J. W. MORRISON & T. W. HOLT.

YARN WINDING MACHINERY.

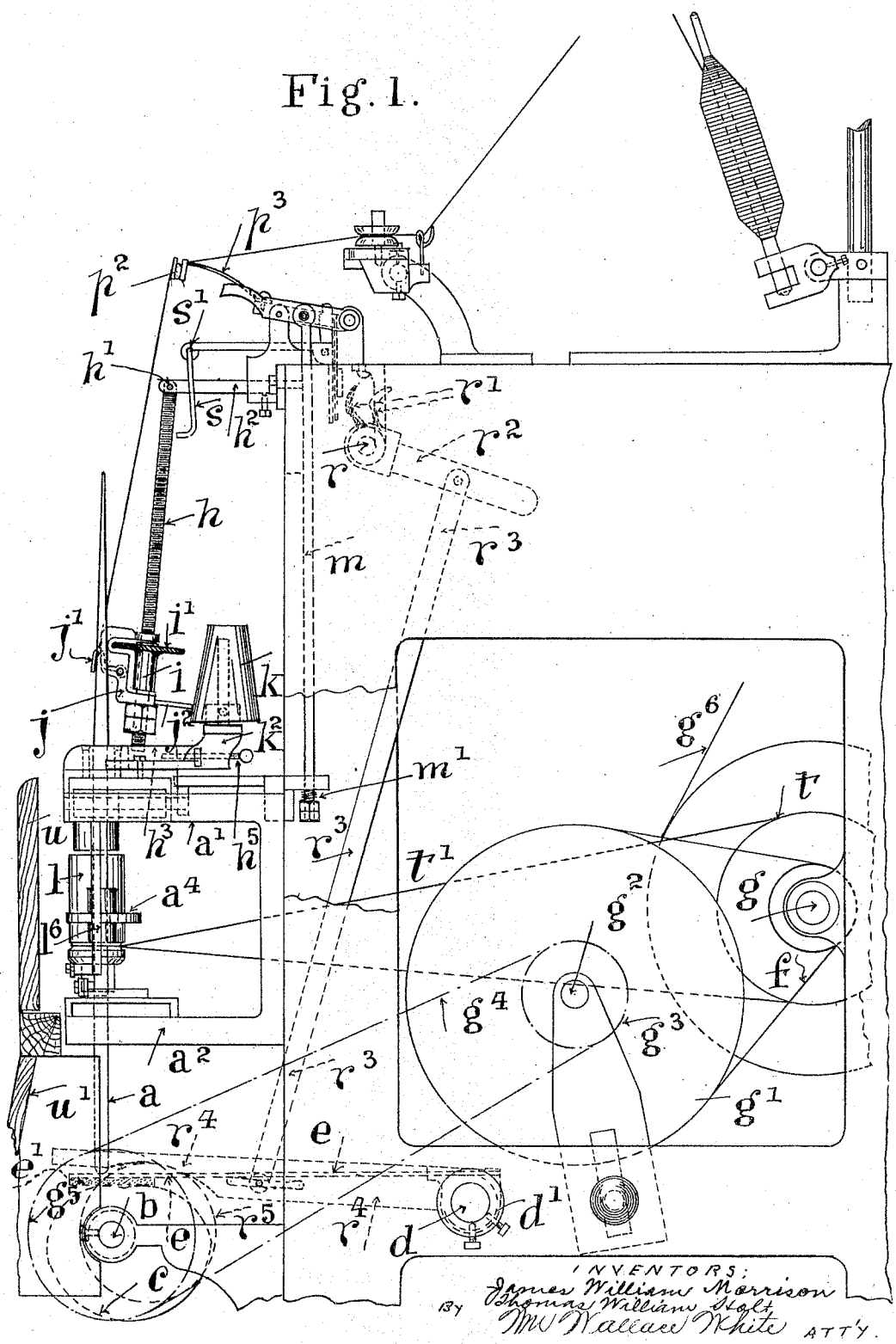
APPLICATION FILED OCT. 18, 1915.

1,237,367.

Patented Aug. 21, 1917.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 2.

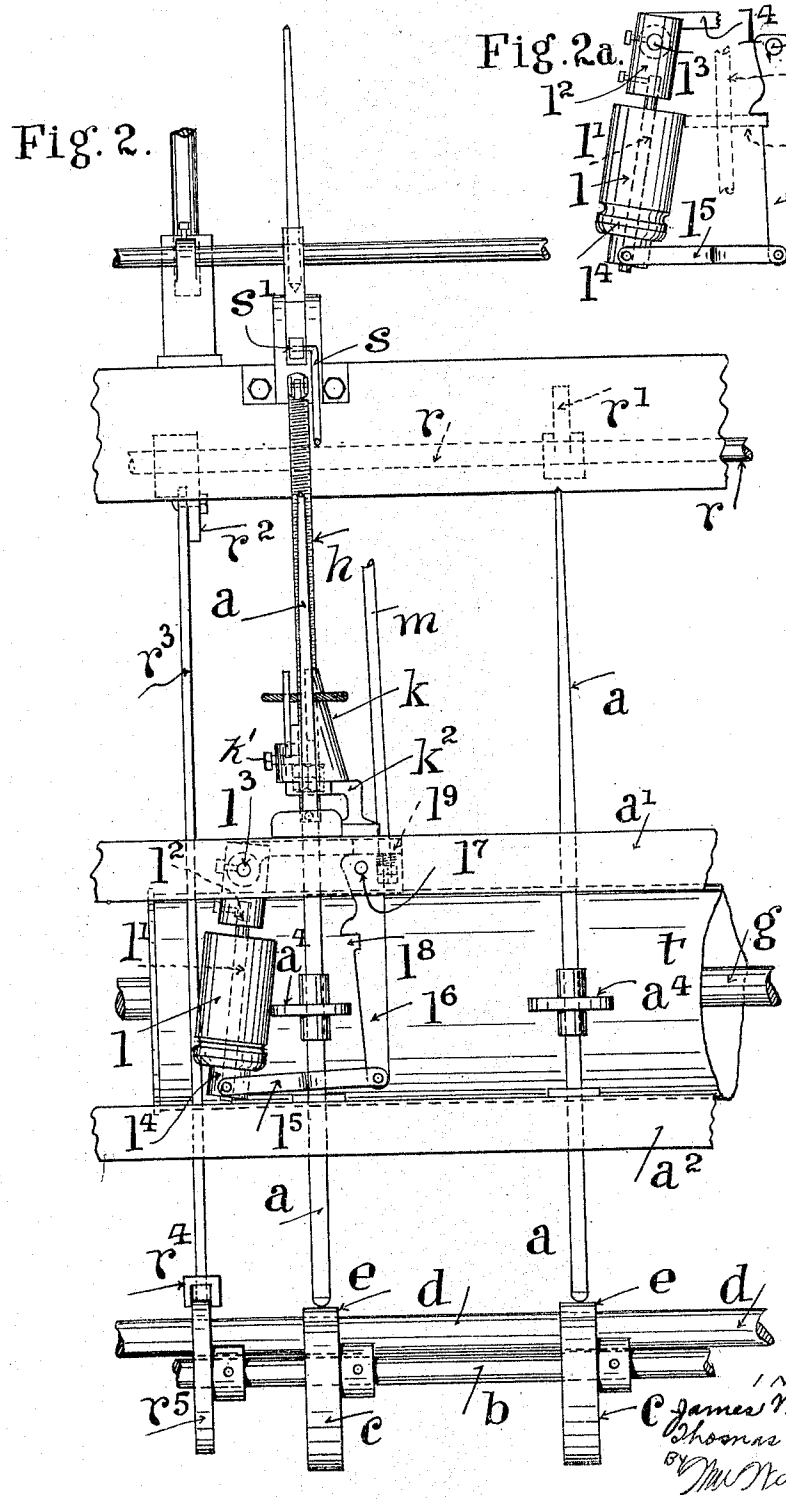

Fig. 2a.

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4 SHEETS—SHEET 3.

Fig. 3.

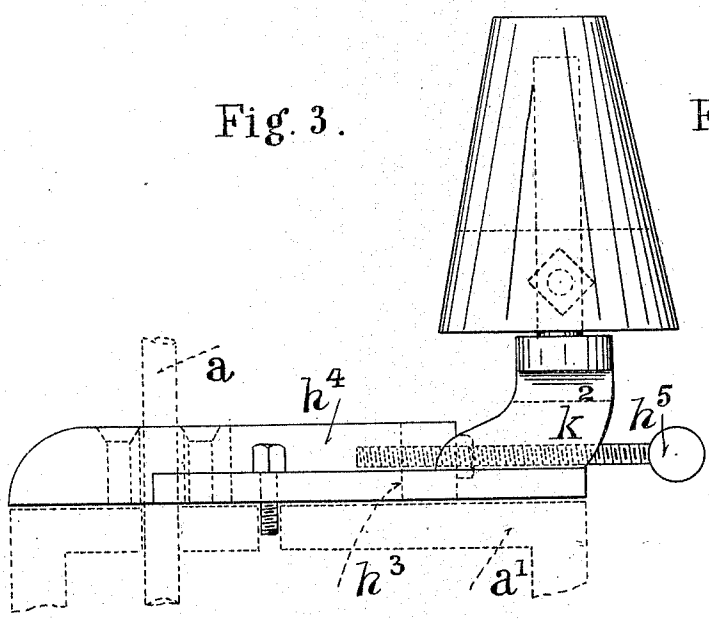


Fig. 4.

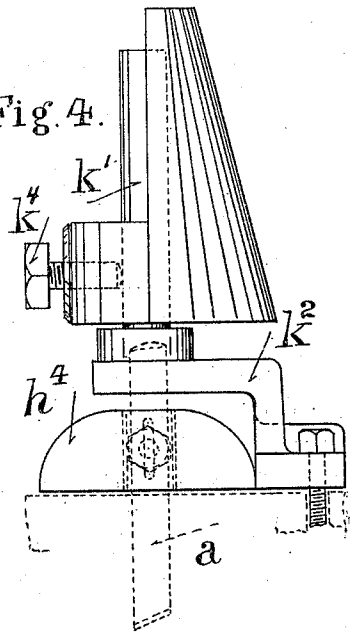


Fig. 5.

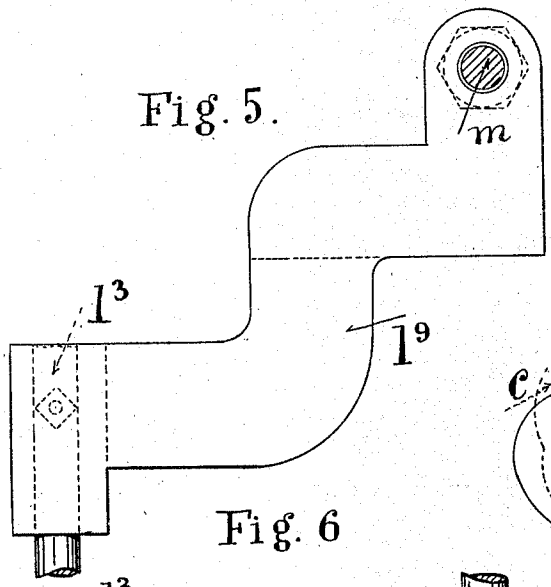


Fig. 6

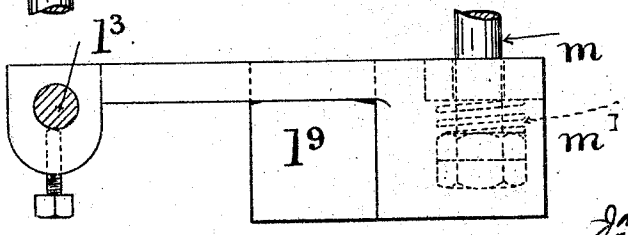
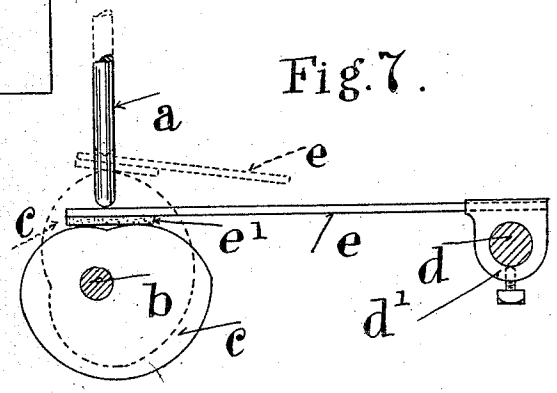


Fig. 7.



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4 SHEETS—SHEET 4.

Fig. 8.

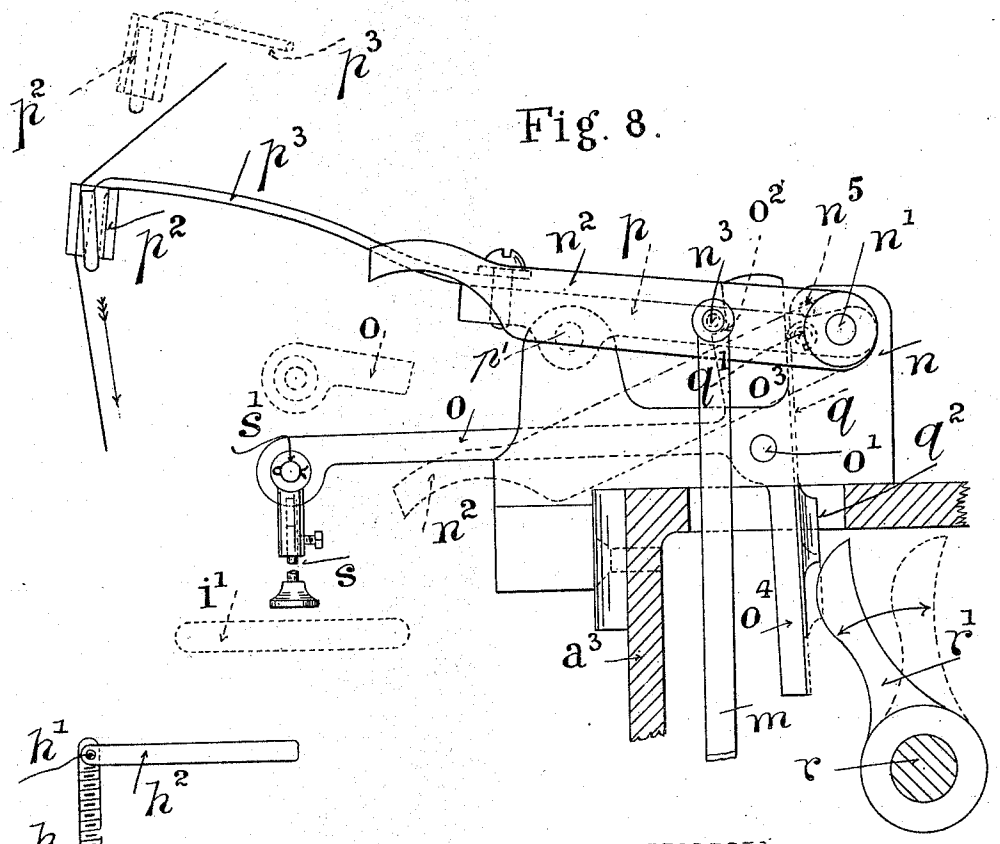


Fig. 9.

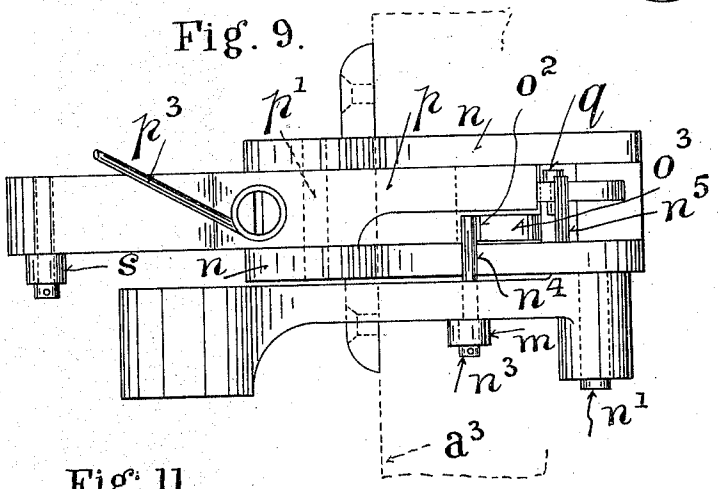


Fig. 10.

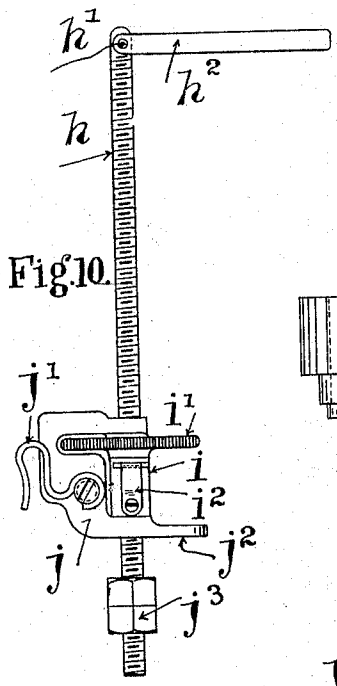
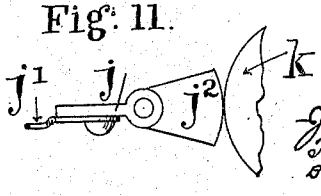


Fig. 11.



INVENTORS:

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UNITED STATES PATENT OFFICE.

JAMES WILLIAM MORRISON AND THOMAS WILLIAM HOLT, OF STALYBRIDGE, ENGLAND.

YARN-WINDING MACHINERY.

1,237,367. Specification of Letters Patent. Patented Aug. 21, 1917.

Application filed October 18, 1915. Serial No. 56,460.

To all whom it may concern:

Be it known that we, JAMES WILLIAM MORRISON and THOMAS WILLIAM HOLT, subjects of the King of Great Britain and Ireland, residing at Platt Bridge Iron Works, Stalybridge, in the county of Chester, England, engineers, have invented new and useful Improvements in and Connected with Yarn-Winding Machinery, of which the following is a specification.

This invention relates to improvements in and connected with yarn winding machinery and in particular to that class of yarn winding frame in which each spindle is a separate unit and independently actuated and controlled.

We employ plain spindles approximating to mule spindles and these spindles are guided in two rails and are given an up and down or vertical motion to govern the length of chase or copying effect by the action of cams coöperating each with a flat spring.

The spindles are driven indirectly from a tin roller through movable friction devices.

The formation of each cop bottom is regulated by the use of a cone, the contact face of which preferably varies as to taper and such cone can be set so as to give a steeper or less steep cop bottom as required. Respecting the building, in conjunction with each cone, works a fulcrumed screwed rod with which engages a nut device carrying a disk to contact with the cop being built. The nut device acts on a support or bracket with movable yarn guide and a contact finger to bear against the cone, the contact finger ultimately moving clear of the cone when the cop bottom is fully formed.

A stop motion is fitted whereby on the breakage of an end or completion of the cop the spindle driving means are disengaged and the spindle is arrested.

We now proceed to describe our improvements in yarn winding machinery in detail and with reference to the attached drawings, wherein,

Figure 1 is an end elevation, broken in part, of a form of winding frame embodying our features of novelty, the machine being a single sided one, that is, having winding spindles along one side of the frame only.

Fig. 2 shows a broken front elevation of the frame and the principal mechanism that appertains to each spindle unit.

Fig. 2ª is a detail view.

Figs. 3 and 4 are enlarged detail side and end view of one of the cones which govern the formation of the cop bottom and of brackets carried on the upper rail.

Figs. 5 and 6 are respectively detail plan and front elevation of one of the pivoted brackets which we act on by one of the vertical stop rods.

Fig. 7 is a separate detail view of one of the cams and its coöperating spring for acting on each spindle.

Fig. 8 shows in elevation, that part of the stop motion mechanism which acts on each vertical stop rod.

Fig. 9 is a plan of Fig. 8.

Fig. 10 shows separately one of the fulcrumed screw threaded rods, the movable nut, the yarn guide support or bracket and the cone contact finger which contacts with the cone.

Fig. 11 is a detail plan of the yarn guide support or bracket, &c.

We make use of plain spindles *a* which are very similar to mule spindles and these are an easy slidable fit in bearings formed in two rails a', a^2 so as to be free to move up and down. It is an important feature of our invention to impart easy vertical movement of the spindles *a* without jerk or rebound. Below the line of spindles *a* we fix a rotating horizontal shaft *b*, and this shaft *b* carries heart shaped or other cams such as *c* there being one cam in respect of each spindle *a*. Another fixed horizontal shaft *d* is also mounted in suitable bearings in the frame and such shaft has bosses d' fixed thereon to which are secured the fixed ends of plate or other springs *e* the forward or yielding end of each spring *e* resting upon its co-acting cam *c*. As shown, the end of each spindle *a* rests on one end of the said springs *e* each fitted with a buffer strip e', and so, as the cams *c* rotate the spindles *a* are raised and lowered, while, due to the constant downward pressure of the plate springs *e* any jerkiness of movement is prevented. The shaft *b* carrying the cams *c* is shown as being driven indirectly from the tin roller shaft *g*. By reason of each spindle resting on a plate spring and by reason of the plate springs pressing on the cams the spindles cannot be jerkily influenced as the cam does not act directly on the spindle the springs being very gradually displaced and tending to cling to the

cam and thus to sensitively and gradually affect the spindle. In the arrangement illustrated, a link belt f drives the large pulley g' on the stud shaft g^2 on which is a chain wheel g^3 which chain wheel by a chain g^4 drives a chain wheel g^5 on the cam shaft b. The tin roller shaft g is driven by a belt pulley g^6.

In connection with each spindle a, we employ a screw-threaded rod h fulcrumed at h' to an adjustable horizontal post or support h^2, and such screw-threaded rod supports a combined sleeve i and disk i' with ⌐ shaped flexible spring i^2 which acts as a nut in engagement with the screw threaded rod h. Each screw-threaded rod also carries a swiveling yarn guide support or bracket j with yarn guide j' and contact finger j^2, the nut device i carrying up or down the swiveling yarn guide support j, as is obvious. Adjustable lock nuts j^3 limit the extent to which the nut device i and swiveling yarn guide support or bracket can be pressed down. Each contact finger j^2 on each swiveling yarn guide support or bracket bears on a cone k during the formation of the cop bottom. Such cone k is conveniently carried on a spindle k' projecting from a bracket k^2 bolted to the upper rail a'. Preferably each cone k varies as to taper, as Figs. 3 and 4 show, so that by turning or adjusting said cone about the spindle k' and securing it by means of the set screw k^4 the form of cop bottom can be varied, that is, made steeper or less steep as required.

The device "k" is a truncated but incomplete cone. The taper over its face varies, that is, the taper varies as to "steepness," *i.e.*, at one part such taper may be greater than at another. By adjusting the cone k about the spindle k' a variation in taper is provided for, that is, the inclination for the guide finger j to press against may be varied. The drawings show this very clearly in Fig. 1. The front taper (left-hand side) in Fig. 1 is much more pronounced than the rear face (right hand side) Fig. 1.

The part j^2 is the curved extremity of the guide finger and it bears against the cone k. As the guide finger rises up the cone, it is obvious that the yarn guide end j' can recede from the spindle center, and it does slowly recede until such time as the cop bottom is fully formed when the screwed spindle cannot fall away farther because of the screwed adjusting stop h^5. Cones for use in connection with the formation of cop bottoms are well known. The cone k is obviously adjustable, about the part k', to get the taper desired the cone being fixed by the pinching screw k^4.

Each disk and nut device i along with the yarn guide support or bracket and contact finger j^2 is gradually elevated by reason of the rotatory motion imparted due to the disk i' contacting with the cop as the spindle is driven and the cop built-up. The lower end of each screwed rod h fits in a slot h^3 in a bracket h^4 screwed to the upper rail a', and, an adjustable screw h^5 limits the distance said screwed rod h can move away from the spindle after rising clear of the influence of its cone.

As will be understood, the use of the cone insures a proper solid and tapered bottom being given to the cop, and, the amount of taper on the cone governs the degree of steepness of the cop bottom, such cop bottom being fully formed when the contact finger j^2 has risen sufficiently high to be freed from the influence of the cone.

The spindles a are driven indirectly from the tin roller t on the tin roller shaft g by friction, in the following simple manner, by a band t' which actuates a loose wooden or other friction sleeve l. Each friction sleeve is loose on a spindle l' carried by a bracket l^2 which is pinned to a pivot spindle l^3 (see the detail view Fig. 2[a]). A boss l^4 on the spindle l' and which keeps the wooden friction sleeve l in place, is jointed by a link or rod l^5 to a lever l^6 pivoted at l^7 in the upper rail a'. In this pivoted lever l^6 is cut a notch l^8. Each spindle has a contact wherve or disk a^4 fixed on it and the wooden friction sleeve l is moved into and out of contact with said wherve or disk according as to whether the spindle is to be driven or arrested. The purpose of the notch l^8 is to engage the wherve or disk a^4, and immediately arrest the spindle whenever the wooden friction sleeve l is moved out of contact, and, the lever l^6 is necessarily drawn slightly inward. The pivot spindle l^3 from which the wooden friction sleeve is supported is in connection with the stop motion through a bracket l^9. This bracket l^9 is pinned upon the said pivot spindle l^3 (see the Fig. 5) and so the said bracket l^9 is hinged and can control the wooden friction sleeve and notched lever l^6 to insure the driving or arresting of the spindle a according as the right-hand end of the bracket is pulled up on the pivot l^3, or allowed to fall.

Each hinged bracket l^9 is acted upon by a vertical stop rod m which lifts up the bracket through an interposed spring m', or otherwise, and this vertical rod is influenced by the stop motion, it being obvious that when such stop rod m is pulled up, the wooden friction sleeve l is pressed into contact with the wherve a^4 on the spindle a, while, when the stop rod m moves down, said sleeve l is taken out of contact and the notched lever l^6 moved in ready to stop the spindle a by engagement of the notch l^8 with the wherve a^4.

A stop motion is fitted for each end and comprises a bracket n bolted to top rail a^3 of the frame and to such bracket is pivoted

at n' a drop lever n^2 the vertical stop rod m being jointed at n^3 to said drop lever n^2. This drop lever n^2 normally latches by a pin n^4 on a notch or ledge o^2 cut on the arm o^3 of a T shaped lever o pivoted at o', and, the bracket n also carries a third lever p, pivoted at p', which carries the yarn guides p^2 fixed on the wire p^3. This lever p is also provided with a dropper q hung from the pin q', and said dropper q has a swell or projection q^2 and can move up or down against the upright limb o^4 of the T shaped lever o which limb acts as a backing or slide surface for the dropper q.

In juxta-position to the rank of droppers q is a rocking shaft r supported in bearings and such shaft carries cam fingers r', that is, one for each dropper, which, as the shaft r rocks, moves toward and from the droppers (see the dotted lines, Fig. 8). The shaft r may be rocked in any suitable manner, and, in the drawings an arm r^2 is fixed to the shaft and this arm r^2 is worked by a connecting rod r^3 from a bar r^4 centered on the shaft d and acted upon by a cam or eccentric r^5 on the shaft b.

So long as the yarn passing down to the spindle over the flexible yarn guides p^2, p^3 or the like, remains unbroken, the yarn guide lever p is sustained (see the full lines, Fig. 8), and the swell on the dropper is kept clear of its particular cam finger on the rocking shaft r, and, conditions remain normal because the lever n^2 holds up the vertical stop rod m. On breakage of an end, the dropper q falls and presents the swell q^2 in the path of the cam finger r', which, acting thereon, influences the T lever o and so unships or unlatches the drop lever n^2 and allows the vertical stop rod m to fall or move down. Thus the right-hand end of the bracket l^9 is no longer sustained and the wooden driving sleeve l is taken out of contact with the spindle wherve and the notched lever l^6 arrests and holds the spindle a. After piecing-up, the yarn again holds down the front end of the yarn guide lever and so holds up the dropper with its swell q^2, and to commence winding, all the attendant requires to do is, to latch the drop lever n^2 on the notch o^2 in the T shaped lever o whereupon the driving of the spindle is again taken up.

When the cop is fully wound, the front end of the T shaped lever o can itself be acted on automatically by the disk i' which may encounter a pendent device s, pivoted at s', and so the front extrmity of the lever o is elevated and the drop lever n^2 is unlatched and falls, thus lowering the stop rod m and bringing about stoppage of the spindle. We prefer to make the pendent device s adjustable, as is shown at Fig. 8, so that the length of cop wound can be controlled by arranging for the disk i' to encounter the lower extremity of the device s sooner or later. A pin n^5 limits the distance the limb o^3 can move back.

We may make frames to wind on both sides as is apparent.

If desired we can arrange to wind on bare spindles by providing cams which give a fairly quick drop to allow of a binding thread being laid.

The parts marked u, u' are hinged boards or covers which protect the front of the frame.

Our improved frame may wind from hanks or cheeses or such like suitable creel supply, provision being made therefor.

We declare that what we claim is:

1. In a winding frame, vertically movable spindles, separate driving devices for each spindle, means to drive same, cams to move said spindles vertically, and flexible plate springs, anchoring means for one end of each spring, the spindles resting on the plate springs, said springs pressing on the cams, said cams operating the spindle through the plate springs, and whereby said spindles are moved up and down without jerk or rebound.

2. A winding frame, vertically movable spindles, guiding means for the spindles, a yarn guide, a cone and a threaded rod to each head, independent driving means for each winding spindle, a plate spring for each spindle, a cam acting on each plate spring, means anchoring one end of each plate spring, each spindle resting on a plate spring and being operative there through and whereby the spindles are moved directly through the plate springs without jerk or rebound as set forth.

3. In a winding frame, a series of spindles mounted for independent axial movement, individual cams arranged to actuate the respective spindles and a flexible plate spring disposed between each spindle and its actuating cam and being supported and arranged so as to exert pressure against the cam.

4. In a winding frame, a series of spindles mounted for independent axial movement, individual rotary cams arranged to actuate the respective spindles, and a flexible plate spring disposed between each spindle and its actuating cam and being supported and arranged so as to exert pressure against the cam.

5. In a winding frame, a series of spindles mounted for independent axial movement, individual cams arranged to actuate the respective spindles, a member disposed between each spindle and its actuating cam, and resilient means for pressing each of the said members against the corresponding cam.

6. In a winding frame, a series of spindles mounted for independent axial move-

ment, individual cams arranged to actuate the respective spindles, a member disposed between each spindle and its actuating cam, resilient means for pressing each of the said members against the corresponding cam, and means for stopping the spindles on thread breakage.

7. In a winding frame, independently movable spindles, driving means for each spindle, and cop building mechanism for each spindle comprising a rod mounted for adjustment laterally with respect to the spindle, a yarn guide device mounted on the said rod, means for operating the said guide device along the rod during operation of the spindle, a forming cam mounted for adjustment about an axis and disposed adjacent to the said guide device, the said cam having an axially tapered surface which varies in taper around the periphery, and a contact member projecting from the guide device and bearing against the peripheral surface of the cam so that the latter serves to influence the building of the cop bottom.

8. In a winding frame, independently movable spindles, driving means for each spindle, and cop building mechanism for each spindle comprising a screw-threaded rod mounted for adjustment laterally with respect to the spindle, a yarn guide device mounted on the said rod, means for operating the said guide device along the rod during operation of the spindle, a forming cam mounted for adjustment about an axis and disposed adjacent to the said guide device, the said cam having an axially tapered surface which varies in taper around the periphery, a contact member projecting from the guide device and bearing against the peripheral surface of the cam so that the latter serves to influence the building of the cop bottom, and means for securing the cam in adjusted position.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JAMES WILLIAM MORRISON.
THOMAS WILLIAM HOLT.

Witnesses:
RICHARD WEBSTER IBBERSON,
ALFRED STUART YATES.