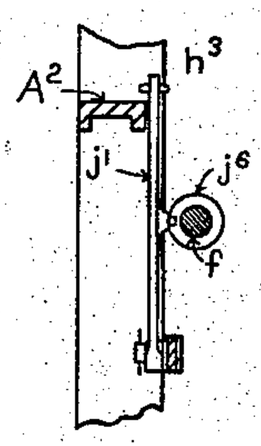

FIG. 12.

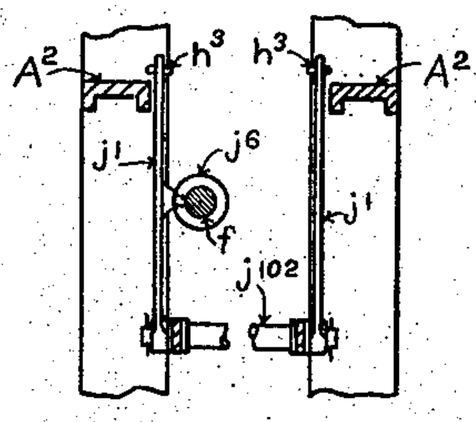

FIG. 15.

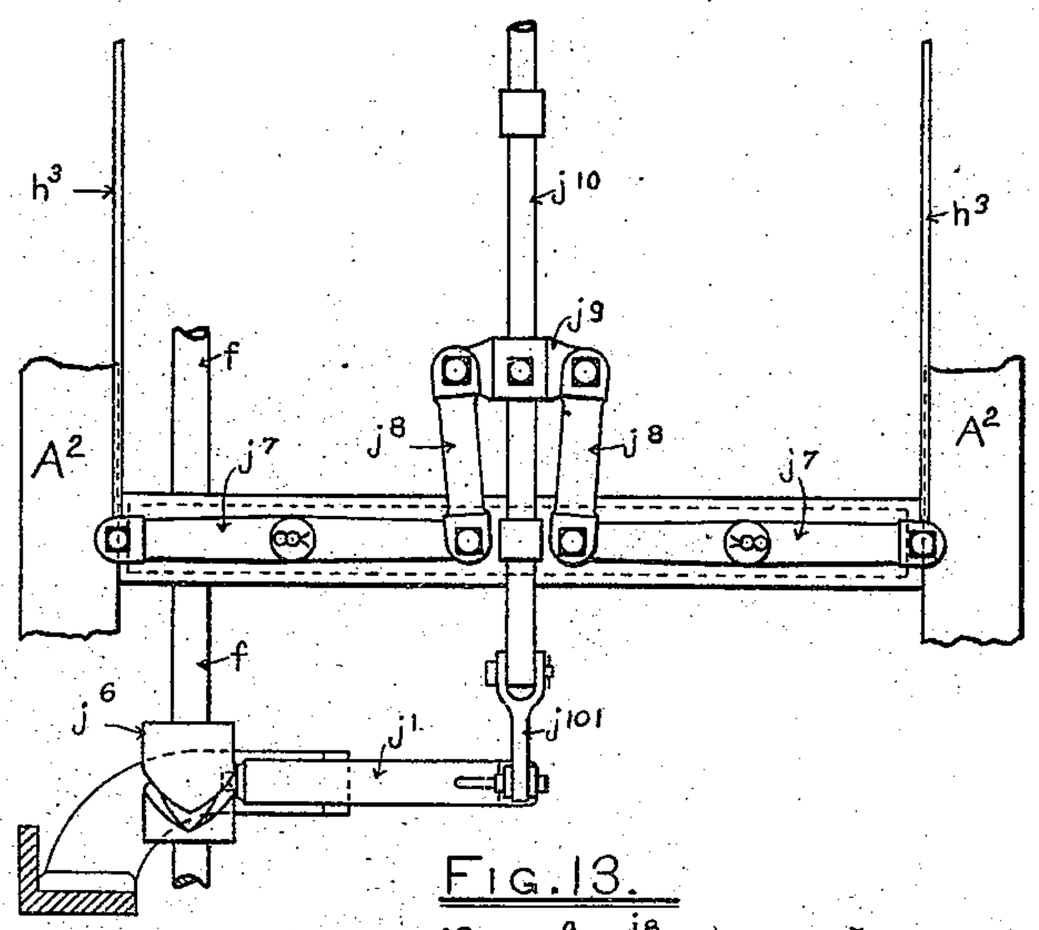

FIG. 13.

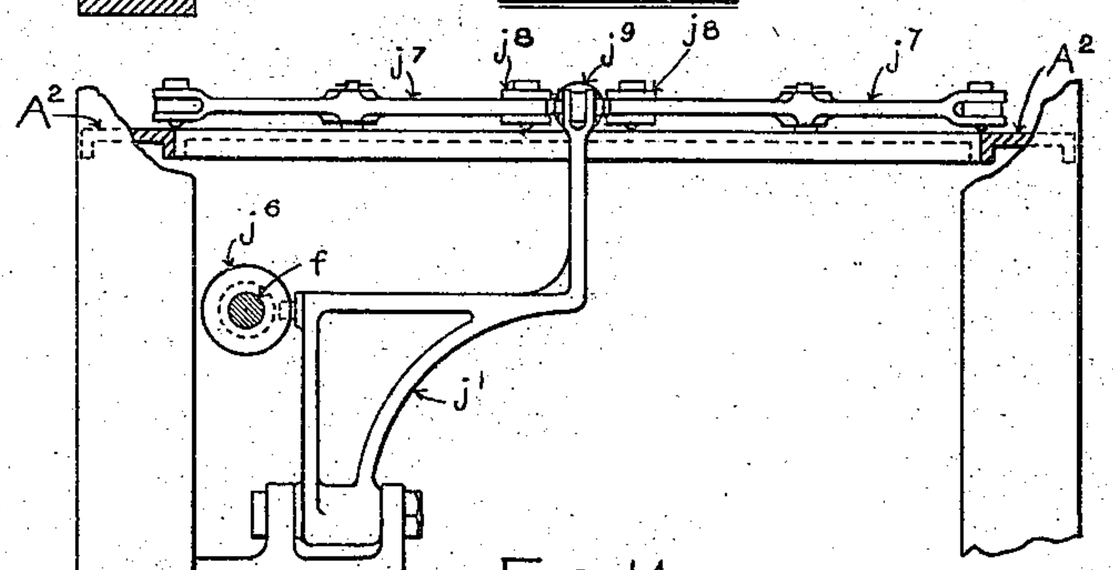

FIG. 14.

WITNESSES.
Mary Caverly.
Saml. G. Stephens.

INVENTORS.
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. 501,737, dated July 18, 1893.

Application filed March 9, 1893. Serial No. 465,253. (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 preventing or obviating what is known as the "ballooning" of the threads being spun or twisted in such frames, 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 a ring-rail and carries the anti-ballooning or yarn-separating arrangement or device which may be employed for preventing the said ballooning.

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 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, 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 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 arrangement is caused automatically to move at the same time as the ring-rail and in the same direction as the latter, but at a different speed, the distance between the anti-ballooning 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. 1ª is a view in vertical transverse section at the line 1ª—1ª of Fig. 1. Fig. 2 is a view showing a detail. Fig. 3 is a view in front elevation showing part of a ring-frame having applied thereto a modified embodiment of our invention. Fig. 4 is a view in side elevation, partly in vertical transverse section, showing certain features of the modification that is represented in Fig. 3. Fig. 5 is a view in plan of certain of the parts that are represented in Figs. 3 and 4, showing the manner of transmitting motion to the anti-ballooning arrangements on both sides of the ring-frame or doubling-frame. Fig. 6 is a view in front elevation showing an arrangement of devices that may be employed in accordance with a further modification. Figs. 7 and 8 are views of details of

the modification that is represented in Figs. 3 and 4. Fig. 9 is a view in plan showing part of the anti-ballooning plate or rail that may be employed if desired, and also showing portions of the ring-rail and spindle-rail. Fig. 10 is a detail view in elevation. Figs. 11, 12, 13, 14 and 15 are views showing modifications hereinafter 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. 9, is shown the form of anti-ballooning 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 or 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. 9, 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. 9, 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 anti-ballooning arrangement a is mounted at the upper ends of the sliding rods a', which slide up and down through the guides a^{16}.

A common and well-known mode of actuating the ring-rail is by levers or arms on shafts or axes placed across the frame, or at a right angle lengthwise of the ring-rail. Our invention is shown in Figs. 1 and 1^a combined with this well-known form of actuating means. At f', f', in the said figure are shown the said levers or arms, and at f, f, are shown the said shafts or axes thereof. A stud or pin f^2 on the end of each arm f' acts as usual against the under side of the foot or shoe b^3 on the lower end of the corresponding poker b^2.

At f^4, f^4, are shown upwardly extending arms on the cross-shafts f, f, the said cross-shafts, f, f, and their arms, f', f', and f^4, f^4, constituting what may be designated as rockers, and at b^6, b^6, are connecting-rods by which the said arms f^4, f^4 are connected with each other and with copping-motion mechanism of any suitable known kind to provide for the actuation of the cross-shafts. We connect or engage the lower ends of the rods a', a', in suitable manner with the cross-shaft arms f', as by means of a pin a^4 on each rod entering a slot f^3 extending lengthwise of the arm, whereby the anti-ballooning arrangement a is caused to rise and fall in unison with the ring-rail. Each rod a' is actuated from a portion of the corresponding cross-shaft arm f' which is intermediate the axis on which the said arm turns and the point at which motion is transmitted from the arm to the corresponding poker b^2. In consequence of separately operating the anti-ballooning arrangement from the cross-shaft arm through means independent of that whereby the ring-rail or copping-rail is actuated from the said arm, and of actuating such means from the intermediate portion of the arm as aforesaid, we are enabled to operate the anti-ballooning arrangement in such manner as to cause it to rise and fall at a reduced speed and to a reduced extent compared with the ring-rail or copping-rail, the distance between the anti-ballooning arrangement and the ring-rail being reduced as the ring-rail rises. The illustrated connection of the rod a' with the cross-shaft arm f' is positive, and causes movement to be transmitted positively to the rod a' in both directions, so as to prevent the said rod from sticking in its guide a^{16} and from failing to descend at the proper time.

The poker b^2 is provided with a stop which is connected therewith and serves to arrest the descent of the ring-rail when, in being lowered by hand after the bobbins or cops have been wound to the desired extent, the ring-rail has descended to the point necessary to be reached thereby in order to permit the doffing to be effected. In the drawings this stop is constituted by the collar b^4 that is applied to the upper portion of the poker and held at the desired height thereon by means of a clamping screw b^{42} which passes through the side of the collar and takes bearing by its end against the surface of the poker. After the descent of the ring-rail has been arrested by the contact of the collar b^4 with the top of the guide b^{21}, or other stationary part, and the lowest position of the ring-rail has been determined thereby, the arm f' may be turned still lower, as indicated in Fig. 1, to depress the plate or rail a sufficiently to permit the doffing to be effected without interference from the said plate or rail. The additional movement of arm f' may be occasioned by pressing thereon, or by moving any arm or lever connected with the rods b^6, and any suit-

able means may be employed for holding the arm f' in a depressed position until after the doffing has been completed.

A convenient means of giving to the shaft f the additional movement required for lowering the anti-balloon plate or rail from the position shown in dotted lines at $a^{\times}$ to the position shown in full lines in Figs. 1 to 3, is shown in Figs. 3 and 10. In these figures there is shown at g a handle mounted to turn loosely on shaft f, and held in place at the side of collar g^2 fast on the shaft by means of a collar g' which also is fast on the shaft. The handle g has a pawl g^3 pivoted thereto, and the disk g^2 is formed with a notch g^{21} with which the pawl g^3 is adapted to engage. After the ring-rail has been lowered, as just above described, the handle g may be grasped and drawn forward, and thereby, in consequence of the engagement of the pawl g^3 with the notch g^{21} in the disk g^2, the shaft f may be rotated sufficiently to lower the anti-balloon plate or rail a from the position indicated at $a^{\times}$ to the position shown in full lines. When the shaft f has been turned thus to the required extent, a pawl g^4, pivoted on a stud on the framing or on a bracket carried thereby, enters a notch g^{22} in either the disk g^2, if desired, or a second disk g^5 also made fast on the shaft f. Thereby the parts are retained in the desired position during doffing. When that operation has been completed, the retaining pawl g^4 is released and turned back out of the way, and the shaft f is allowed to go back to its normal position, the pawl g^3 on the handle g being turned back also so as to be out of the way, and not catch in the notch or notches in the disk g^2 when the copping mechanism is at work. The handle g rests against a stud g^6 projecting from the framing or a bracket attached to it when the copping motion is working.

In place of giving the extra lowering movement to the arm f' and the anti-ballooning arrangement in the manner just described, it may be secured by forming the rod or connection b^6 between the copping mechanism and the first lever or arm f^4 with a slot b^9 for the reception of a pin b^8 on the said arm f^4, as shown in Fig. 2, the said slot having an offset portion or notch b^7 at the right-hand end thereof in the said figure, in which offset or notch the pin b^8 normally remains engaged during the regular working of the ring-frame. By lifting the end of rod b^6 so as to withdraw the notched part thereof from the pin b^8, the said pin is released and permitted to pass to the opposite end of the slot b^9, which allows the anti-balloon arrangement to descend to the additional extent that is required to permit the doffing to be effected. By moving the arm f^4 in the reverse direction the anti-balloon arrangement will be raised again to the proper height above the ring-rail, and the notch may then be permitted to pass down upon the pin b^8.

In the construction that is represented in Figs. 3, 4, and 5 the rods a' supporting the rail or plate a or its equivalent are actuated by rockers in the form of bell-crank levers h, h, each lever 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 in two parts united by a right-and-left-handed screw coupling h^7 whereby to 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 eye h^5 swiveling on a pin h^6 passing through a hole in the end of the arm, as shown in Figs. 7 and 8. The rod or wire h^3 connecting the arms h^2, h^2, of the levers h, h, is, in this case, made to pass through the eye h^5, and each length of rod has a screw-thread at the ends and the lengths are coupled together by a screw-nut coupling h^7, the latter having locking nuts h^{71}, h^{71}. There is also a screw-nut h^{72}, 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, shown in Fig. 3 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. 6 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 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. 6 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. 3, 4, and 5, we have shown a 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. In practice, the said shaft is caused to rock by suitable means, and thereby the usual movements of the ring-rail or copping-rail are occasioned. The arrangement described will be recognized as one pertaining to an ordinary form of ring-rail actuating mechanism. 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 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 h^3 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 a disk-cam j being employed, as shown, a drum cam j^6 may be used, as shown in Figs. 11 and 12, 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 h^3 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 h^3, on one side of the frame, 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 h^3 on the latter side. Thereby, the anti-ballooning arrangements on both sides of the frame may be simultaneously actuated from the same cam. It is obvious that in place 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. 13 and 14 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. 13 is a plan view illustrating sufficient to make clear the modification intended to be represented therein. Fig. 14 is a partially sectional elevation of the parts which are shown in Fig. 13. 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. 15 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 the rock-shaft, j^{102}, one of the said levers, j', being engaged and actuated by the drum-cam, j^6, on the shaft, f.

In place of lowering the anti-balloon plate or rail, or its equivalent, in the arrangement shown in Figs. 3, 4 and 5, by turning the shaft f by hand, the lowering may be effected by a lengthening and shortening, or releasing, arrangement on the order of that hereinbefore described and shown in detail in Fig. 2. In this case, the rod b^6 of Fig. 2 would be the first length of wire or rod h^3 between the lever j' and the first arm h^2.

We do not lay broad claim herein to mounting the anti-ballooning plate or rail on rods, and operating the same by means whereby it is caused to move in unison with the ring-rail but at a reduced speed, and through a traverse of diminished extent, or to a stop for determining the extent of the descent of the ring-rail or copping-rail, or to the devices shown in Figs. 3 and 10 for turning the shaft f by hand, for we have laid such claim in our application for patent hereinbefore mentioned.

The particular modifications which are shown in Figs. 3 to 8 of our drawings, have been claimed specifically in our other application for patent for improvement in ring-spinning and doubling frames filed March 9, 1893, Serial No. 468,254. We, therefore, do not lay specific claim to such modifications herein.

We claim as our invention—

1. The combination with the ring-rail and a separate rail or plate having anti-balloon or yarn-separating arrangements located beside the spindles, of a rod supporting the said rail or plate, an arm which engages with the said rod to actuate the same, and means for moving the said arm up and down, substantially as described.

2. The combination with the ring-rails on opposite sides of a frame, and separate rails or plates also on the opposite sides having anti-balloon or yarn-separating arrangements located beside the spindles, of a rod at each side by which the said rail or plate at each side is supported and operated, a cross-shaft, and arms at the opposite ends of the said cross-shaft whereby the said rods are actuated, substantially as described.

3. The combination with the ring-rail, the poker for the ring-rail, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements located beside the spindles, and independent means whereby the said rail or plate is separately operated from the said cross-shaft arm and caused to rise and fall vertically during the corresponding movements of the ring-rail, substantially as described.

4. The combination with the ring-rail, the poker for the ring-rail, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements located beside the spindles, and a rod supporting said rail or plate and also actuated by the said cross-shaft arm, substantially as described.

5. The combination with the ring-rail, the

poker for the ring-rail and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements located beside the spindles, and a rod supporting said rail or plate and also actuated by the said cross-shaft arm but through a traverse of less extent than that of the poker, substantially as described.

6. The combination with the ring-rail, the poker for the ring-rail, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements located beside the spindles, and a rod supporting said rail or plate, in continuous operative engagement with the said cross-shaft arm, and actuated by the latter through a traverse of less extent than that of the poker.

7. The combination with the ring-rail, the poker for the ring-rail, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements located beside the spindles, and a rod supporting said rail or plate and also actuated by the said cross-shaft arm but at a different speed from that of the poker, substantially as described.

8. The combination with the ring-rail, the poker for the ring-rail, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements located beside the spindles, and a rod supporting said rail or plate and also actuated by the said cross-shaft arm but from a point thereof intermediate the axis on which the arm swings and the point on the arm at which motion is transmitted to the poker of the ring-rail, substantially as described.

9. The combination with the ring-rail, the poker for the ring-rail, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements located beside the spindles, and a rod supporting said rail or plate and also actuated vertically by the said cross-shaft arm positively in both directions, substantially as described.

10. The combination with the ring-rail, the poker for the ring-rail, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements, and a rod supporting said rail or plate and connecting positively with the said cross-shaft arm at a point intermediate the axis on which the said arm turns and the point at which motion is transmitted to the poker of the ring-rail, substantially as described.

11. The combination with the ring-rail, the poker for the ring-rail, a stop to arrest the descent of the ring-rail when the latter has reached the position for doffing, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements, and a rod supporting said rail or plate and also actuated from the said cross-shaft arm, substantially as described.

12. The combination with the ring-rail, the poker for the ring-rail having connected therewith a stop to arrest the descent of the ring-rail when the latter has reached the position for doffing, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements, and a rod supporting said rail or plate and also actuated from the said cross-shaft arm, substantially as described.

13. The combination with the ring-rail, the poker for the ring-rail, a stop to arrest the descent of the ring-rail when the latter has reached the position for doffing, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements, a rod supporting said rail or plate and also actuated from the said cross-shaft arm, the cross-shaft and its arm f^4, and an actuating-rod b^6 provided with lengthening and shortening means, substantially as described.

14. The combination with the ring-rail, the poker for the ring-rail having connected therewith a stop to arrest the descent of the ring-rail when the latter has reached the position for doffing, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements, a rod supporting said rail or plate and also actuated from the said cross-shaft arm, the cross-shaft and its arm f^4, and an actuating-rod b^6 provided with lengthening and shortening means, substantially as described.

15. The combination with the ring-rail, the poker for the ring-rail, a stop to arrest the descent of the ring-rail when the latter has reached the position for doffing, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements, a rod supporting said rail or plate and also actuated from the said cross-shaft arm, the cross-shaft and its arm f^4 carrying a pin, and an actuating-rod formed with the slot b^9 having the notch or offset b^7, substantially as described.

16. The combination with the ring-rail, the poker for the ring-rail having connected therewith a stop to arrest the descent of the ring-rail when the latter has reached the position for doffing, and the cross-shaft arm actuating the said poker, of a rail or plate having anti-balloon or yarn-separating arrangements, a rod supporting said rail or plate and also actuated from the cross-shaft arm, the cross-shaft and its arm f^4 carrying a pin, and an actuating-rod formed with the slot b^9 having the notch or offset b^7, substantially as described.

17. The combination with a rail or plate having anti-balloon or yarn-separating arrangements, and a rod supporting said rail or plate, of a rocker by which the said rod is actuated, and operative connections in engagement with the said rocker and provided with lengthening and shortening means, substantially as described.

18. The combination with a rail or plate

having anti-balloon or yarn-separating arrangements, and a rod supporting said rail or plate, of a rocker by which the said rod is actuated, and also carrying a pin, and an actuating-rod formed with the slot b^9 having the notch or offset b^7, in which the said pin normally is engaged 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.