

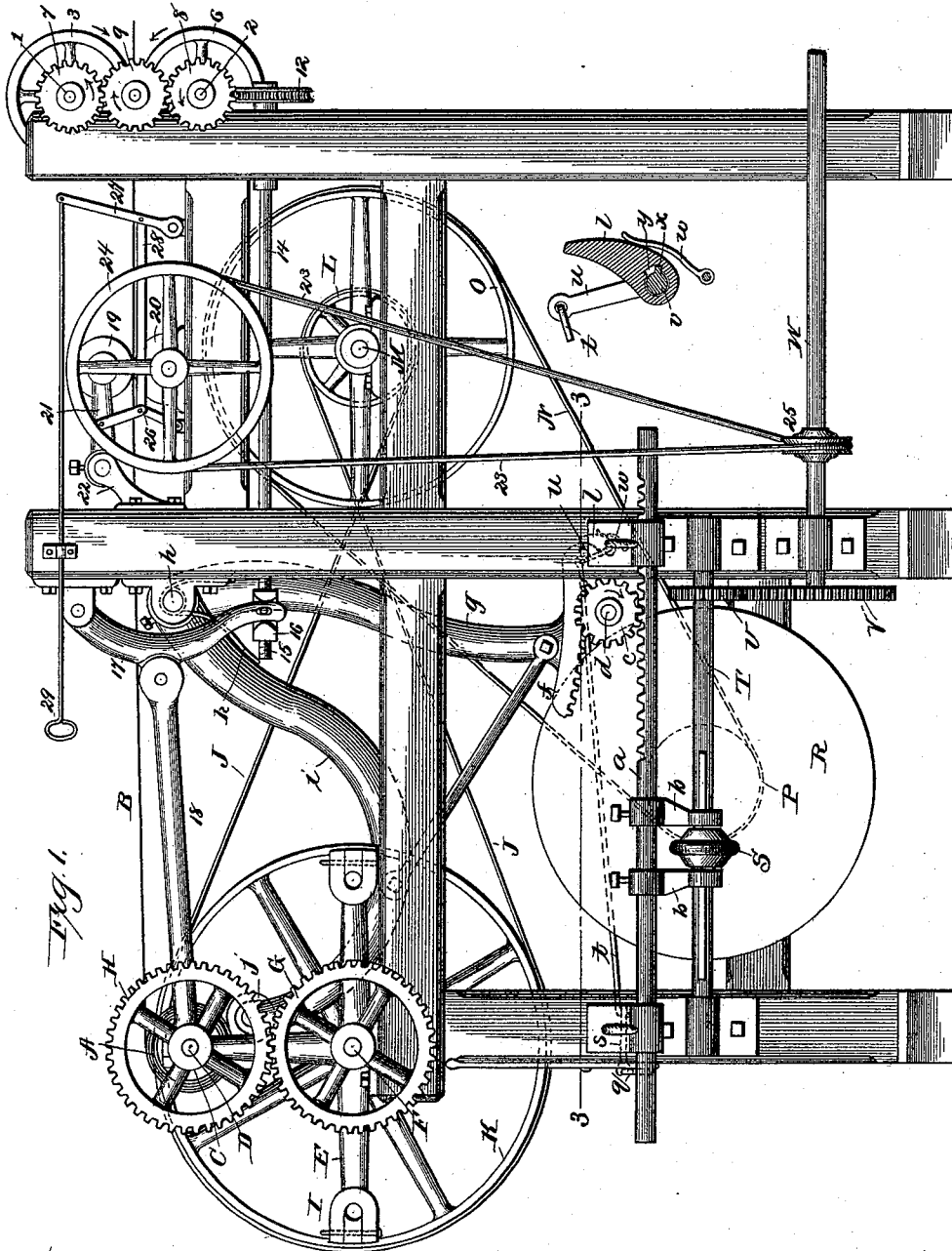
(No Model.)

3 Sheets—Sheet 1.

E. H. SCHOFIELD.
MACHINE FOR WINDING FABRICS.

No. 494,491.

Patented Mar. 28, 1893.



Witnesses:

Wm. M. Rheem.

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Eugene H. Schofield

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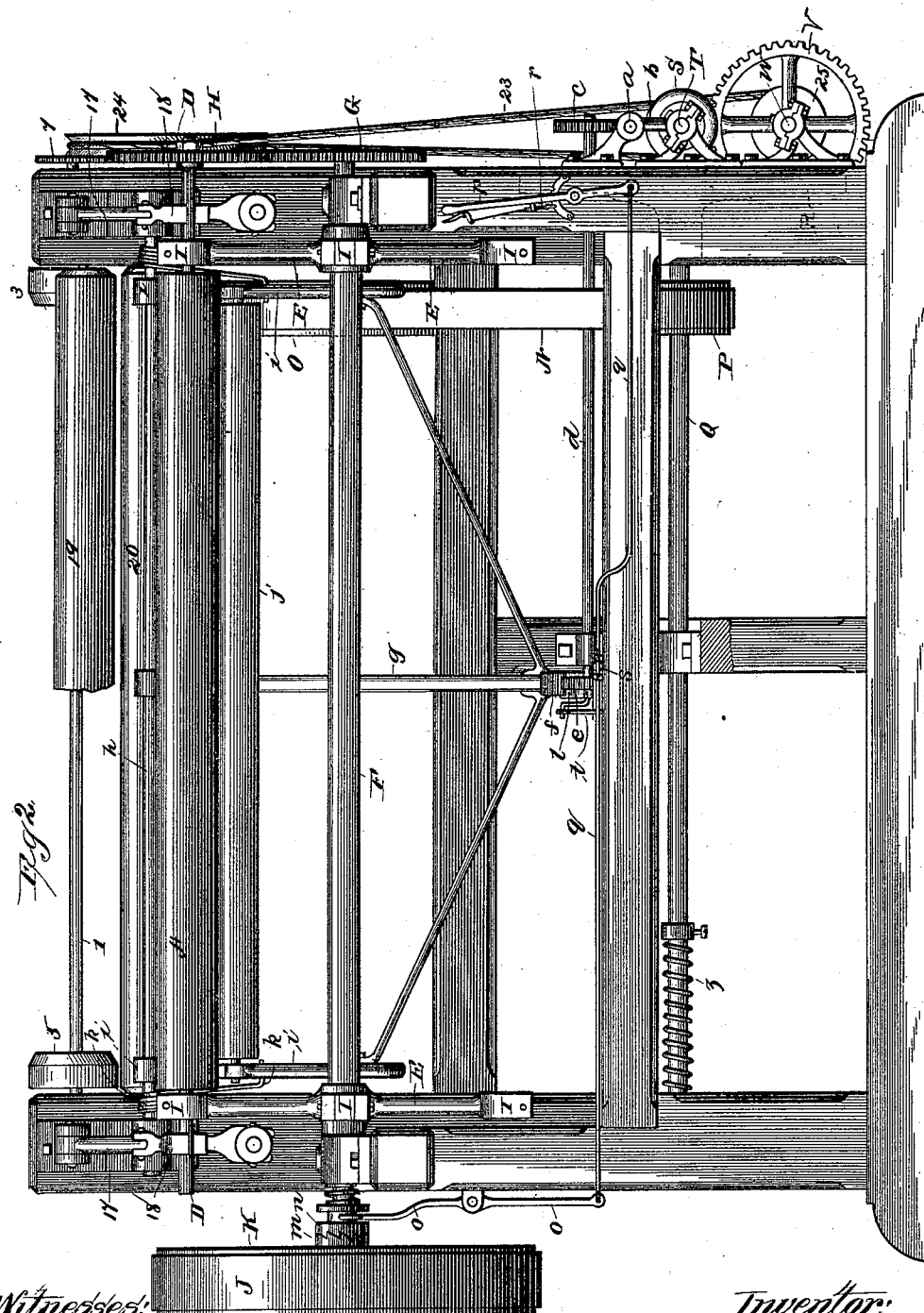
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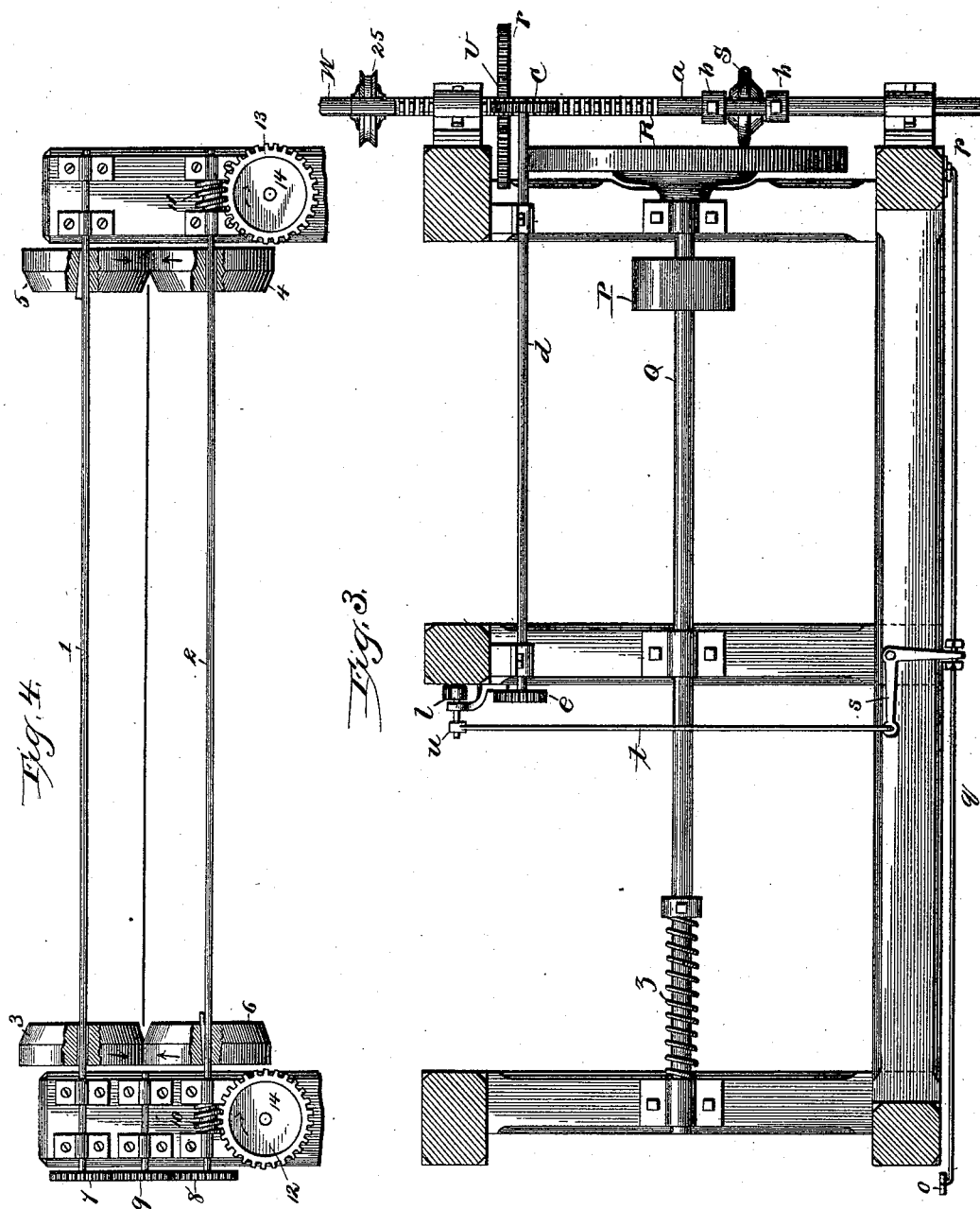
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UNITED STATES PATENT OFFICE.

EUGENE H. SCHOFIELD, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF
TO OREN DUNHAM, OF LUDINGTON, MICHIGAN.

MACHINE FOR WINDING FABRICS.

SPECIFICATION forming part of Letters Patent No. 494,491, dated March 28, 1893.

Application filed October 27, 1890. Serial No. 369,419. (No model.)

To all whom it may concern:

Be it known that I, EUGENE H. SCHOFIELD, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Winding Fabrics, of which the following is a specification.

This invention relates to improvements in apparatus for winding fabrics, and more particularly shade cloth, which is made in considerable lengths and stored upon reels after both the sizing and painting operation, although obviously this apparatus may be employed for reeling any other material and for any other of the various uses to which such an apparatus can be put.

In reeling or winding apparatus as heretofore constructed, great difficulty has been experienced in reeling the cloth evenly and with a uniform degree of tightness throughout the roll because where the reel revolves continuously at a uniform rate of speed, in starting the roll the speed is apt to be too slow, thereby permitting an accumulation of the fabric and resulting in a loose and uneven reeling thereof, but as the roll increases in size, although the speed of rotation remains the same, the reeling effect will be constantly increasing until the roll will be so tight as to not only be objectionable because of the resultant unevenness of the roll, but it is liable to tear, unduly stretch, or else break the fabric. Another objection to the prior forms of machine is, that when the fabric becomes warped or unevenly stretched before its delivery to the reeling apparatus, it will be wound unevenly upon the reel, unless the latter is stopped and the cloth adjusted by hand until again delivered straight to the reel; and this twisting or unevenness of the cloth is of such frequent occurrence, by reason of the necessarily long stretch of cloth between the reeling apparatus and the painting, sizing or other machine from which the cloth is delivered, as to cause considerable annoyance and a great loss of valuable time to the operator, necessitating frequent adjustment of the fabric upon the reel.

The prime object of my invention is to automatically decrease the speed of the reel in

proportion to the increased diameter thereof, whereby the reeling effect will be substantially the same at all times, that is to say the surface speed of the reel will always remain the same, notwithstanding the constant increase in the diameter thereof.

Another object is to utilize the reel itself for automatically changing or reducing the speed of rotation thereof, whereby an exact and predetermined proportion may at all times exist between the speed of rotation and the diameter of the reel, thus maintaining at all times a uniform surface speed for the reel, and avoiding both the stretching as well as an accumulation of the fabric being reeled, between the reel and the machine by which it is delivered.

A further object is to have the reel automatically operated through the medium of the fabric being reeled, to compensate for all unevenness in the delivery of the fabric to the reel, whereby the fabric will be automatically evened upon the reel, and the necessity for stopping the machine at intervals thereby avoided.

Other objects are to provide several novel, useful and efficient details of construction in carrying out my invention, all as illustrated in the accompanying drawings, in which:

Figure 1, represents a side elevation of a cloth reeling machine embodying my invention; Fig. 2, a rear elevation thereof; Fig. 3, a horizontal section taken on the line 3, 3, of Fig. 1, and Fig. 4, a front elevation partly in section, of the automatic cloth guide.

Similar letters and numerals of reference indicate the same parts in the several figures of the drawings.

Referring by letter to the accompanying drawings, A, indicates the reel upon which the cloth or fabric B, is wound, consisting ordinarily of a wooden roll C, keyed upon a shaft D, which latter is loosely journaled in one arm of spider frames E, in turn loosely journaled upon a cross-shaft F, at the rear end of the machine, the reel being driven from the latter cross-shaft through the medium of a spur wheel G, keyed upon one end thereof, and meshing with a corresponding spur wheel H, upon the shaft D.

The spiders E, in the present instance, are

provided with four arms, each terminating in a bearing I, for reception of a reel-shaft similar to the shaft D, for convenience in changing the reels, and as the spiders have a common axis with the driving cog or spur wheel G, and the reel with its corresponding spur wheel swings about this axis, the reel may be moved down to a horizontal plane with the shaft F, without arresting the operation of the machine, which movement brings an empty reel which has been previously inserted in the inner or right hand pair of arms, up into position for receiving the cloth; and to make the change, it is only necessary to stop the machine for an instant, sever the cloth from the full reel, and attach it to the empty reel and again start the machine, the full reel being removed at leisure.

As already intimated each reel is provided with its own shaft, as D, and each of said shafts carries its own pinion or gear wheel, as H, for engaging with the driving gear, G. Hence it is readily seen that the new reel begins to revolve as soon as it is slipped into position with its cog in engagement with the cog, G, the old or filled reel continuing to revolve until its cog is disengaged from the cog G, or until the machine is stopped.

The spiders or reel supporting frame, may be locked in adjusted position by any suitable device to secure it against rotation under the influence of the reeling operation, and where my automatic cloth guide is employed in connection therewith, it will serve to lock the reel frame in position as described farther on.

In practice, if the speed of rotation of the reel were maintained at a uniform rate constantly, the surface speed thereof would be constantly increasing as the diameter of the reel increased, thus resulting in unduly stretching and drawing the fabric, if not breaking it, as it is delivered by the painting, sizing or other machine at a uniform speed, and it is therefore desirable that the surface speed of the reel should be maintained at a uniform rate throughout the winding thereof. This may be done by properly proportioning the speed of rotation of the reel to the diameter thereof, and constantly changing the speed of rotation as the diameter increases, thus maintaining a fixed proportion between the diameter and the speed of rotation of the reel which will result in a uniform surface speed of the reel. To this end the shaft F, which drives the reel through the intermediary of the spur gears G, and H, is driven by a belt J, working over a pulley K, on one end of said shaft, and a pulley L, upon a counter-shaft M, which shaft is in turn driven by a belt N, working over a driven pulley O, on said shaft, and a drive pulley P, on another counter-shaft Q, at the lower part of the machine. Upon one end of this shaft is rigidly mounted a large friction disk R, driven by a friction wheel S, working upon the face of the disk, and splined upon a short shaft T, driven

by a spur gear U, keyed thereon near one end, and meshing with a corresponding spur gear V, upon a power-shaft W, which may be driven from any suitable source of power. Obviously the nearer the center of the friction disk the friction wheel bears, the faster will be the rotation of the disk, and consequently of the winding reel; and the farther from the center the friction wheel engages the disk, the slower will be the rotation of the latter and of the reel. Therefore to accomplish this change in the point of engagement of the friction wheel with the disk, I employ a sliding rack-bar *a*, that is, one capable of endwise movement, from which depends a pair of arms *b*, one at each side of the friction wheel S, for moving the wheel in either direction upon the shaft T, and I operate the rack-bar by means of a pinion *c*, upon one end of a short shaft *d*, which shaft has at its opposite end, another pinion *e*, with which engages a segmental rack *f*, carried by a crank arm *g*, upon a cross-shaft *h*, about the center of length thereof, said shaft near each end being also provided with crank-arms *i*, the said crank arms *g* and *i*, in effect constituting a bell crank-lever, the arm *i*, of which being suitably curved and having journaled in the free ends thereof, a roller *j*, which is designed to bear against the underside of the reel. Thus it will be seen that as the diameter of the reel increases, the roller will be forced downwardly or away from the axis of the reel, and through the intermediary of the crank-arms and the racks and pinions, will cause an endwise movement of the bar *a*, and a consequent change in the point of engagement of the friction wheel with the disk, thereby gradually reducing the speed of rotation of the disk and consequently of the reel in proportion to the increase in the diameter of the reel; and if the parts are properly adjusted with relation to the speed movement and surface speed of the reel required, a uniform surface speed of the reel will be maintained throughout the winding thereof, notwithstanding the gradually and constantly increasing diameter of the reel. When the reel is almost fully wound, it is desirable to change the position thereof as before described preparatory to its removal, and to insert the empty reel in position without arresting the operation of the machine, and in order to prevent the crank-arms under the influence of the springs *k*, which hold them to their work, from flying back to their first position when no longer opposed by the filled reel, I provide a catch device consisting of a spring actuated dog *l*, (shown in dotted lines in Fig. 1,) projecting into the path of movement of the segmental rack *f*, and which may be ridden down by the rack when moving under the influence of the reel, but which engages the teeth of the rack and prevents a movement of the crank-arms in the contrary direction.

The starting and stopping of the reel are accomplished by some suitable clutch device

such as that shown in Fig. 2, in which the belt wheel K, is shown as loose upon the shaft F, and provided with a half clutch *m*, engaged by another half clutch *n*, spring actuated and splined upon the shaft F, in the usual manner, and operated by a yoke lever *o*, through the medium of a hand lever *p*, connected with the yoke lever by a rod *q*, and provided with the usual spring latch *r*, for locking the lever in any adjusted position.

It is desirable in starting up the machine to release the crank arms *i*, *g*, or bell crank-lever of the speed changing devices, simultaneously with the shifting of the clutch in the gear, to which end the rod *q*, is connected with, so as to actuate the dog *l*, by means of a bell-crank *s*, connected by a rod *t*, with a crank-arm *u*, connected with the pivots *v*, of the dog.

Various devices may be provided for permitting the swinging of the dog on the pivot when moved by the segmental rack which it engages under the influence of the spring *w*, without affecting, or being affected by, its connection with the rod *q*, but which at the same time enables the actuation of the dog so as to disengage it from the rack whenever the rod is actuated; and as an example of such a device, one form is shown in the drawings in which the pivot *v*, of the dog is provided with a radial projection *x*, working in a peripheral slot or groove *y*, interiorly formed in the dog, which permits the movement of the dog upon the pivot in one direction to the extent of the length of the groove, but prevents its movement in the opposite direction. Obviously a shoulder on the dog engaged by the crank arm *u*, would subserve the same purpose, as would numerous other devices obvious to one skilled in the art. Thus it will be seen that when the reel is lowered in position for removal, is completely filled, and the empty reel in position to begin winding, by shifting the hand lever *p*, the clutches *m*, *n*, will be thrown out of gear or disconnected, thus instantly arresting the rotation of the shaft F, and consequently of the reel, and at the same time, and by the same movement, disengages the dog from the segmental rack *f*, thereby permitting the crank-arms *i*, *g*, or bell crank-lever of the speed changing device to swing back to their normal position under the influence of the spring *k*, by such action bringing the roller *j*, into contact with the empty reel, which will then be in the position of the present partially filled reel, and simultaneously shifting the position of the friction wheel S, upon the disk R, thus instantly increasing the speed of rotation proportionate to the diameter of the empty reel.

To maintain a uniform degree of friction between the disk R, and the wheel S, I provide a coiled spring *z*, sleeved upon the shaft Q, and confined between one of the bearings of said shaft, and a collar thereon, the tension of which spring tends to an endwise movement of the shaft, thus maintaining the

disk in sufficient frictional contact with the wheel, to produce the required driving power.

In the reeling operation, one of the commonest sources of annoyance and delay, is the uneven winding of the reel due to the warping or lateral shifting of the fabric in its delivery from the painting or sizing machine to the reel; and to overcome this difficulty, I have provided an automatic cloth guide at the front end of my machine, consisting of two cross-shafts, 1 and 2, arranged one above the other, upon each of which near the ends thereof, are mounted a loose guide-roller 3 or 4, and a fixed guide-roller 5 or 6, the loose guide-roller upon one shaft opposing the fixed guide-roller upon the other shaft, thus forming two pairs of rollers, one of each of which is fixed upon the shaft, and the other loose upon the shaft. The face of each roller, or rather the periphery thereof, is beveled or inclined a suitable distance back from the inner edge thereof, so that when the pair of rollers come together, the opposing beveled surfaces form a V shaped notch, in which the cloth of the machine travels, and when properly delivered to the reel out of contact with either roller. But when from any cause, the cloth is shifted laterally in its delivery in either direction, it will wedge into the V shaped space between the rollers on one side or the other as the case may be, thereby causing the rollers to revolve; and, through the intermediary of the mechanism now to be described, to shift the winding reel so as to compensate for the lateral shifting of the cloth until the cloth again works back to the center, the shifting of the reel tending to induce this action.

Upon one end of each shaft, is a spur gear 7, and 8, connected by an intermediate gear 9, and upon the lower shaft 2, near each end thereof, is mounted a worm 10, 11, meshing respectively with worm wheels 12 and 13, keyed or otherwise rigidly secured upon one end of longitudinal screw shafts 14, the opposite ends of which shafts are provided with right and left hand screw threads respectively, upon which work internally screw threaded sleeves 16, having pivotally connected therewith one end of a lever 17, the opposite end of which lever is pivoted to the frame of the machine, so that whenever the shaft 2, is rotated, these levers 17, through the intermediary of the worm gear and screw thread connection, will be operated so as to move in reverse directions to each other, one inwardly and the other outwardly, or vice versa, according to the direction in which the shaft 2, is rotated.

With each of the levers 17, (only one of which is shown in the side elevation in Fig. 1, the other being in line therewith and not appearing,) is pivotally secured one end of a connecting rod 18, the opposite end of which hooks over or is otherwise detachably connected with the shaft D, of the reel A, as illustrated in Fig. 2, which rods not only serve to prevent the rotation of the reel frame or sup-

port upon the shaft F, but also serve as a means for communicating the movement of the levers 17 to the reel, so as to change the alignment thereof, sufficiently to compensate for the shifting of the cloth being wound thereon; in other words, the normal position of the axis of the reel is parallel with the axis of the shaft F; but when the cloth is shifted in its delivery and winds unevenly upon the reel, tending toward either end thereof, through the action of the cloth upon the automatic guide, as before described, the position of the reel will be changed so as to work at a very slight oblique angle to the axis of the shaft F, in which position it will remain until shifted back to the center or to the opposite oblique position by the action of the cloth upon the automatic guide.

With the guide rollers arranged in pairs, one of each pair being a loose roller on one shaft, and a fixed roller on the other, the pairs of rollers alternately become the actuator of the devices connecting their shafts with the reel as before described; for instance looking toward the machine as illustrated in Fig. 4, with the cloth moving away from you, so long as it remains out of contact with either pair of rollers as illustrated, no change in the position of the reel will take place, but as soon as the cloth becomes shifted, in either direction, say toward the left so as to bind between the pair of rollers 3, 6, the roller 6, which is fixed upon the shaft 2, will become the driver, rotating the various gears in the direction illustrated by the arrows in the drawings, the roller 3 running idle upon its shaft, which is caused to rotate in the reverse direction thereto, by reason of the intermediate gear connection between the shafts 1 and 2, which of course reverses the direction of rotation of the guide wheels 4 and 5, but that produces no effect, because the cloth is entirely out of contact therewith at this time. On the other hand, should the cloth shift in the opposite direction, or toward the right, making contact with and actuating the rollers 4 and 5, the fixed roller 5 will become the actuator for the mechanism operating the reel, and through the medium of the gear connections, will rotate the various gears and the worm wheels in the opposite direction to that shown by the arrows, thus causing the position of the reel to be reversed or removed to the opposite side of its normal alignment parallel with the axis of the actuating shaft F, thereof; and obviously this guide will cause an automatic shifting of the reel, to one side or the other of its normal aligned position, thereby compensating for all irregularities in the delivery of the cloth.

In practice it is desirable to avoid arresting the operation of the entire machine during the changing of the reels, that is in removing a filled, and replacing it by an empty, reel, to which end I employ a pair of feed-rollers 19, and 20, the former of which is a driven gravity roller resting upon the latter

and loosely journaled upon a cross-shaft bearing in swinging or hinged arms 21, pivotally supported at their opposite ends in brackets 22, attached to the machine, or in any other convenient manner. The roller 20, is the driving roller and is operated by means of a belt 23, working over a belt wheel 24, on the shaft thereof, and another belt wheel 25, upon the power shaft W, the proportion between these wheels being so arranged as to give the feed rolls substantially the same surface speed as the reel. These feed rollers serve to keep the cloth taut between them and the sizing, painting or other machine from which the cloth is delivered during the brief interval occupied in changing the reels, continuing the feed, but producing only a very slight accumulation of cloth between them and the reel, which is taken up by the reel before the reeling apparatus is again started. In practice these feed rollers may be adapted for serving the purpose of simple guide rollers during the time the reeling apparatus is in operation, by providing some means for lifting the gravity feed-roller off of the driven roller, such for instance as the toggle connection 26, between the arms 21, and the stationary portion of the machine operated by levers 27, connected therewith by rods 28, and pivotally secured at one end to the frame of the machine, the opposite end of which levers may be provided with a hand rod 29, for convenience of manipulation.

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

1. In a reeling apparatus, the combination with the reel; of guide rollers adapted to be actuated by the shifting of the cloth and a connection between said rollers and the opposite ends of the reel for changing the alignment of the latter, substantially as set forth.

2. In a reeling apparatus, the combination with the reel; of hook arms engaging said reel and guide rollers adapted to be actuated by the edges of the cloth, said rollers being connected with said arms for imparting motion thereto, substantially as set forth.

3. In a reeling apparatus the combination with the reel; of guide rollers adapted to be actuated by the edges of the cloth, screw rods operated by said rollers and being connected with the ends of said reel for changing the alignment thereof, substantially as set forth.

4. In a reeling apparatus, the combination of guides having beveled edges between which the cloth engages in shifting, and a reel connected with said guides whereby its alignment will be changed by the motion of the guides, substantially as set forth.

5. In a reeling apparatus, the combination with the shaft, F; of the reel supporting spiders through which said shaft passes, having journal bearings in the arms thereof, for the reception of a reel shaft adapted to be driven by the shaft, F, guiding rollers actuated by the shifting of the fabric and connected with

the reel shaft for changing the alignment thereof, substantially as set forth.

6. In a reeling apparatus, the combination with the reel; of guide rollers adapted to be actuated by the shifting of the cloth, the levers, 17, connected to said reel, and worm and wheel connection between said levers and rollers, substantially as set forth.

7. In a reeling apparatus, the combination with the reel and a speed changing device having a movable member; of a bell crank lever, one arm of which engages the reel and a rack and pinion connection between the other arm of said lever and the said movable member of the speed changing device, substantially as set forth.

8. In a reeling apparatus, the combination with the reel, a friction disk suitably geared or belted thereto for driving the same, the power shaft and a movably supported friction wheel driven thereby, and working upon the face of the disk, of a bell-crank lever, one arm of which engages the reel, and a rack and pinion connection between the other arm of said lever and the support of the friction wheel, substantially as described.

9. In a reeling apparatus, the combination with the reel, a friction disk suitably geared or belted thereto for driving the same, a driven counter-shaft and a friction wheel splined upon said shaft and working upon the face of said disk, of a movable rack-bar, an arm projecting therefrom on each side of the said friction wheel for shifting the same upon the counter shaft, a rotatable shaft carrying a pinion engaging and operating said rack-bar, a bell-crank lever, one arm of which engages the reel, and a rack and pinion connection between the other arm of said lever and the rotatable shaft, substantially as described.

10. In a reeling apparatus, the combination with the reel, a friction disk suitably geared or belted thereto for driving the same, a clutch for throwing the reel into and out of gear, the power-shaft and a friction wheel driven thereby and working upon the face of said disk, of a bell crank-lever, one arm of which engages and is actuated by the reel, a rack and pinion connection between the other arm of said lever, and the support for the friction wheel, a lock device for said lever, and a hand lever connected therewith for simultaneously oper-

ating said lock device, and the reel clutch, substantially as described.

11. In a reeling apparatus, the combination with the reel, the adjustable reel frame, the friction disk suitably geared or belted to the reel, a clutch for throwing the reel into and out of gear, the power-shaft and a friction wheel driven thereby, movably supported and working upon the face of said disk, of a bell crank-lever, one arm of which engages the reel, a rack and pinion connection between the other arm of said lever, and the support for the friction wheel, a spring actuated lock device for said lever, and a hand lever connected therewith, for simultaneously operating said lock device and the reel clutch, substantially as described.

12. In a reeling apparatus, the combination with the reel, of an automatic cloth guide operated by the cloth being reeled, and connected with, so as to change the alignment of the reel, substantially as described.

13. In a reeling apparatus, the combination with the reel, of an automatic cloth guide comprising two pairs of guide rollers adapted to be actuated by the shifting of the cloth, and a connection between each pair of said rollers and the reel, whereby the reel is alternately shifted out of alignment in opposite directions, substantially as described.

14. In a reeling apparatus, the combination with the reel, of an automatic cloth guide comprising a pair of transverse shafts, a loose and a fixed guide roller on each of said shafts, the loose roller of one shaft opposing the fixed roller of the other, all of said rollers being provided with beveled or inclined faces, a gear on one end of each of said shafts, an intermediate gear connecting the same, a pair of screw shafts each having a worm connection with one of said transverse shafts at one end, and at their opposite ends provided with right and left hand screw threads respectively, screw-threaded sleeves working thereon, levers pivotally connected to said sleeves, and a rod connecting each of said levers with the shaft of the reel, substantially as described.

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