(No Model.) 2 Sheets—Sheet 1.

G. L. BROWNELL.

ROPE MACHINE.

No. 532,307. Patented Jan. 8, 1895.

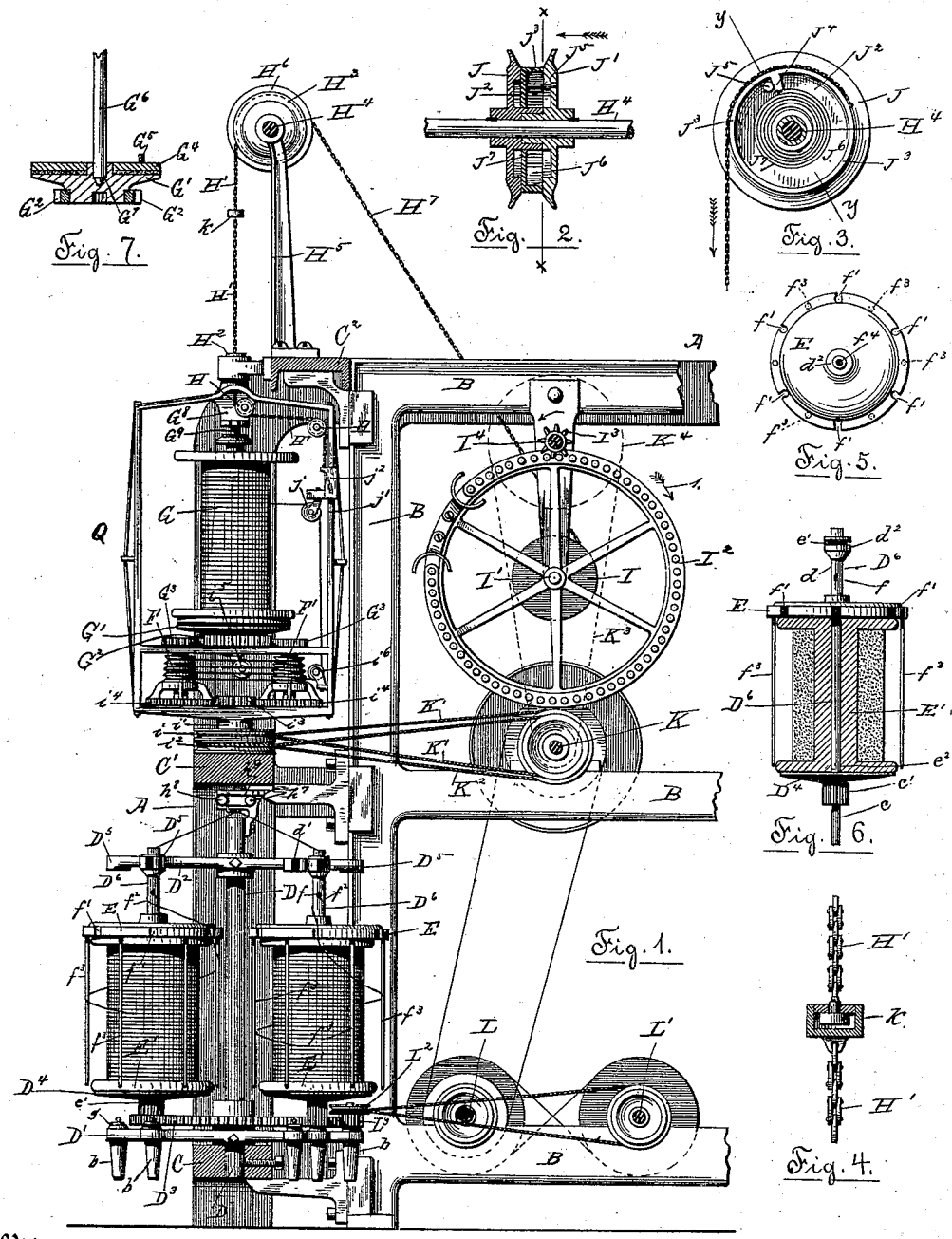

Fig. 1.

Fig. 7.

Fig. 2.

Fig. 3.

Fig. 5.

Fig. 6.

Fig. 4.

Witnesses
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(No Model.) 2 Sheets—Sheet 2.

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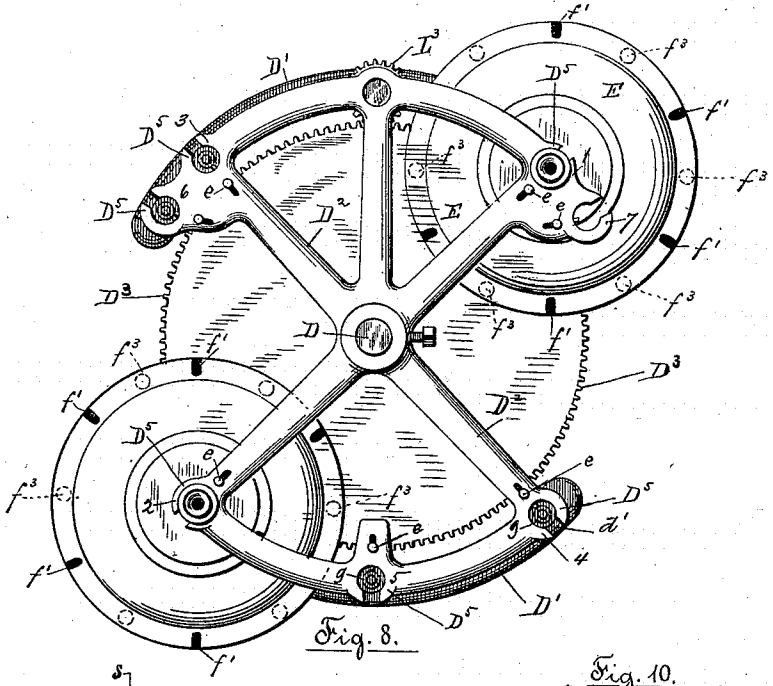

Fig. 8.

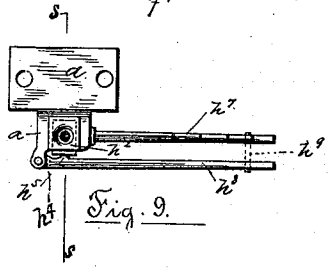

Fig. 9.

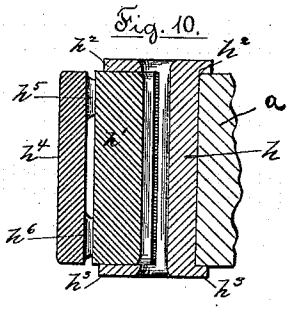

Fig. 10.

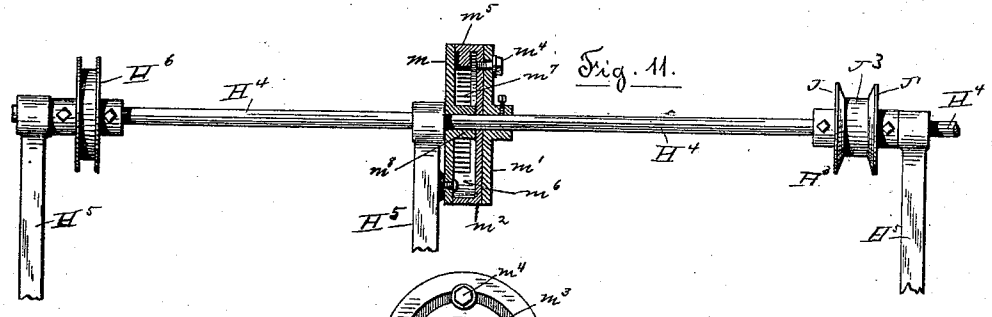

Fig. 11.

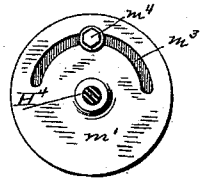

Fig. 12.

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UNITED STATES PATENT OFFICE.

GEORGE LOOMIS BROWNELL, OF WORCESTER, MASSACHUSETTS.

ROPE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 532,307, dated January 8, 1895.

Application filed January 20, 1888. Serial No. 261,433. (No model.)

To all whom it may concern:

Be it known that I, GEORGE LOOMIS BROWNELL, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Rope-Machines, of which the following is a specification, accompanied by drawings forming a part of the same, and in which—

Figure 1 represents in elevation the operating parts of my improved machine together with a portion of the supporting frame. Fig. 2 is a sectional view of the drum by means of which the twisted rope is traversed along the upper or winding spool; the section being shown on line Y Y Fig. 3. Fig. 3 represents a sectional view of the winding drum on line X, X, Fig. 2. Fig. 4 shows, partly in section, the swiveled joint in the winding chain. Fig. 5 is a top view of the notched disk of a strand flier. Fig. 6 is an elevation of a lower spool spindle, with the spool shown in sectional view. Fig. 7 is a sectional view of a weighted disk by which the upper or winding spool is rotated. Fig. 8 is a top view of the lower or strand fliers with their supporting frame. Fig. 9 is a top view of the compressing die. Fig. 10 is a sectional view of the same on line S, S, Fig. 9. Fig. 11 represents the shaft carrying the winding drum; and Fig. 12 is a side view of the drum shown in Fig. 11, and containing a spring by which a torsional tension is applied to the shaft carrying the winding drum.

Similar letters refer to similar parts in the several views.

My present invention relates to that part of a rope making machine employed in twisting the separate strands of which the rope is composed; to the compressing die; and also to the mechanism for winding the twisted rope; and it consists in the construction and arrangement of the several parts as hereinafter described and set forth in the accompanying claims.

A denotes a portion of the frame work of the machine, forming one end, the opposite end next the beholder having been removed in order to disclose more clearly the operating parts of the machine. B represents a portion of the central supporting framework. C, C′ and C^2 are respectively the lower, middle and upper rails, extending from one end frame to the other, and which serve to directly support the mechanism for twisting the individual strands and for winding the rope as it is twisted.

Held in the lower rail and supported at the top by a bracket attached to the middle rail is a post D to which are attached the lower spider D′, and the upper spider D^2. The lower spider D′ is provided with step bearings *b*, *b*, which carry short spindles *c*, Fig. 6; each spindle having a pinion *c′* in mesh with a large central driving gear D^3 and carrying a spool support D^4. The upper spider D^2 has forked bearings D^5 to receive the upper ends of the spindles D^6, which support the spools carrying the separate strands which are to be twisted together to form the rope. The spindles D^6 are placed in position by passing the neck *d* of each spindle through a forked opening *d′*, and then lowering the spindle until the enlarged head d^2 enters the bearing D^5. The spindle is then held from rising by means of a spring-actuated sliding bolt *e* which enters a groove *e′* in the head of the spindle. The lower ends of the spindles D^6 are halved, and are engaged by the studs e^2 similarly halved and projecting upward from the spool supports D^4, by which the rotary motion of the spool supports is imparted to the spindles D^6. The upper end of each spindle D^6 is hollow; and an opening *f* leads into the interior concentric chamber f^4. A disk E is attached to each spindle, provided with notches *f′* and a series of pins f^3 extending downward the length of the spools E′. The strand is taken from the spool and conducted around one or more of the downwardly projecting pins f^3, through one of the notches *f′* in the edge of the disk E, and through the opening *f*, into the interior chamber f^4 in the upper end of the spindle, carrying the strand around the spindle D^6 as at f^2, Fig. 1, in case it is desired to give an increased tension to the strand.

The bearings in the lower and upper spiders D′, D^2 are arranged in pairs, the bearings of each pair being in the same vertical line. The bearings are also arranged concentrically around the post D at unequal distances apart in order to allow either two, three or four spools to be used with equal spaces between

them. In Figs. 1 and 8, two spools are shown held in bearings 1 and 2. The bearings 1, 2, 3 and 4 are arranged to hold four equi-distant spools and the bearings 5, 6 and 7 are arranged to hold three equi-distant spools.

Whenever any of the step bearings in the lower spider are not in use they are closed by plugs *g*, Figs. 1 and 8. From the ends of the spindles D^6 the strands are taken to the compressing die, which is shown in Fig. 9 in top view, and in sectional view in Fig. 10. The die is held in the bracket *a* and consists of two halves *h* and *h'*. The half *h* is provided with flanges h^2, h^3 at each end which inclose the half *h'*. The halves are provided on their opposing faces with semi-circular grooves forming an opening through which the twisted rope passes. A plate h^4 is hinged to the bracket *a* with spurs h^5, h^6 resting against the upper and lower ends of the half *h'* of the compressing die. Bars h^7 and h^8 extend parallel to each other, from the bracket *a*, and the hinged plate h^4, and are drawn toward each other by an elastic band h^9, so as to apply a slight pressure to the twisted rope as it passes through the compressing die.

Between the middle rail C' and the upper rail C^2 I place a revolving head Q carrying the stretching drums F, F', placed in the lower compartment of the revolving head. The head is driven by a driving band K' upon the scored pulley *i* attached to the hollow hub *i'* of the revolving head; and the stretching drums F, F' are rotated by the driving band K^2 upon the scored pulley i^2 attached to a hollow spindle extending through the hollow hub of the head and which carries upon its upper end the gear i^3 engaging the gears i^4, i^4, on the stretching drums. The strands forming the rope are taken from the compressing die through the hollow spindle within the hub *i'* of the revolving head, over the guide pulley i^5, around the stretching drums F, F', over the guide pulley i^6 attached to the frame work of the head, thence over a guide pulley *j* carried in a sliding frame j^2 sliding on the ways *j'* on the frame work of the head to the winding spool G.

Journaled in the upper compartment of the revolving head is a spool-support G', shown in sectional view in Fig. 7; having attached thereto the gear G^2, which is engaged by the gears G^3, G^3 on the spindles of the stretching drums F F'. The spool-support G' carries a weighted disk G^4, separated from the spool support by a washer of leather or other friction material and provided with a spur G^5 which enters a hole in the head of the winding spool G, causing the rotation of the spool-support to be communicated to the winding spool through the frictional resistance between the spool-support G' and the weighted disk G^4.

The winding spool G is maintained in a vertical position, concentric with the spool support by means of a spindle G^6, whose lower end enters a socket G^7 in the spool support and whose upper end is held in a forked bearing in the bracket G^8, permitting the spindle G^6 to be raised until the neck G^9 can be passed through the opening in the forked bearing allowing the winding spool G to be removed.

Guide pulleys H, H, are attached to the frame of the revolving head, over which I carry a chain H' attached to the sliding frame j^2 and passed concentrically through the hollow hub H^2 of the revolving head, with its upper end attached to a winding drum H^3 on a shaft H^4 journaled in the supporting posts H^5. Upon the shaft H^4 is a drum H^6 connected by a chain H^7 with a drum I on the shaft I', which shaft also carries a mangle wheel I^2 engaged by a pinion I^3 by which the shaft I' is rotated alternately in opposite directions nearly an entire revolution; its rotation in the direction of the arrow 1 serving to wind the chain H^7 upon the drum I, unwinding it from the drum H^6 on the shaft H^4, and rotating the shaft H^4 so as to wind the chain H' upon the winding drum H^3, causing the sliding frame j^2 to be drawn upward on the side of the head Q and traversing the twisted rope along the entire length of the winding spool G from the bottom to the top.

As the rotation of the mangle wheel I^2 and shaft I' is reversed, the chain H^7 is released, allowing the tension of the twisted rope as it is being wound upon the winding spool G, to draw the sliding frame j^2 downward on the head, causing the rope to be traversed along the winding spool G from the top to the bottom; unwinding the chain H' from the drum H^3 and winding the chain H^7 upon the drum H^6.

As the rope reaches the lower end of the spool G, the rotation of the mangle wheel I^2 and shaft I' is reversed, and the chain H^7 is again rewound upon the drum I, unwinding it from the drum H^6 and rotating the shaft H^4, causing the chain H' to be wound again upon the drum H^3, raising the sliding frame j^2, and again traversing the rope along the winding spool G from the lower to the upper end. The chain H' is provided with a swivel-joint at *k* in order to allow the head Q to rotate.

In order to provide that the rotation of the shaft H^4 shall be reversed with certainty, in case the tension of the rope is not sufficient to accomplish that purpose, I attach the device shown in Fig. 11, and in side view in Fig. 12, in which *m* denotes a disk attached to the shaft-supporting post H^5 (Fig. 11). *m'* is a disk attached to the shaft H^4. Between the two disks *m* and *m'* is a disk m^2 attached to the disk *m'* by the screw m^4 which passes through the slot m^3 in the disk *m'* the slot m^3 being curved concentrically with the shaft H^4. The disk m^2 is provided with a flange m^5 inclosing the annular chamber m^6 which contains a spring m^7 with one end attached to the hub m^8 of the disk *m* and with the other end attached

to the inside of the flange m^5 in such a manner that the action of the chain H^7 in being wound upon the drum I will wind up the spring m^7, whose tension will then be applied to reverse the rotation of the shaft H^4 and wind the chain H^7 upon the drum H^6 as soon as the rotation of the mangle wheel I^2 is reversed. The central disk m^3 is adjusted with reference to the disk m' and shaft H^4 by means of the adjusting screw m^4, allowing the tension of the spring m^7 to be varied as desired. In case the rope being wound upon the winding spool G is broken and its tension therefore removed from the guide pulley j and frame j^2, it will become necessary to wind up the chain H′ so as to raise the sliding frame j^2 to its highest point, and maintain the chain H′ taut. This is accomplished by the peculiar construction of the winding drum H^3 which is illustrated in the sectional views in Figs. 2 and 3.

J and J′ are disks attached to the shaft H^4 by means of splines or set screws in the usual manner. Between the disks J, J′ is a disk J^2 having a flange J^3 with an inwardly projecting spur J^4 (Fig. 3). A pin J^5 is held in the disk J′, projecting into the annular chamber J^6 between the two disks J, J′ and in the path of the spur J^4 on the flange J^3. A spring J^7 is placed in the annular chamber J^6 with one end attached to the hub of the disk J and with the other end attached to the flange J^3, so as to resist the downward motion of the chain H′. The strain upon the chain H′ as the frame j^2 is being raised serves to hold the spur J^4 against the pin J^5, maintaining the spring J^7 in a state of tension sufficient to rotate the winding drum an entire revolution and wind up the chain H′. As the chain H^7 is wound upon the drum I and unwound from the drum H^6, the shaft H^4 is rotated a revolution; and the pin J^5 resting against the spur J^4 will carry the flange J^3 around, upon whose outer surface the chain H′ is wound. Whenever the rope becomes broken, the tension is removed from the chain H′, allowing the spring J^7 to rotate the flange J^3 of the winding drum and wind up the chain H′.

Rotary motion is imparted to the central driving gear D^5 from the shaft K through the intermediate shafts L L′, pulley L^2 and pinions L^3, as illustrated in Fig. 1. From the main shaft K, power is communicated through the driving bands K′, K^2 to the scored pulleys i, i^2, and by the belt shown in broken lines K^3 to a pulley K^4 on shaft I^4.

The operation of my improved rope machine is as follows: Each of the strands upon the lower or strand spools is taken around one or more of the pins f^3, in order to cause the strand to be drawn off the spool at nearly right angles to the axis of the spool, and carried through one of the notches f' in the edge of the disk E, thence as already described, to the compressing die where all the strands are united and a pressure applied to the rope which allows the rope to turn in the die. The individual strands are twisted by means of the rotation of the spindles D^6 and their attached disks E.

The rotation of the head Q containing the winding spool causes the strands to be twisted together at the compressing die; while the independent rotation of the spool-support G′ imparts a rotary motion to the winding spool through the friction between the spool support and the weighted disk G^4, the rope being at the same time traversed along the winding spool G by means of the operation of the traversing mechanism as hereinbefore described.

That part of the machine which is employed in stretching the cord or rope forms no part of my present invention; neither do I confine myself to the use of a mangle wheel in order to produce a rotation of the shaft I′ in opposite directions as many other known devices for that purpose may be used, or any known method by which the shaft H^4 may be rotated in one direction and then released in order to allow the tension of the rope which is being wound to reverse the rotation of the shaft.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a rope machine, the mechanism for twisting the component strands of the rope consisting of a spool support, a rotary spindle concentric therewith, and provided at its upper end with a concentric chamber an opening in the spindle communicating with said chamber, a disk attached to said spindle and having a series of notches in its edge, and a series of pins attached to said disk and extending downward parallel with the axis of the spindle, all combined, substantially as described.

2. In the winding mechanism of a rope machine, the combination with a traversing rope guide by which the rope is evenly laid upon the winding spool, of a winding drum having a flexible connection with said rope-guide, said winding drum consisting of a disk attached to a rotary shaft, a flanged disk turning on said shaft with its flange forming the winding surface of said drum, a spur projecting from said flanged disk and a spur projecting from said fixed disk said spurs serving as stops to limit the motion of said flanged disk and a coiled spring held in a state of tension when said spurs are in contact by means of the strain exerted by said flexible connection between the winding drum and the rope guide, whereby said flexible connection will be wound upon said winding drum whenever the rope is broken, substantially as described.

3. The combination with the rope guide having a traversing motion whereby the rope is evenly laid upon the winding spool, of a shaft H^4, connected means for rotating said shaft alternately in opposite directions disk J′ attached to said shaft and provided with a pin J^5, disk J^2 having a flange J^3 and spur J^4, spring

J^7 and flexible connection H′ between said rope guide and flanged disk, substantially as described.

4. The combination with a rope guide, having a traversing motion by which the rope is evenly laid upon the winding spool, of a winding drum having a flexible connection with said rope guide, a rotary shaft carrying said drum and connected operating mechanism, substantially as described, for imparting to said shaft a rotary motion in one direction against the tension of the rope which is being wound, and a coiled spring operatively connected with said shaft to cooperate with the tension of the rope to reverse the motion of said shaft, substantially as described.

5. The combination with a rope guide having a traversing motion by which the rope is evenly laid upon the winding spool, a winding drum and a flexible connection between said winding drum and said rope guide, of a disk concentric with the shaft carrying said winding drum and fixed to the frame work of the machine, a parallel disk attached to said shaft, a disk placed between said parallel and fixed disks and adjustably connected to the disk on said shaft by means substantially as described and a coiled spring with its opposite ends so attached to said disks that the tension of said spring shall be applied to rotate the shaft carrying said winding drum in cooperation with the tension of the rope which is being wound, substantially as described.

6. The combination with a traversing rope guide by which the twisted rope is laid upon a winding spool, a winding drum a flexible connection between said rope guide and said winding drum and a rotary shaft carrying said winding drum, of a disk m attached to the rigid frame work of the machine, disk m' attached to said shaft and provided with a concentric slot m^3, disk m^2 having a flange m^5 and adjustably connected with the disk m' by means of a screw m^4 and a spring m^7 with one end attached to the hub of the disk m and the opposite end attached to the flange m^5, substantially as described.

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