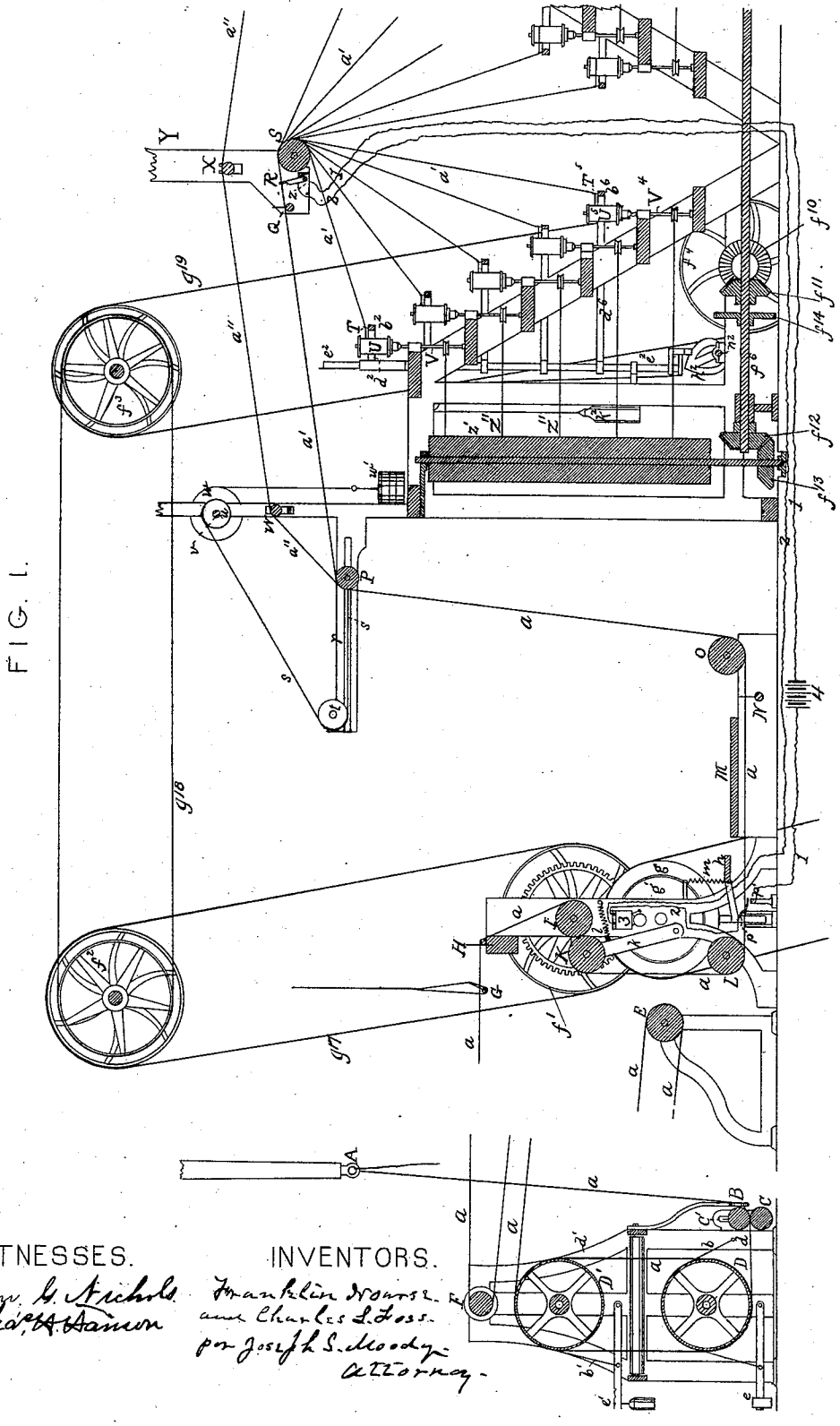
(No Model.) 7 Sheets—Sheet 1.

F. NOURSE & C. L. FOSS.

YARN WINDING MACHINERY.

No. 367,922. Patented Aug. 9, 1887.

FIG. 1.



WITNESSES.

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Attorney.

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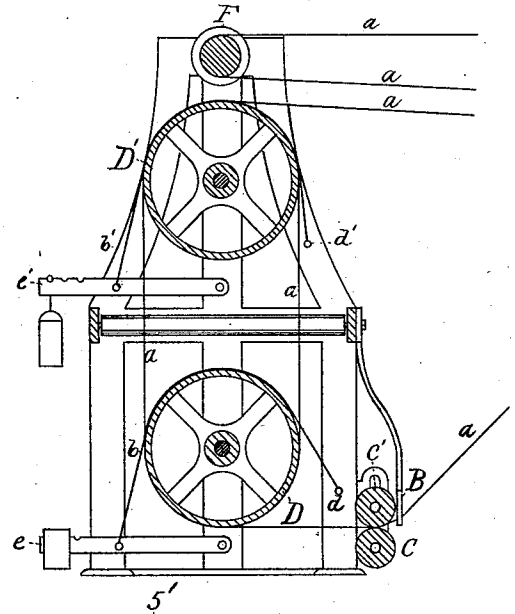
FIG. 2.



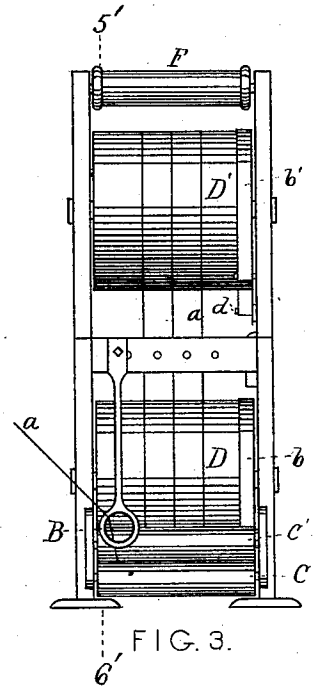


FIG. 3.

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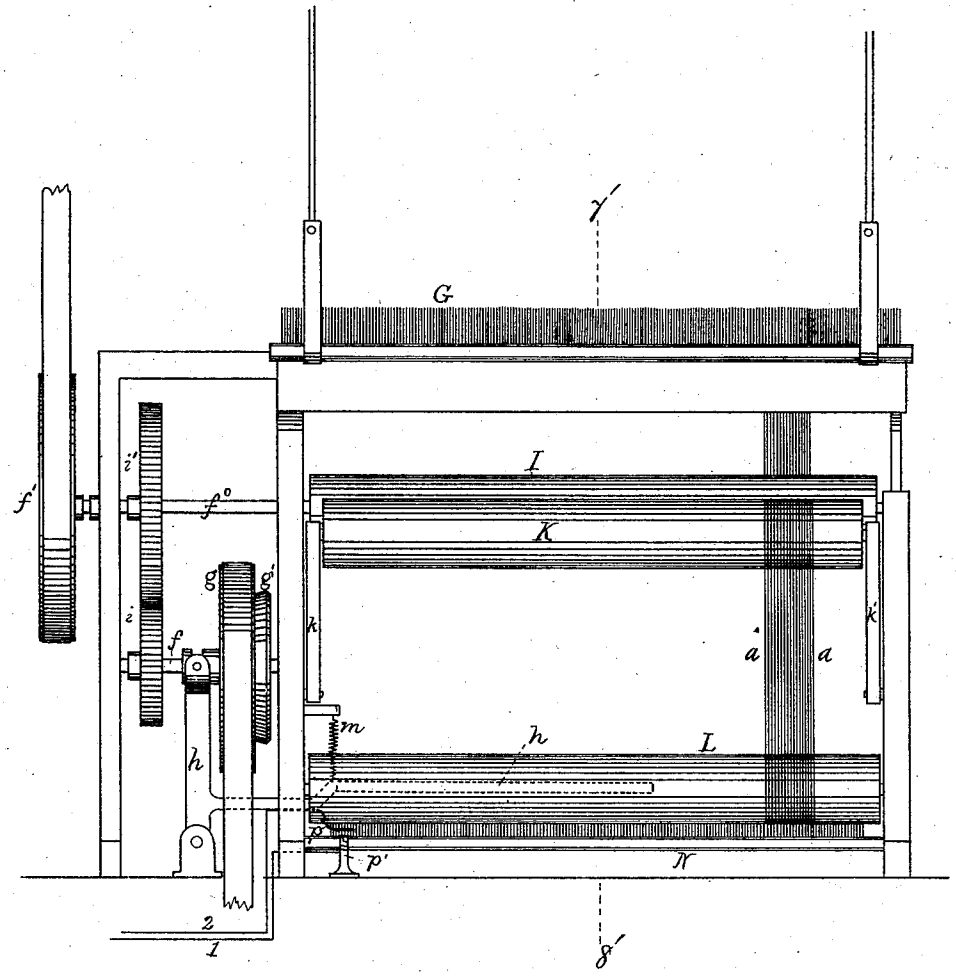
FIG. 4.



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(No Model.) 7 Sheets—Sheet 4.

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YARN WINDING MACHINERY.

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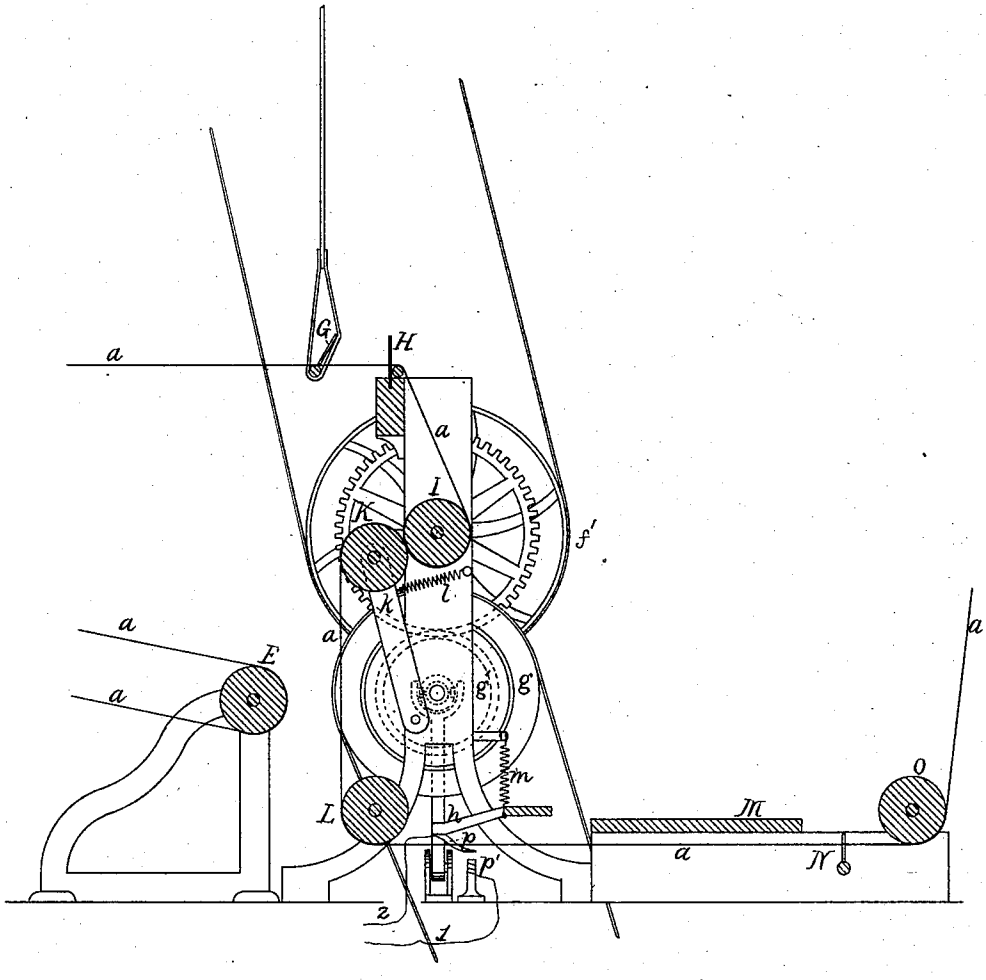
FIG. 5.



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YARN WINDING MACHINERY.

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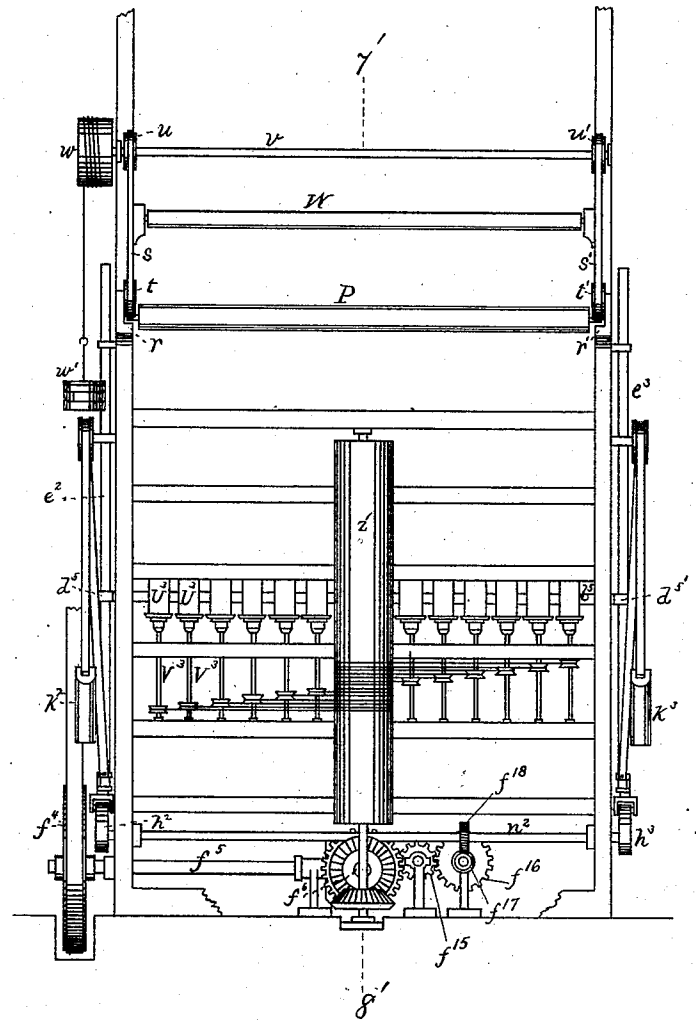
FIG. 6.



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YARN WINDING MACHINERY.

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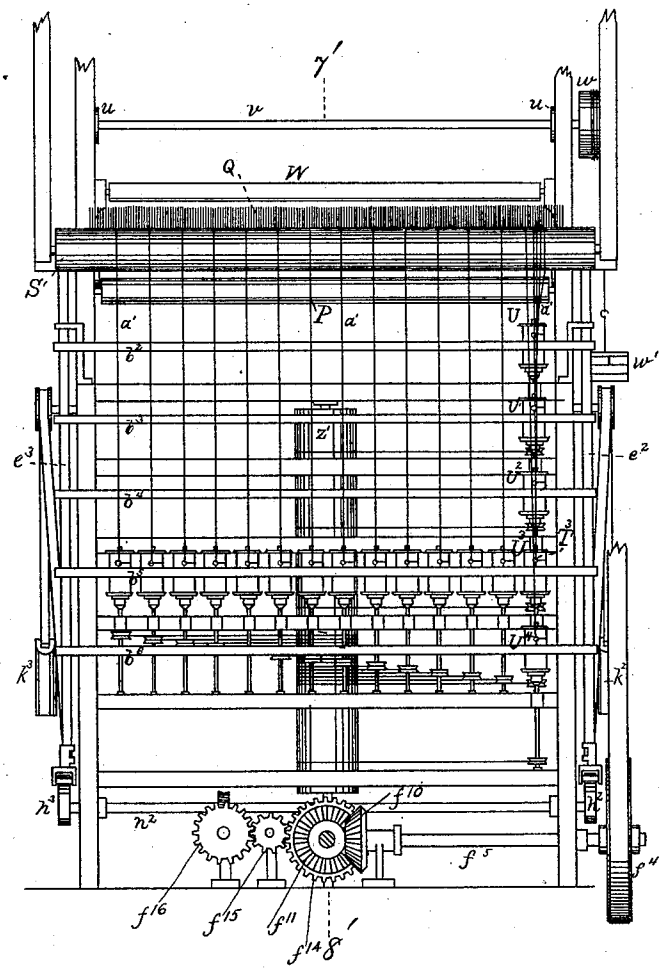
FIG. 7.



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YARN WINDING MACHINERY.

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FIG. 8.

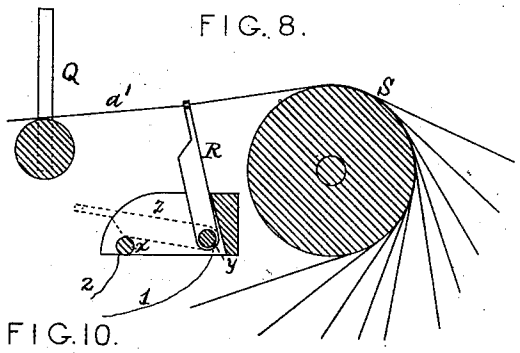

FIG. 9.

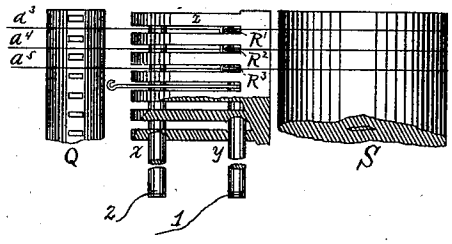

FIG. 10.

FIG. 11.

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UNITED STATES PATENT OFFICE.

FRANKLIN NOURSE AND CHARLES L. FOSS, OF SACO, MAINE.

YARN-WINDING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 367,922, dated August 9, 1887.

Application filed August 2, 1886. Serial No. 209,728. (No model.)

To all whom it may concern:

Be it known that we, FRANKLIN NOURSE and CHARLES L. FOSS, citizens of the United States, residing at Saco, in the county of York and State of Maine, have invented a new and useful Improvement in Yarn-Winding Machinery; and we do hereby declare that the following is a full, clear, and exact description of our invention, reference being had to the drawings accompanying and forming a part of this specification.

Similar letters of reference indicate corresponding parts in all the views.

Our invention relates to machinery for the winding of chain-dyed yarns directly from the chain upon spools, thus preparing the chained yarns for use either as warp or filling in the weaving of goods, as herein described and claimed, through the use of known and commonly-used devices.

Figure 1 is a sectional elevation, having parts broken out, of our improved mechanism arranged in order as in practical use, as and for the purposes herein set forth, in which f^2 and f^3 are driving-pulleys, other driving-pulleys being shown in other views. Fig. 3 is a front elevation of a friction-drum stand, of which Fig. 2 is a sectional elevation on line 5′ 6′, Fig. 3. In these views B is a guide-ring. C C′ are guide-rolls. D D′ are friction-drums. *b b′* are friction-bands passing over the drums. One end of each of these bands is held by pins *d d′*, the other ends being attached to the weighted levers *e e′*. These friction-bands are designed to control the motion of the friction-drums. E and F are carrying-rolls; *a*, the chained yarns.

Fig. 4 is a front elevation of a drawing and driving machine, of which Fig. 5 is a sectional elevation on line 7′ 8′, Fig. 4. In these views G is a swinging reed. H and N are fixed reeds. I and K are drawing-rolls. L and O are carrying-rolls, so located as to avoid all risk of injury to the threads from the movements of the operator. M is a platform, on which the operator is stationed. *g g′* is a friction-clutch pulley, through which motion is communicated to the entire machinery. This pulley is connected by suitable belting with any available motor. *h* is a treadle acting as a shipper for the friction-clutch pulley. *m* is a spring connected with the treadle, and designed to prevent the frictional contact of *g g′*. *k k′* is a swinging frame carrying the drawing-roll K. *l l* are springs attached to the swinging frame, their purpose being to secure the close contact of the rolls K and I. *f* is a shaft carrying the friction-clutch pulley *g g′* and gear *i*. f^9 is a shaft carrying the drawing-roll I, gear *i′*, and pulley *f′*. *p* is an electric-circuit breaker attached to the treadle *h*. *p′* is a metallic stand. 1 and 2 are insulated wires, designed for use as hereinafter explained.

Figs. 6 and 7 are rear and front transverse elevations of a tension-frame and the spooling-frame. These are shown in Fig. 11 in sectional elevation on the lines 7′ 8′ of Figs. 6 and 7. In these three figures P is a tension-roll journaled in guides in the arms *r r′*. To each end of this roll straps *s s′* are attached. These straps pass over the pulleys *t t′*, the other ends being attached to the pulleys *u u′* on the shaft *v*. On the same shaft is the pulley *w*, to which is attached a cord carrying the weight *w′*, the tendency of this weight being to draw the roll P back toward *t t′* in a direction opposite to the pull of the threads, thus taking up all slack in the threads between this point and the spools and securing a uniform tension. This tension-roll frame is attached, as shown in these views, to the spooling-frame; but it may form a separate piece of machinery. The shaft f^5 carries the driving-pulley f^4. This shaft also carries a bevel-gear, f^{10}, which meshes with a bevel-gear, f^{11}, on shaft f^6. Shaft f^6 carries another bevel-gear, f^{12}, which meshes with a bevel-gear, f^{13}, on the shaft of the drum *z′*, and said shaft f^6 also carries a spur-gear, f^{14}, which, through the intermediate pinion, f^{15}, drives a gear, f^{16}, and worm f^{17}, the latter engaging the worm-gear f^{18} of the shaft n^2, said shaft n^2 carrying the heart-shaped cams h^2 h^3. Shaft f^6 extends beneath two or more sets of spool-frames and is similarly geared to drive each frame. These shafts and gears are common mechanical devices for communicating motion and are not claimed as our new invention. S is a carrying-roll. T T T, &c., are guide-wires. U U′ U^2, &c., are the spools on the spindles V V′ V^2, &c., which are driven by bands *z″* from the upright drum *z′*. The guide-wires T T T, &c.,

are attached to the bars b^2 b^3 b^4, &c., which connect the arms d^2 d^3, &c., these arms being fastened to the upright shafts c^2 c^3. This connected mechanism, called a "traverse-frame," is raised and lowered by the action of the heart-shaped cams h^2 h^3 on the shaft n^2. This movement of the frame secures the even distribution of the threads upon the spools. k^2 k^3 are weights attached by straps passing over pulleys on the frame to the traverse-frame to relieve the cams of a part of the weight of the traverse-frame. W and X are rolls carrying threads a'' to a second set of spooling-frames, to be operated, if desirable, by an extension of the shaft f^6, similarly geared. Q is a guide-reed. x and y are metallic rods inclosed in a wooden bar, z, the rod y carrying drop-wires R. 1 and 2 are insulated wires. These are shown in enlarged detail in Figs. 8, 9, and 10. Their construction and operation will be hereinafter explained. The spools U turn loosely upon the spindles V, the motion of the spindles being communicated to them by friction-washers between the spindles and the spools. Y is a frame carrying the roll S, reed Q, and slotted bar z, a duplicate of which accompanies each set of spooling-frames.

The office of the several parts of our improved mechanism may best be understood from a description of the operation of spooling chain-dyed yarns by and with the use of the within-described machines.

The chained yarn is placed in a suitable receptacle, one end of the chain being passed through the hanging ring A, Fig. 1, above the mass of yarn, so that the chain may be gently lifted without danger of becoming entangled. From this point it passes downward through the guide-ring B, guide-rolls C C', over the drums D D', thence over the tension-roll E, Figs. 1 and 5, and thence back over the carrying-roll F. The object of passing and repassing the chain over the drums and rolls F and E is to straighten the chain, giving it a uniform tension, and partly freeing the threads from contact with each other consequent on the handling of the chain in the process of dyeing. After leaving the roll F the individual threads are passed separately through the dents of the swinging reed G, Fig. 4, and through the fixed reed H, Fig. 5, under the drawing-roll I, between I and K, over K, thence down around the carrying-roll L, beneath the platform M, through the fixed reed N, around the carrying-roll O, thence upward to the tension-roll P. The office and operation of this tension-roll has been already set forth. From the time the chained yarns leave the guide-rings to the time they arrive at P the chain, as well as the threads, is designated by a in the several views. The threads, after passing over this tension-roll, are divided, one half, a', passing over the roll S and thence to the several spools U on the banks composing a single set, as shown in Fig. 11, the other half, a'', passing forward over the rolls W and X to duplicate banks, this division of the threads depending upon the number of threads composing the chain, as well as the number of banks of spools in the train. Before passing over the roll S the threads are passed through the guide-reed Q and through drop-wires R. Of these an enlarged detail view is shown in Figs. 8 and 9. The office of the drop-wires will be explained further on. After passing over the roll S the threads are passed singly through guide-wires T on the traverse-bars b^2 b^3 b^4, &c., each thread to a different spool. The threads are then secured to the spools, and the entire mechanism is now in position to be operated under the direction of a single workman, the drawing-rolls K and I being held in contact by the springs. The operator, standing upon the platform M, faces the drawing-rolls, having one hand on the swinging reed G. This reed he manipulates for the purpose of freeing the individual threads from contact with each other, the threads being handled singly from this time forth. Power from any available motor is applied to the loose pulley g on the shaft f, this shaft carrying the fixed clutch g' and gear i. When the parts of the friction-clutch pulley are brought in contact, as will be hereinafter shown, motion is communicated through the gear i and i' to the shaft f''. This shaft carries the drawing-roll I and the pulley f'. From this pulley f', by means of belts g^{17}, g^{18}, and g^{19} and the pulleys f^2, f^3, and f^4, or by any equivalent known devices, motion is communicated to the pulleys f^2, f^3, and f^4, or by any equivalent known device, motion is communicated to the shafts f^5 and f^6, and thence to the drum z' and spools U. By depressing with the foot the treadle h the loose pulley g is forced through the action of the shipper upon the fixed clutch-pulley g', thus communicating motion to the whole mechanism. The action of the drawing-rolls I and K, being in contact, draws the yarn forward from the mass to this point, whence it is drawn forward by the rotary motion of the spools, communicated from the drum z' by means of bands around the spool-spindles. The motion of the entire machinery is stopped by the action of the spring m, which raises the treadle to its normal position, and thus breaks the contact of the pulley g with the clutch g' on the removal of the pressure of the operator's foot.

The position of the operator facing the drawing-rolls and the swinging reed G, to which his attention is confined, renders some device necessary to advise him of any defect in the threads a' and a'', they not being under his direct inspection. To this end the electrical device shown in Figs. 1, 5, and 11 is made use of, enlarged detail views of parts of which are shown in Figs. 8, 9, and 10. The construction, operation, and use of this device will now be explained.

x and y are metal rods held in place by the wooden bar z on a line with the roll S. This bar is slotted sectionally, as shown in Fig. 9. The rod y carries the drop-wires R, which are

passed through the slots in the wooden bar, that they may be kept apart. Each thread carries a single drop-wire. An insulated wire, 1, is attached to the rod *y* and passes to a battery, 4, a similar wire passing from the opposite pole of the battery to the stand *p'*. The wire 2 is attached to the rod *x* and passes to the bell 3, from which a similar wire passes to the circuit-breaker *p*, attached to the treadle *h*. When the treadle is depressed and the machinery in motion, the circuit-breaker *p* is in contact with the stand *p'*. While in this position should a thread break its drop-wire falls upon the rod *x*, as shown by the dotted line in Fig. 8, also at R^3, Fig. 9, thus completing an electric circuit and sounding an alarm on the bell 3. On this alarm being sounded the operator removes his foot from the treadle, which, by the action of the spring *m*, is raised, thus releasing the friction-clutch pulley and stopping the whole machinery. This also breaks the circuit at *p* and prevents exhaustion of the battery. The location of a broken thread is indicated by the position of the drop-wire out of line with its fellows. When the broken thread is repaired and replaced in the eye of the drop-wire, the operator resumes his position and, as before, sets the machinery in motion. This electrical alarm device thus places the entire machinery under the control of a single operator, indicates the breaking of a thread as well as its location, the electric circuit being incomplete without the contact of the circuit-breaker *p*, stand *p'*, rod *x*, and drop-wire R. Bells having distinct tones are used to indicate the bank of spools needing attention. When filled, the spools are removed and replaced by other spools. When the last end of the chain leaves the friction-drum stand, a new chain is supplied, the threads of which are joined to the threads already in the swinging reed G, and the spooling goes on continuously.

The advantages claimed for our improved machinery and its combinations are that it secures the practical application of the art of winding chain-dyed yarns directly from the chain upon spools, thereby securing the economical advantages of their use in the manufacture of woven goods, as fully set forth in the application of Franklin Nourse, filed June 25, 1886, Serial No. 206,280.

These advantages are consequent on the construction of the drawing and driving mechanism, as well as of the operating devices herein set forth, all of which are compact, simple, and durable and are under the control of a single operator; also on the construction and location of the carrying-rolls, the tension mechanism, and electric alarm devices herein set forth.

We do not claim as our invention the friction-drum stand as shown in Fig. 2, this being an old device in common use in other connections; neither do we claim the spooling-frames or spools, they being old devices for other purposes, although our arrangement of the banks in pairs facing each other and operated as herein set forth is claimed as a part of our invention and adds greatly to economy in space and power, as well as convenience in operating.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The drawing-rolls I and K, frame *k' k*, springs *l*, friction-clutch pulley *g g'*, shafts *f f⁰*, gears *i i'*, treadle *h*, and spring *m*, in combination, substantially as and for the purposes set forth.

2. The combination of the swinging reed G, fixed reed H, and drawing-rolls I and K, swinging frame *k k'*, and springs *l*, as and for the purposes set forth.

3. The combination, with the metallic rods *x* and *y* and slotted wooden bar *z*, of the drop-wires R, as and for the purpose specified.

4. The combination of the slotted bar *z*, rods *x* and *y*, drop-wires R, insulated wires 1 and 2, bell 3, circuit-breaker *p*, stand *p'*, battery 4, and treadle *h*, to operate as and for the purpose set forth.

5. The combination, with the friction-drum stand, drawing mechanism, tension mechanism, and spooling-frames, of pulleys *f'*, f^2, f^3, and f^4, and belts g^{17}, g^{18}, and g^{19}, substantially as herein shown and described, to operate as herein specified.

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