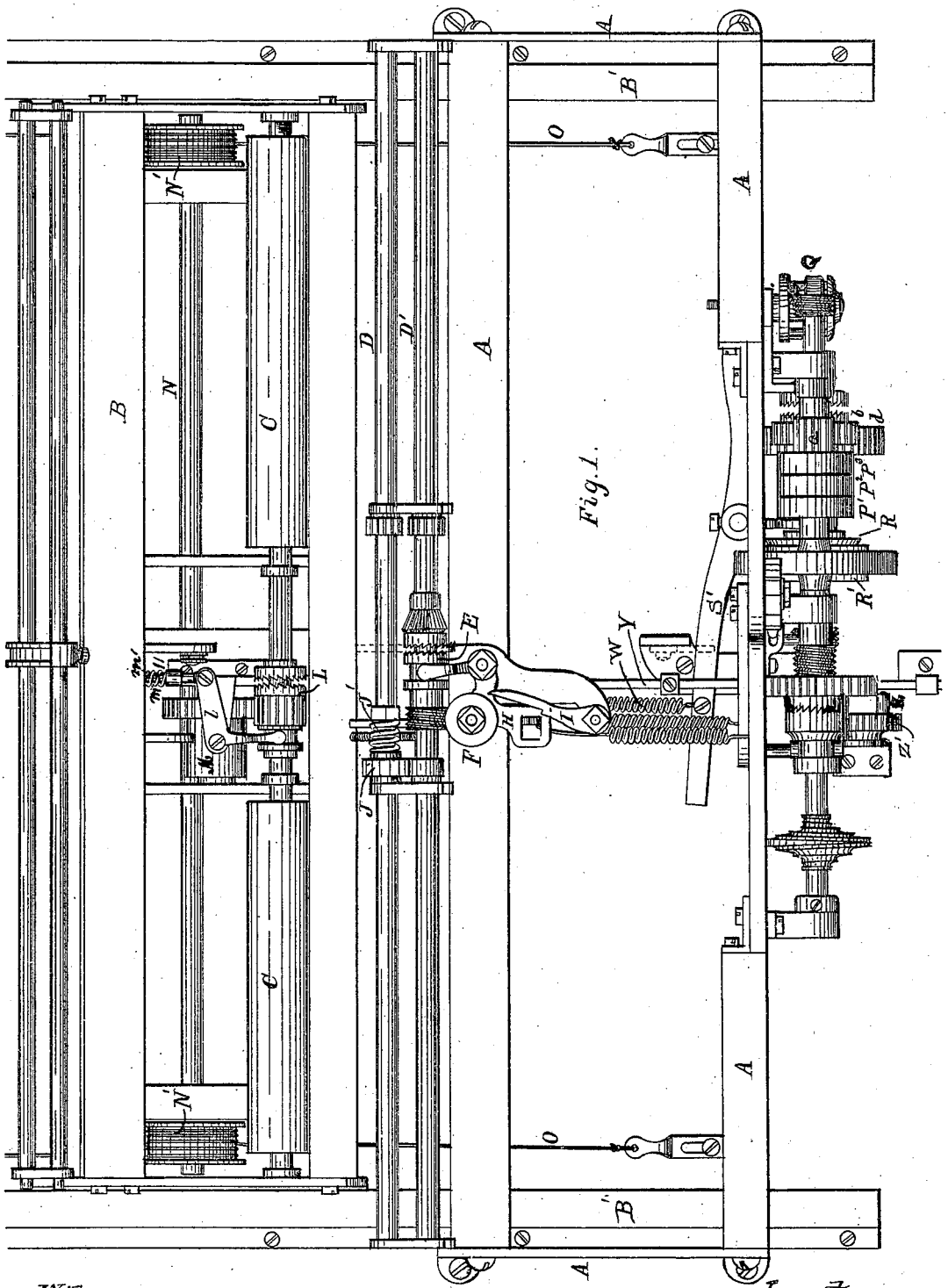
3 Sheets—Sheet 1.

P. McGOVERN.

SPINNING-MULES.

No. 193,887. Patented Aug. 7, 1877.



Witnesses.
Wm. P. Edwards.
E. A. Hemmenway.

Inventor.
Peter McGovern

3 Sheets—Sheet 2.

P. McGOVERN.

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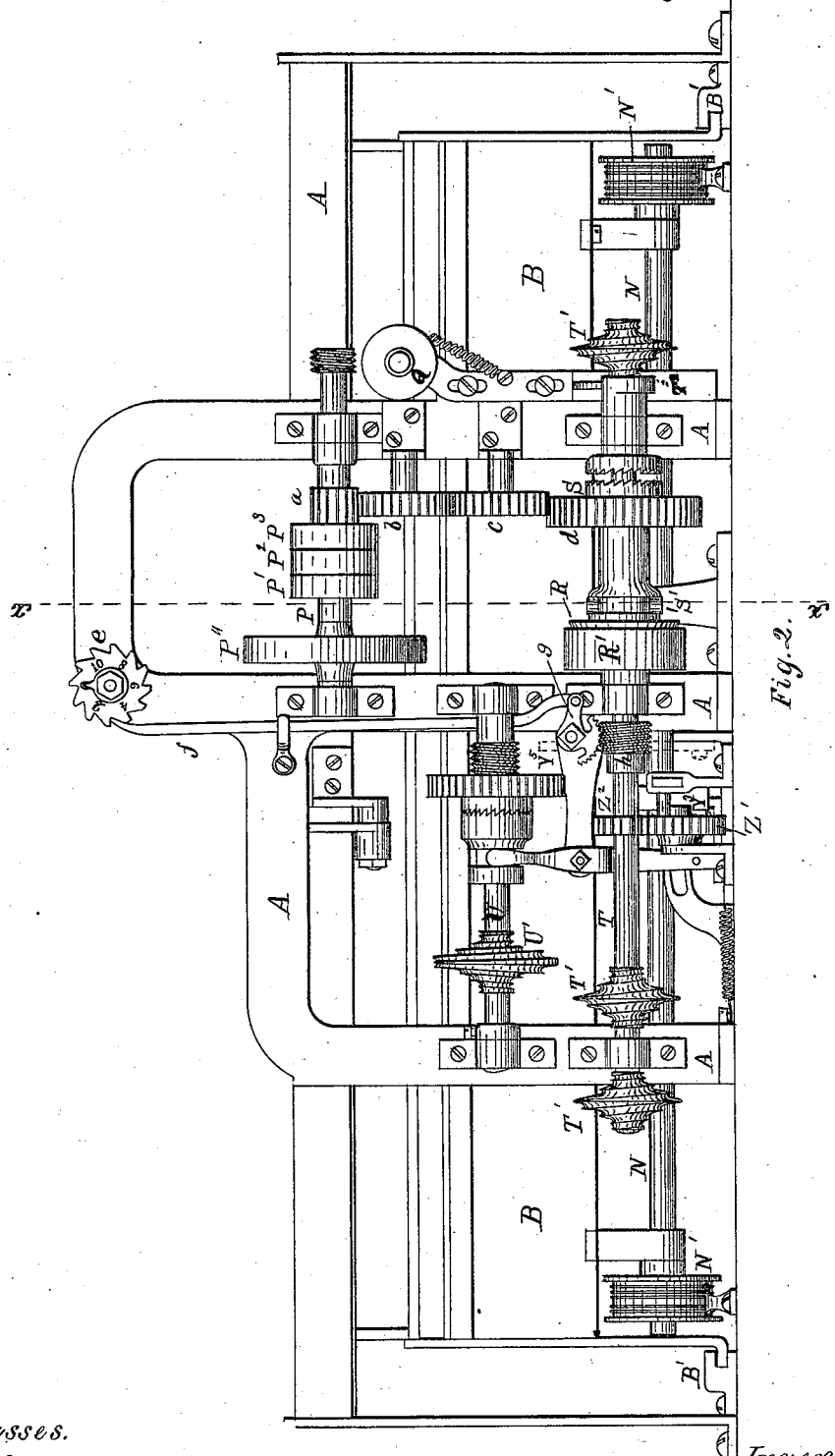

Fig. 2.

Witnesses.
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3 Sheets—Sheet 3.

P. McGOVERN.

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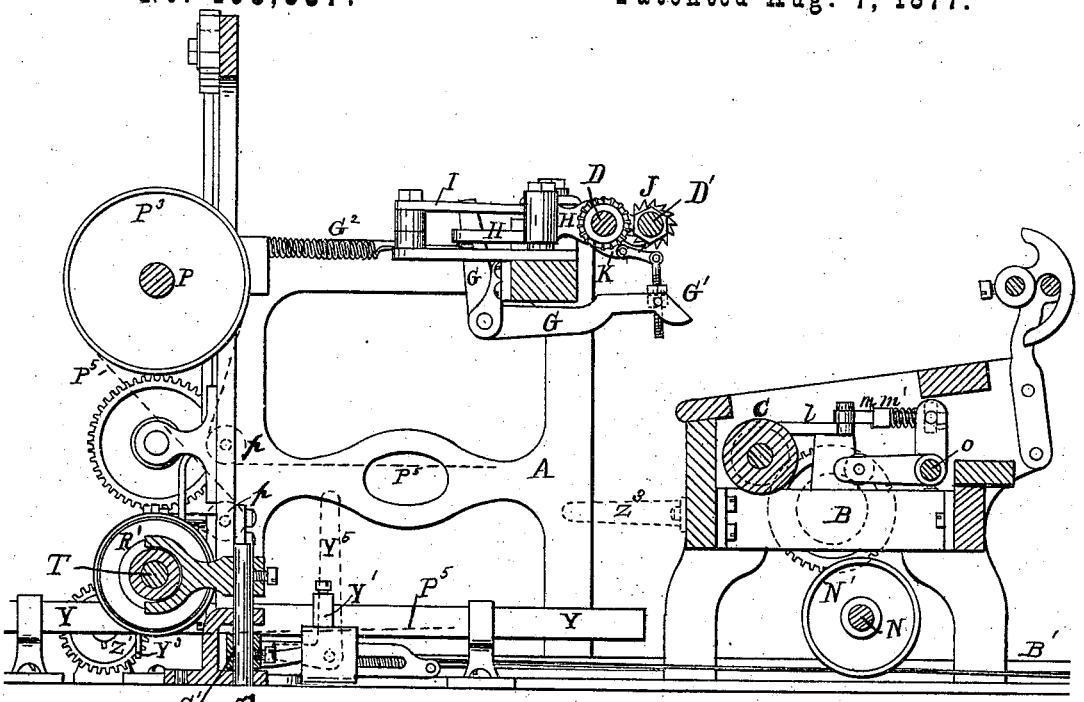

Fig. 3.

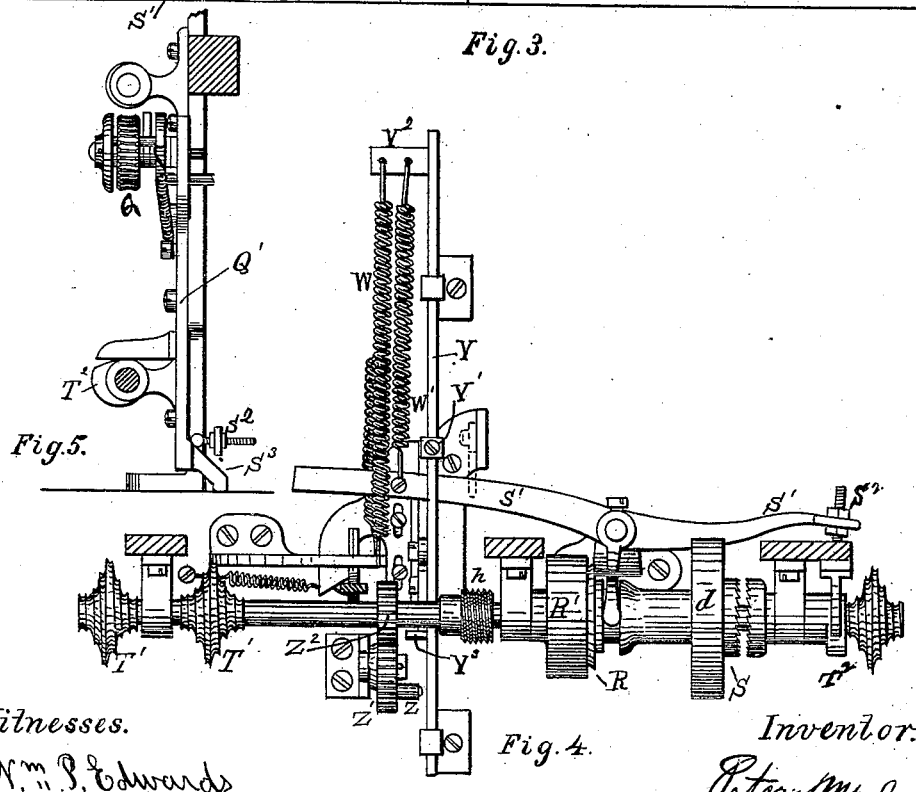

Fig. 5.

Fig. 4.

Witnesses.

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UNITED STATES PATENT OFFICE.

PETER McGOVERN, OF NORTH ANDOVER, MASSACHUSETTS, ASSIGNOR TO GEORGE L. DAVIS, JOHN A. WILEY, JOSEPH M. STONE, GEORGE G. DAVIS, JOSEPH H. STONE, AND JAMES H. DAVIS, OF SAME PLACE.

IMPROVEMENT IN SPINNING-MULES.

Specification forming part of Letters Patent No. **193,887**, dated August 7, 1877; application filed April 8, 1876.

To all whom it may concern:

Be it known that I, PETER McGOVERN, of North Andover, in the county of Essex and State of Massachusetts, have invented certain Improvements in Automatic Mules or Jacks for Spinning, of which the following is a specification:

My invention relates to the construction and arrangement of several of the subordinate parts of the machine, by which the same are improved in their operation and simplified in construction, and may be usefully employed in other automatic mules, differently arranged as to other parts of the machine, which are not involved in my invention.

These improvements have more especial reference to machines constructed substantially like those described in Letters Patent heretofore granted to me, numbered 113,784 and 138,511; but parts of the same may be usefully employed with machines differently constructed.

My first improvement relates to the mechanism which operates the winding-clutch on the spindle drum-shaft, by means of the rocker-shaft on the spindle-carriage, which is marked *o* in my said Patent No. 113,784, by which the said rocker-shaft is enabled to make a full movement, when the teeth of the clutch are in such position as to prevent their full engagement; and consists in making the connection between the said rocker-shaft *o* and the said clutch yielding, and so that the said rocker-shaft can make its full movement, and thus the resilience of the connection puts the clutch into full engagement as soon as the positions of its teeth permit.

My second improvement relates to the devices for "squaring the carriage," as it is called; and consists in the combination, with the carriage, of a long shaft extending nearly the entire length of the carriage, having a series of pulleys upon the same, of equal diameter, upon which pulleys a series of fixed cords are wound, so that by the rotation of the said shaft and pulleys, and the winding and unwinding of the cords upon the pulleys, all parts of the carriage will be moved back and forth with the same velocity, and with but slight resistance from friction.

My third improvement relates to the method employed in my aforesaid Patent No. 113,784 for effecting several changes in succession in the machinery, by the recoil of a strong spring, which is set by the running in of the carriage, and by the partial recoils of which spring at different times it produces a succession of operations, which put in action the different parts of the machinery in the proper order to perform the different operations necessary for spinning and winding up the yarn. These operations were nearly all controlled in my aforesaid Patent No. 113,784 by the long rod marked Y, which was drawn lengthwise to set the spring, and by its movement in the opposite direction the said operations were effected. My invention in this respect consists in combining, with the said rod Y, or its equivalent, a mechanism for forcing the rod endwise to set the spring, which is actuated from the scroll-shaft which runs in the carriage, and is not directly connected with or operated by the carriage, so that the power required to set the spring may be distributed over a longer time in the running in of the carriage, and does not interfere with the proper motion of the carriage.

My fourth improvement relates to the manner of combining and arranging the backing-off pulley and friction-cone and the driving-clutch which drives the running-in scroll-shaft; and consists in placing the backing-off pulley loosely upon the shaft as an axle, and in forming the cone and clutch in one piece, so that both of them will be operated by the same movement of the shipper.

My fifth improvement relates to the method of operating the counter for counting the number of drafts made by the carriage, by which only the full drafts will be registered, and the counter is protected from fraudulent interference. This consists in so combining the pawl, or its equivalent, which operates the counter with the carriage, or some part partaking of the same movement, that it requires substantially the whole extent of movement of the

carriage to operate the counter, and the pawl is also so connected with the carriage that it can be moved only by the movement of the carriage.

And my improvements further consist in certain minor modifications of the machinery, which will be more particularly referred to in the description.

In the drawings are represented only such parts of the machine as are concerned with my improvements more particularly described.

Figure 1 is a plan of same. Fig. 2 is an elevation of the back side. Fig. 3 is a sectional elevation on line *x* of Fig. 2. Fig. 4 is a plan of the running-in scroll-shaft and the parts below it, and Fig. 5 is a detail which will be referred to in the description.

A is the frame of the machine, and B is the carriage which carries the spindles, in the usual way.

The carriage is represented merely as being guided by the rails B^1 only; but in practice it would be mounted upon truck-wheels and rails, as is usual in such machines.

C is the drum which drives the spindles. D and D′ are the delivering-rollers, which deliver the roping in the usual way.

The parts that are not represented in the drawing in connection therewith are supposed to have substantially the mode of operation that is represented and described in my aforesaid Patent No. 113,784, excepting so far as they would be modified by my improvements herein described.

E is the clutch by which the delivering-rollers are put in rotation and stopped under control of the clock F, as is usual. It is thrown into engagement by a piece upon the carriage, which hits upon the inclined end G^1 of the bent lever G, the upright arm of which works through an opening in the clutch-lever H, upon which the clock F is mounted in substantially the same way that is described in my Patent No. 138,511. The lever G, when it is depressed by the carriage, throws both the clock F and the clutch E into gear, and is held by the latch I till the latch is disengaged by the rotation of the clock, in an obvious manner, and the lever G is thrown back by the spring G^2.

J is a ratchet, which is placed upon one of the delivering-rollers, and is held fixed upon it by the friction of the coiled spring J′, which holds the ratchet against its shoulders upon the shaft, so that the shaft may revolve while the ratchet is held fixed without breaking the parts.

K is a pawl, which turns upon the other roller-shaft as an axis, and is vibrated up and down by means of its connection, as shown, with the lever G. When the lever G is depressed the pawl is held out of the ratchet J; but when it is elevated to throw the clutch E and clock F out of gear, the pawl K engages with the ratchet J, and instantly arrests the motion of the delivering-rollers, and prevents their delivering too much roping by continuing their motion by their momentum, while the frictional engagement of the ratchet with its shaft prevents the breaking of the mechanism in case both the ratchet and clutch E should be engaged at the same instant.

L is the clutch upon the spindle drum-shaft C, which connects this shaft with the winding-drum M, in the usual way, to wind up the yarn. This clutch is put in action by the bent lever *l* and the elastic connecting-rod *m*, Figs. 1 and 3, by the rocker-shaft *o* upon the carriage.

This rocker-shaft *o* is represented in my aforesaid Patent No. 113,784 by the same letter, and is operated in combination with the faller-lock in this case, in substantially the same manner as in that.

The connecting-rod *m* is made in two parts, one sliding upon the other, as shown, and these parts are held asunder by the spring *m′*, so that the rocker-shaft *o* can make its full oscillation and produce the full action of the faller-lock without being prevented by the position of the teeth of the clutch L or breaking the parts, while the operative length of the connecting-rod remains the same.

By this arrangement the operation of the winding-clutch L is put entirely under the control of the locking-rod of the faller, which dispenses with the use of the frictional devices operated by the main drum, which are usually employed for that purpose.

N is a long shaft mounted upon the carriage B, having a series of pulleys, N′, all of equal diameter, fixed upon the same near the ends, and at intermediate positions, if desired, and O O are cords or bands, which are attached at each end to some fixed object near the floor, and are wound several times around the pulleys, respectively, so that the cords are substantially parallel with the rails upon which the carriage runs, and are tangent to the pulleys N′ upon the shaft N.

By this arrangement the cords may be drawn tight upon the pulleys O without imparting great friction to the carriage, and by the use of the intermediate pulleys and fixed cords the intermediate parts of the carriage are kept in line with the ends.

In the drawings but two pulleys, N′, are shown; but, in practice, from three to five of them would be employed, at about equal distances apart on the shaft N, according to the length of the carriage.

By this mode of construction, after the cords or bands O O, &c., are adjusted, all parts of the carriage must move with the same velocity.

P is the driving-shaft of the machine, which carries the driving-pulleys P^1 P^2 P^3 and the race-pulley P^4 at one end of it, and the worm which drives the twist-clock Q, at the other. The pulley P^3 is connected, by the train of gearing *a b c d*, with the backing-off cone R, and the clutch S, which drives the lower scroll-shaft T, which, by means of the scrolls T^1, run in the carriage.

U is the running-out scroll-shaft, which, by the scroll U′, runs out the carriage, as usual,

the whole of the driving mechanism of which is not shown, as those parts and the other parts just mentioned are not substantially modified by my present invention.

The course of the race-belt is shown by the dotted line P^5 in Fig. 3, in that part near the driving mechanism, and by means of the carrying-pulleys *p p* shown it passes around the backing-off pulley R′, which runs loosely upon the scroll-shaft T, and, except during the time that this pulley is engaged with the cone R in backing off, it acts merely as a guide-pulley for the race-belt. The cone R and the clutch S and driving-gear *d* are all attached together, and operate as one piece, and revolve loosely upon the scroll-shaft T, so that the same movement which disengages the backing-off cone R throws the running-in clutch S into engagement with the shaft T to run the carriage in. This movement is produced by the shipper-lever S^1, which, at one end, co-operates with twist-clock slide Q′, and at the other end with the springs W and W^1 and rod Y, as will be described. The spring W is called the "main-spring," and serves to draw that end of the lever S^1 toward the back of the machine, throwing the cone R out of engagement and the clutch S into engagement through the intervention of the rod Y, to which the spring W is attached, as shown, the stop Y^1 on which comes against the shipper-lever S^1 and moves it, as just described.

The rod Y serves the same purpose, substantially, in this machine as the rod which is indicated by the same letter in my aforesaid Patent No. 113,784. It is made of sufficient length to extend to the front of the machine, and is there provided with a catch, which is worked by the rocker-shaft *o* on the carriage at the commencement of the winding operation, substantially as is shown and described in my aforesaid Patent No. 113,784, excepting that it is arranged to be moved by the mainspring W in the opposite direction, or toward the back of the machine, which spring is attached to an arm, Y^2, which projects from the side of the rod Y, as is shown. This rod is forced back, to set the spring W, by the rotation of the wrist-pin Z, which projects from the side of the gear Z^1 which comes against the projection Y^3 upon the side of the rod Y as the gear Z revolves. This gear is driven by the gear Z^2 upon the scroll-shaft T, which engages with the gear Z^1, as is shown, and thus gives to the operations of the parts actuated by the rod Y a definite relation to the running-in movement of the carriage.

The mainspring W serves, substantially, the same purpose as the spring that is marked Y^4 in Patent No. 113,784, and the spring W^1 in this machine serves, substantially, the same purpose as the leaf-spring marked W^2 in said patent.

Y^5 shows, in dotted lines, the position of the latch-lever which holds the shipper-lever S^1 against the tension of the spring W in setting the spring, and serves the same purpose as the latch-lever marked with the same letter in my aforesaid patent, and is operated, also, by being struck by the arm Z^3 on the carriage at its inner limit of movement, and unlocks the shipper-lever S^1, which enables the spring W^1 to throw the lever a sufficient distance to disengage the clutch S and stop the running-in scroll-shaft T, but will not carry the shipper-lever a sufficient distance to throw the backing-off cone into action at this juncture, by reason that the stop S^2 on the end of the lever S^1 comes in contact with the inclined stop S^3 on the lower end of the clock-slide, which is then in a raised position, having been raised and latched by the action of the cam T^2 on the scroll-shaft T, Fig. 5, but is shown in the lowest position in the drawing. This part of the machine is then ready to begin the draft.

The machinery which operates to draw the carriage out is partly represented in the drawing, and has substantially the same mode of operation as the corresponding machinery which is described and shown in my aforesaid Patent No. 113,784, in a somewhat different form, and will only be more particularly described so far as is necessary to explain the present improvements.

Upon some conspicuous place of the framing of the machine I place the counter *e*, which is operated by the scroll-shaft T, as shown, by means of a long pawl, *f*, which has a reciprocating movement of sufficient length to move the counter one notch of its ratchet and no more. This reciprocating movement is given by means of the rocking lever *g*, to which the pawl *f* is jointed, which is provided with a geared segment, which engages with the worm *h* on the scroll-shaft T. By this construction the pawl can only be moved to a sufficient extent to operate the counter and register the number, by turning the shaft T as far in either direction as it is moved in making a draft of the carriage. The counter is inclosed within a suitable case, so as to be inaccessible, and is provided with suitable counting-wheels and dials, as is usual, to register the numbers of the drafts.

By this arrangement several of the parts of the mechanism which require considerable power to operate them are operated directly by the shaft T, instead of by the carriage, as was the case in my former patent, especially the setting of the mainspring W, and the raising of the twist-clock slide Q′ to operate the main belt-shipper, as well as the continuous control of the counter; but as this shaft T always preserves a constant relation to the movements of the carriage, the several operations of the machine preserve the same relations to each other as in my former patent, No. 113,784, and the mode of operation of the machine, as a whole, remains substantially the same.

What I claim is—

1. The combination of the winding-clutch

on the main drum, for driving the spindles, with the faller-lock and a yielding connection, operating substantially as described.

2. The combination, with the carriage, of the long shaft N and its series of pulleys N′, and fixed cords or bands winding upon the same, and operating substantially as described.

3. The combination of the rod Y with the wrist-pin Z and its driving-gear, and the scroll-shaft T, whereby the mainspring W is set by the revolution of said scroll-shaft, substantially as described.

4. The combination, with the scroll-shaft T and the shipper S, of the backing-off pulley and the cone and the drawing-in clutch, the said pulley being free to revolve upon the scroll-shaft as an axle, the said cone and drawing-in clutch being made in one piece, whereby, by the operation of the shipper-lever, the different parts of the mule are put into operation in their proper order to perform the different functions necessary to spinning and winding up the yarn, as specified.

5. The combination of the counter *e*, which registers the number of drafts of yarn made, with the scroll-shaft T and connecting mechanism, substantially as described, whereby the movement of its driving-pawl is continuously under the control of the movement of the said scroll-shaft, substantially as described.

6. The combination of the driving-pawl of the counter with the scroll-shaft T by means of the worm and segmental gear, operating substantially as described.

7. The combination and arrangement of the twist-clock slide and the drawing-in scroll-shaft T, substantially as described, whereby the twist-clock will be put in gear with its driving mechanism by the action of said shaft, substantially as described.

Executed April 4, A. D. 1876.

PETER McGOVERN.

Witnesses:

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