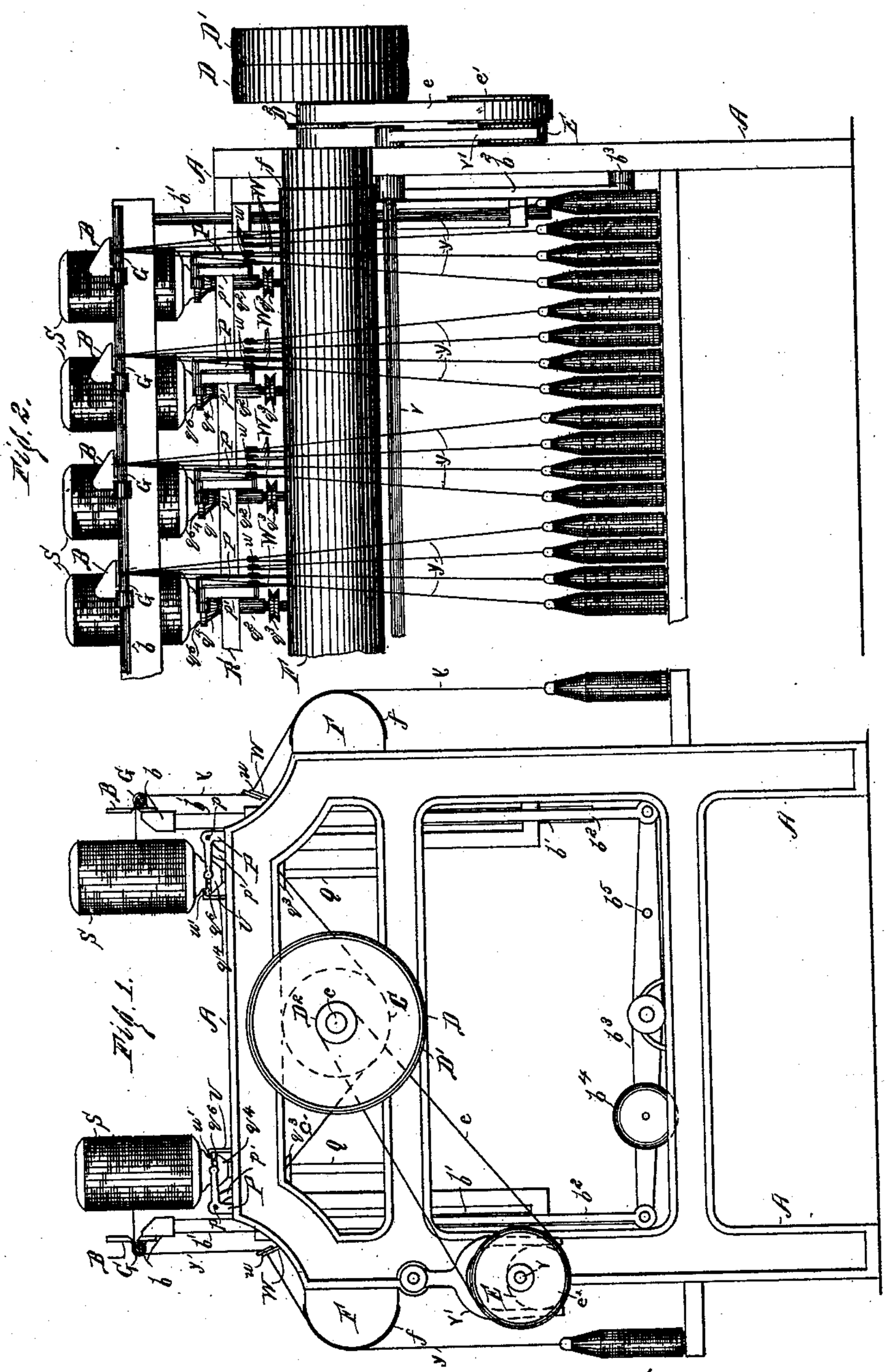
(No Model.) 2 Sheets—Sheet 1.

# T. C. ENTWISTLE.

## STOP MOTION MECHANISM FOR SPOOLERS AND WINDERS.

No. 360,868. Patented Apr. 12, 1887.



Witnesses—
Kirkley Hyde
Gertrude M. Day.

Inventor—
Thomas C. Entwistle,
By Albert M. Moore,
His Attorney.

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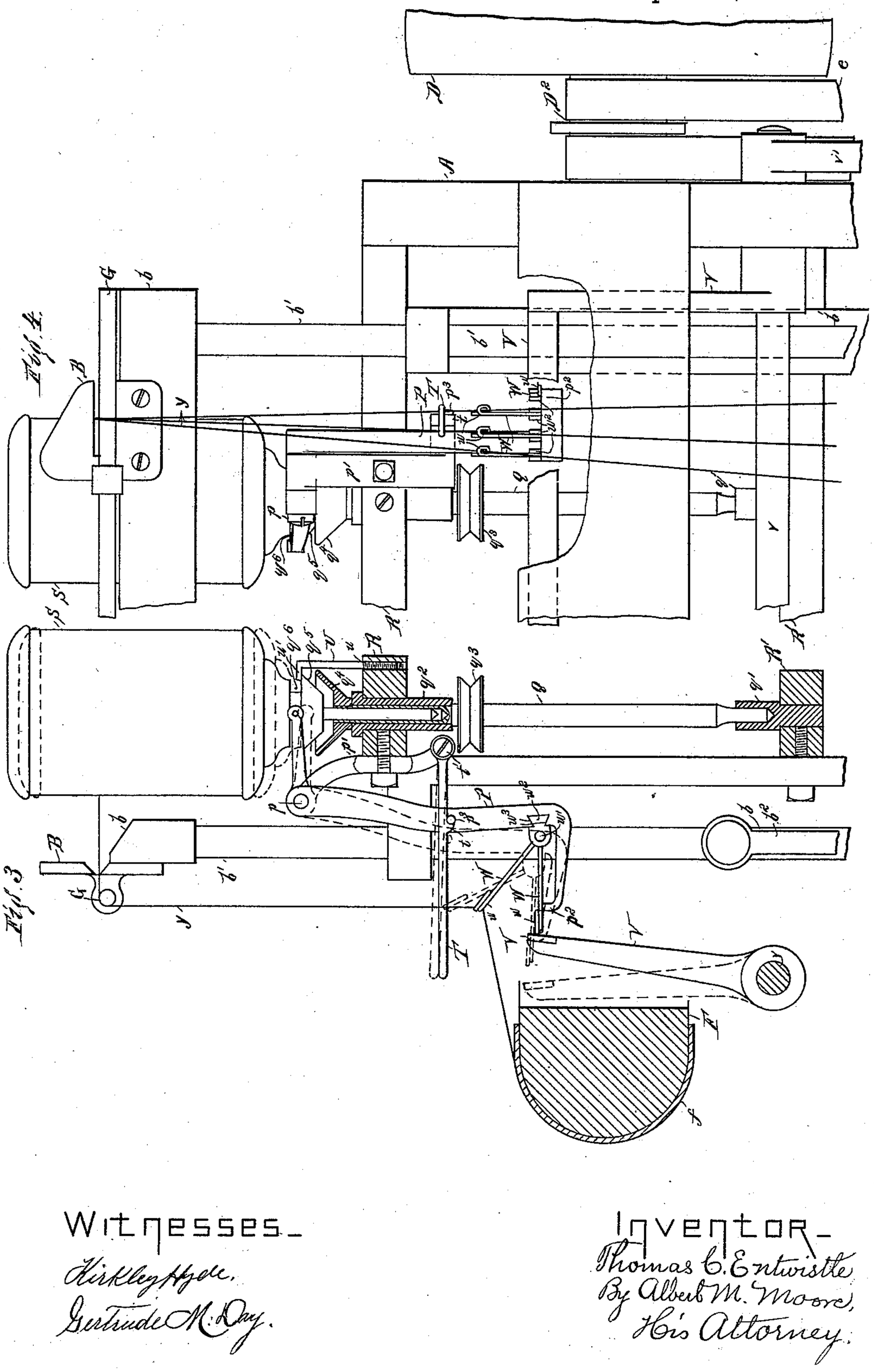

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His Attorney.

# UNITED STATES PATENT OFFICE.

THOMAS C. ENTWISTLE, OF LOWELL, MASSACHUSETTS.

## STOP-MOTION MECHANISM FOR SPOOLERS AND WINDERS.

SPECIFICATION forming part of Letters Patent No. 360,868, dated April 12, 1887.

Application filed April 28, 1886. Serial No. 200,402. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS C. ENTWISTLE, a citizen of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Stop-Motion Mechanisms for Spoolers and Winders, of which the following is a specification.

My invention relates to stop-motion mechanism for spoolers and winders; and it consists in the devices and combinations hereinafter described and claimed, the object of my invention being to stop any spool when a thread which is being wound thereon breaks without stopping the other spools of the machine; also, to allow any of the drop-wires to be readily placed in position and removed therefrom.

In the accompanying drawings, on two sheets, Figure 1 is an end elevation of the frame of a spooler, and shows the spools, yarn guides and clearers, the spindles, the rods which lift the yarn-guides, the yarns, the bobbins from which the yarns are drawn, the friction-beams, the vibrator-shaft, the fast and loose pulleys, the mechanism which operates the vibrator-shaft, and part of the frame of the machine; Fig. 2, a side elevation of the spooler-frame near its end, showing the parts shown in Fig. 1; Fig. 3, an end elevation of a part of a spooler, showing a spool, its spindle, part of the frame, part of the lifting-rod which raises the yarn-guide rod, a yarn-guide rod, a yarn-clearer, a vibrator, and the upper part of the link which raises the lifting-rod, showing also, in section, the friction-beam, the vibrator-shaft, the step and bolster of the spindle, and a part of the spindle, together with my stop-motion mechanism operating to raise the spool, in full lines, showing also, in dotted lines, the position of the vibrator when nearest the friction-beam and the position of the other parts of the stop-motion mechanism and of the spool and the spindle-clutch when the yarn is unbroken; Fig. 4, a side elevation of a part of a spooler at its end, a part of the fast pulley, the spindle and spool, the yarn-guide, yarn-clearer, lifting-rod, a part of the friction-beam, its upper portion being broken away in part, and my improved stop-motion, showing four drop-wires, from one of which the thread is absent, the spool being stopped.

The frame A, cylinder C, fast pulley D, and loose pulley D′ on the shaft *c* of said main cylinder, the yarn-guides G, the yarn-clearers B, supported on the clearer-rods *b*, the lifting-rods *b′*, connected by links $b^2$ to the lifting-levers $b^3$, the latter being pivoted at their middle and operated in one direction by weights $b^4$, and in the other direction by cams, (not shown herein, but shown in patent to Isaac W. Clarke, No. 89,854, dated May 11, 1869,) which depress the stud $b^5$, projecting horizontally from each lifting-lever on the other arm thereof from that which supports the weight $b^4$, the lifting-levers, lifting-rods, and guide-rods, constituting the building motion which disposes the yarns properly on the spools S, are all of the usual construction and operation.

The friction-beams F, having their convex surfaces covered with flannel, *f*, to produce a friction or tension of the yarns *y* as they are drawn from the bobbins through the yarn-eyes *w* of the drop-wires W, said drop-wires, the vibrator V, secured to the vibrator-shaft *v*, the forked arm *v′*, also secured to the vibrator-shaft and caused to oscillate by an eccentric, E, driven by a belt, *e*, which passes around a pulley, $D^2$, on the main shaft and around a pulley, *e′*, concentric with the center of motion of and secured to said eccentric E, together with another vibrator, precisely like the vibrator V, and secured to another vibrator-shaft at the opposite side of the machine from said vibrator V and driven by mechanism at the other end of the spooler, which is the duplicate of the mechanism shown for operating said vibrator V, (the vibrator at the other side of the machine and its operating mechanism not being shown,) are also all of the usual construction and operation. The spindle Q is supported in a step, *q′*, and bolster $q^2$, said step and bolster being secured, respectively, in the step-rail and the bolster-rail R′ R, the latter being bolted to the frame A in the usual manner.

The spindle Q is of unusual construction, the lower part of the same being provided with the usual whirl, $q^3$, by which it is driven from a band, *c′*, from the cylinder in the usual manner, the lower part of said spindle being provided with a central cylindrical opening, and with a cup, $q^4$, having a conical interior. The

upper part of the spindle at its lower end is cylindrical, to fit the central opening of the lower part of said spindle, and has secured to it an upwardly-flaring collar, $q^5$, of a size and shape to fit the cup $q^4$ and cause the upper part of the spindle to be driven by friction on the lower part of the same, when the collar is in the cup, the collar and cup forming the counterparts of a friction-clutch.

The spool S surrounds the upper end of the upper part of the spindle and rests upon the flat upper surface of the collar $q^5$, and is driven by frictional contact therewith. The collar $q^5$ is provided with an annular groove, $q^6$, to receive the forked upper nearly-horizontal end of a bent lever, P, pivoted at $p$ to the upper end of a bracket, $p'$, secured to the bolster-rail R. The lower end of the lever P extends outward for a distance toward the vibrator V, (see Fig. 3,) and its end is bent upward, to limit the motion of the falling drop-wire, its lower end, $p^2$, serving the purpose of the usual stationary stop-bar.

A drop-wire, W, of the usual construction, is pivoted at $w'$ to the lever P in such a position that when its free end falls upon the end $p^2$ of the lever P the drop-wire will be in a nearly-horizontal position and in the path of the vibrator V. The drop-wire is normally held in the position shown in Fig. 1 and by dotted lines in Fig. 3, at an angle of less than forty-five degrees from a vertical position, by the tension of the yarn $y$, which passes through the yarn-eye of said drop-wire, as above stated, in passing from the friction-beam to the yarn-guide; but when the yarn breaks the drop-wire falls by its own weight upon the lower outer end, $p^2$, of the lever P, and is struck on its free end by the vibrator V at the next inward motion of said vibrator, the vibrator pushing the drop-wire and the lever P toward the middle of the machine, and causing the forked upper end of said lever P to raise the collar $q^5$ out of the cup $q^4$ and stop the revolution of the spool S, the lower part of the spindle being still driven, as above described, but the friction between the two parts of the spindle being too small to drive the upper part of the spindle. When the lower arm of the lever P swings inward, a horizontal stud, $p^3$, projecting from said lever engages with a hook or projection, $t$, on the under side of a catch-lever, T, pivoted at $t'$ to the lower part of the bracket $p'$, said bracket extending below the bolster-rail R', and prevents the lever P from resuming its normal position, and therefore prevents the spindle-clutch from coupling and the spool from being rotated until the free end of said catch-lever T is lifted. When the drop-wire is again threaded, the broken ends of the yarn being then tied together, the drop-wire is again held out of the path of the vibrator, and the catch-lever is raised out of engagement with the lever P, and thereupon the tension of the yarn, drawing the lower end of said lever P toward the friction-beam, and the weight of the spool cause the parts of the clutch to couple, causing the spool to be again revolved.

The use of a stop-motion is necessary where several yarns are wound at the same time upon the same spool from several bobbins or cops, in order that when the yarns are twisted together the resulting thread may be of uniform diameter.

In the drawings four yarns are shown being wound upon each spool, and the mechanism above described will stop the spool when any one of its yarns breaks. Only one lever P is required for each spool; but a separate drop-wire must be used for each yarn. Inasmuch, therefore, as it is sometimes desired to fill a bobbin from a greater or less number of spools simultaneously, it is desirable to have the drop-wires, or, at least, all but one of them, removable from the lever P, so that instead of pivoting said wires directly to said lever I pivot them to small heads or brackets $w^2$, which are provided on their inner sides with dovetails $w^3$, which enter a horizontal dovetailed groove in said lever, being held therein by friction.

The upper part of the spindle may be prevented from being separated from the lower part when the spool is lifted from the spindle in doffing, or for any reason, by a hook, U, the shank $u$ of which is screwed into the top of the bolster-rail, and the upper part or hook proper, $u'$, of which is turned into the annular groove $q^6$. By turning the hook $u'$ out of the groove $q^6$ the parts of the spindle may be separated.

I claim as my invention—

1. A spindle formed in two parts placed with their axes in the same straight line, one of said parts being provided with an axial opening adapted to receive a portion of the other of said parts and to support the same, each of said parts being provided with one of the counterparts of a clutch, whereby the rotation of one of said parts will cause a rotation of the other of said parts when said clutch is closed, but will allow said last-named part to remain stationary when said clutch is open, in combination with a bell-crank lever provided with an upper arm adapted to engage the upper part of said clutch, a pivoted drop-wire supported upon the lower arm of said lever, a vibrator having a reciprocating motion, said drop-wire being normally held out of the path of said vibrator by the tension of the yarn being wound upon a spool supported upon said spindle, but adapted when said yarn is broken to fall into the path of said vibrator, whereby when a yarn being wound upon said spool is broken the upper part of said spindle will be uncoupled from the lower part of the same and no longer rotated thereby, as and for the purpose specified.

2. The combination of a spindle formed in two parts, one of which is adapted to be rotated in stationary bearings, means for rotating the same, the other or upper portion of which spindle is provided with a cylindrical

lower portion adapted to enter and fit a corresponding opening in the lower part of said spindle, each of said parts of said spindle being provided with one of the counterparts of a clutch, which when coupled causes said upper part to be rotated upon the rotation of said lower part, said upper part of said spindle being adapted to support a spool and to rotate the same by frictional contact therewith and provided with an annular groove, a bell-crank lever provided with a forked upper arm adapted to engage said annular groove, a pivoted drop-wire supported upon the lower arm of said lever, a vibrator having a reciprocating motion, said drop-wire being normally held out of the path of said vibrator by the tension of the yarn being wound upon said spool, but adapted when said yarn is broken to fall into the path of said vibrator, whereby when a yarn being wound upon said spool is broken the upper part of said spindle will be separated or uncoupled from said lower part of said spindle and no longer rotated thereby, as and for the purpose specified.

3. The combination of a spindle formed in two parts, the upper of which is normally driven by frictional contact with the lower, said upper part being provided with an annular groove, a lever having a forked arm adapted to engage with said groove, a pivoted catch-lever provided with a catch adapted to engage a stud projecting from the lower arm of said lever, said stud, a vibrator, a drop-wire pivoted to said lower arm and normally held out of the path of said vibrator, but when unsupported by the tension of a yarn, as herein described, adapted to be struck by said vibrator, whereby said lever is turned upon its fulcrum to raise the upper part of said spindle and to engage said catch-lever with said stud, as and for the purpose specified.

4. The combination of a spindle formed in two parts, each of which is provided with one of the counterparts of a clutch, the upper one of said parts being adapted to carry a spool and provided with an annular groove, a lever provided with an arm adapted to engage said groove, a drop-wire pivoted to a bracket, said bracket having a dovetailed shape and adapted to enter a dovetailed groove in the lower arm of said lever, and the vibrator, as and for the purpose specified.

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Witnesses:
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