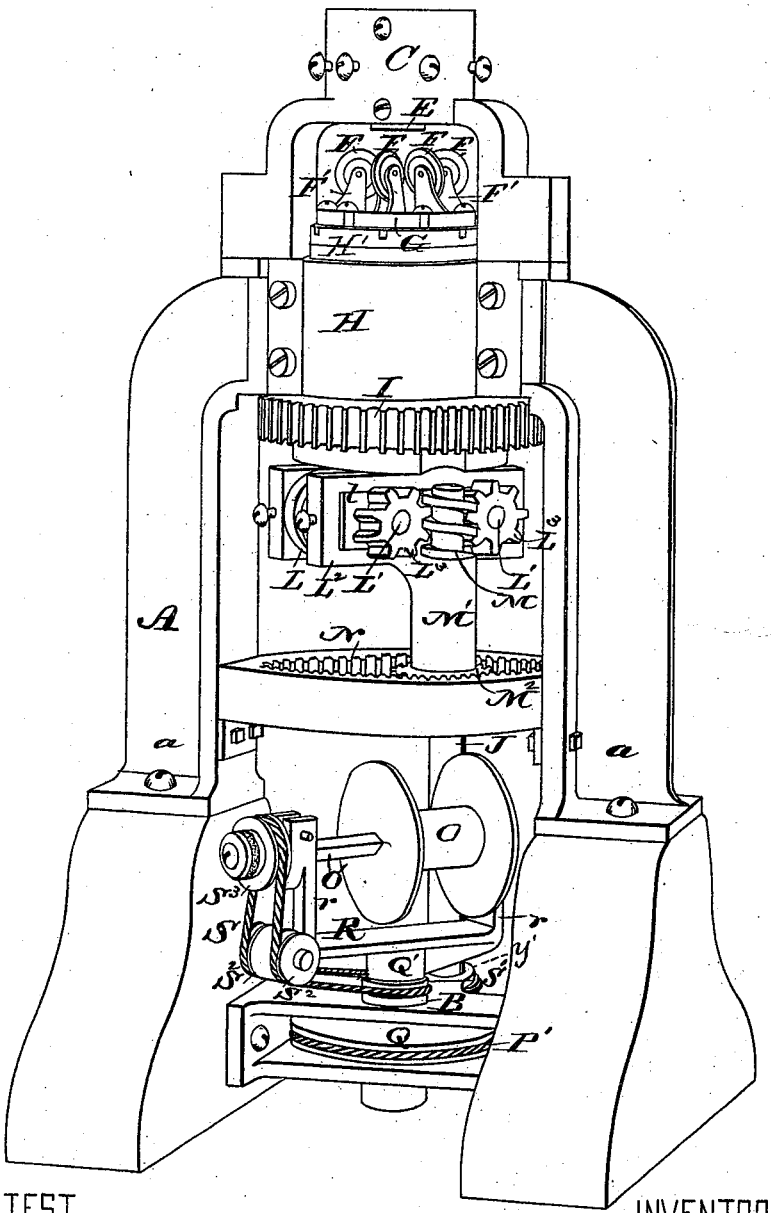
3 Sheets—Sheet 1.

C. K. PICKLES & R. BURNS.

Wire Rope Machine.

No. 209,626. **Patented Nov. 5, 1878.**

FIG. 1.



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Wire Rope Machine.

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FIG. 2.

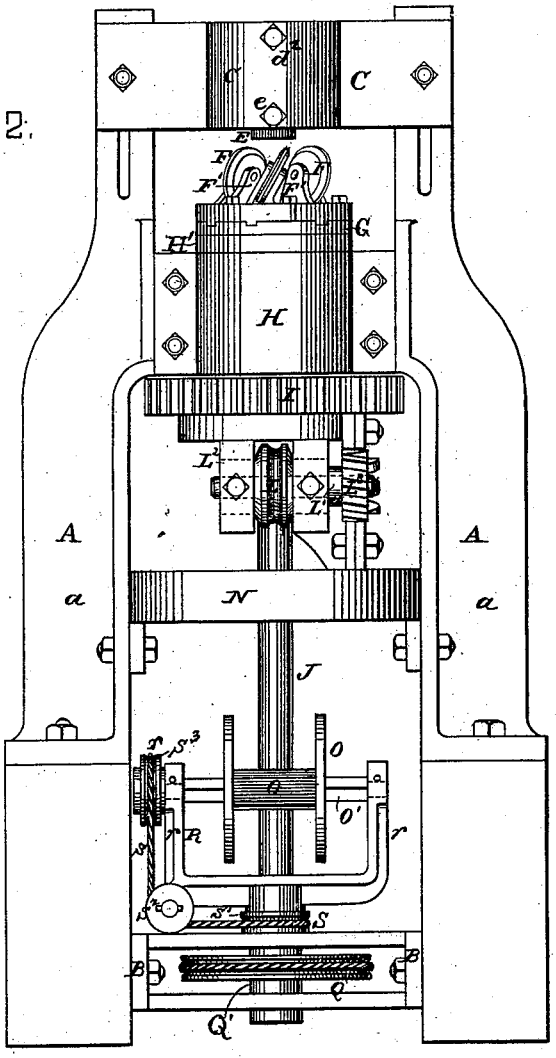
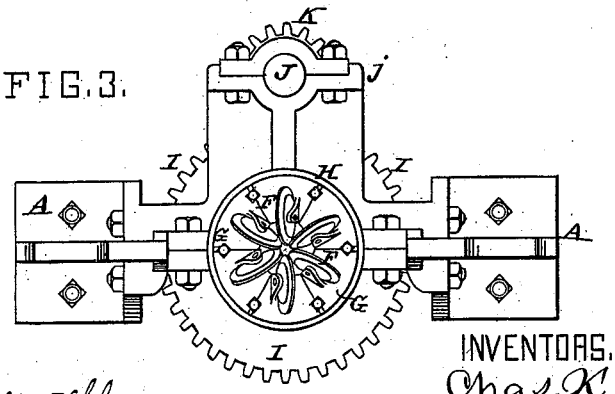


FIG. 3.



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3 Sheets—Sheet 3.

C. K. PICKLES & R. BURNS.

Wire Rope Machine.

No. 209,626. **Patented Nov. 5, 1878.**

FIG. 7.

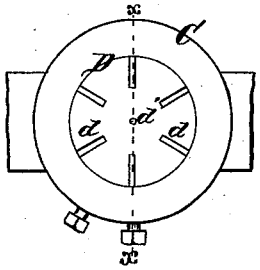

FIG. 4.

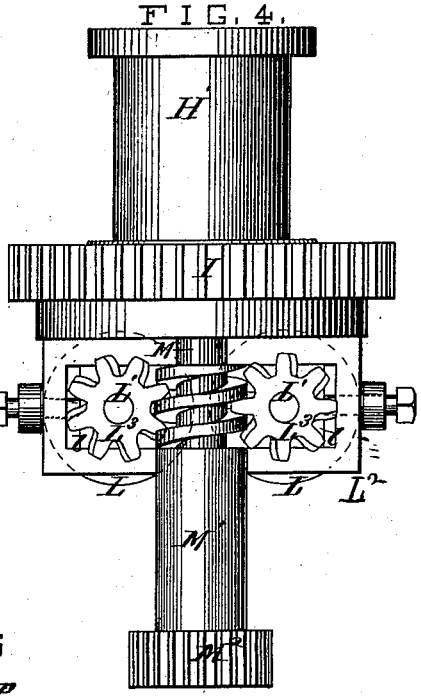

FIG. 9.

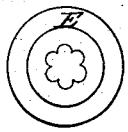

FIG. 10

FIG. 8.

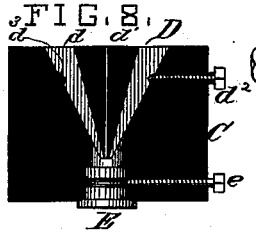

FIG. 5

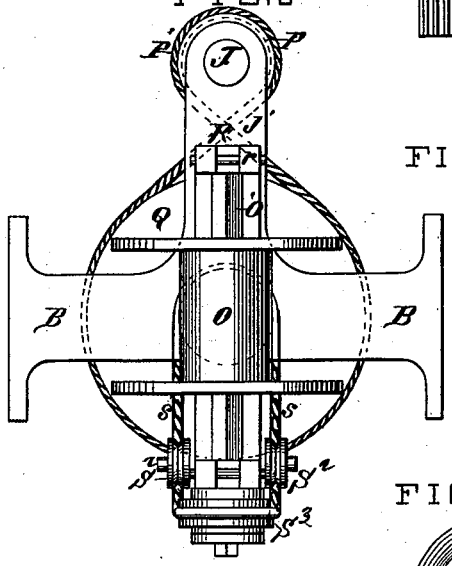

FIG. 6.

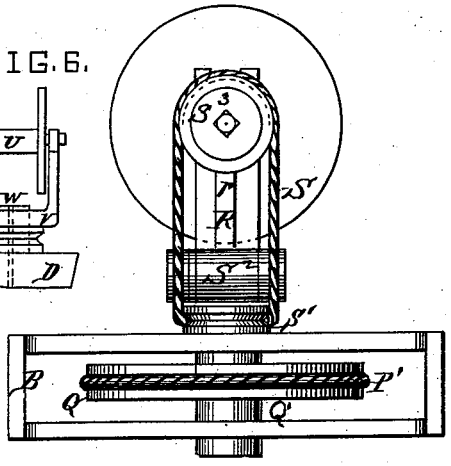

FIG. 13.

FIG. 11

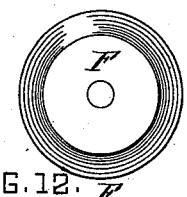

FIG. 12.

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UNITED STATES PATENT OFFICE.

CHARLES K. PICKLES AND ROBERT BURNS, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN WIRE-ROPE MACHINES.

Specification forming part of Letters Patent No. **209,626**, dated November 5, 1878; application filed July 11, 1878.

To all whom it may concern:

Be it known that we, CHARLES K. PICKLES and ROBERT BURNS, both of the city of St. Louis, State of Missouri, have made a new and useful Improvement in Wire-Rope Machines, of which the following is a full, clear, and exact description, reference being had to the annexed drawing, forming part of this specification, in which—

Figure 1 is a view, in perspective, of the invention; Fig. 2, a front elevation; Fig. 3, a plan, the guide and retaining dies and supporting-bar being removed; Fig. 4, a side elevation of the mechanism immediately connected with the drawing-rolls; Fig. 5, a plan of the winding-spool and mechanism immediately therewith connected; Fig. 6, an end elevation of the latter; Fig. 7, a plan of the guide-die and a portion of its support; Fig. 8, a vertical section of the latter, and showing also the retaining-die in elevation; Figs. 9 and 10, a plan and vertical section, respectively, of the retaining-die; Figs. 11 and 12, a side and edge view of one of the rollers of the twisting device; and Fig. 13, an elevation of the reel for the central strand, and showing the parts immediately therewith connected.

Similar letters refer to similar parts in all of the drawings.

The present invention is especially valuable in that, by means of it, the operation of wire-rope making can be carried on in much less space than heretofore has been needed. All parts of the apparatus are readily accessible for adjustment and repair, and any wire, if broken, can be easily reached for mending. The apparatus, also, as an entirety, is compact, simple, and portable.

The invention, generally considered, consists as follows: An upright frame supports at its upper end a fixed guide-die, through which the various wires composing the strand are fed from reels, which, in turn, may be located in any desirable position for delivering the wires to the die, either directly above the die or at points more or less remote therefrom, as preferred. The reels are not shown, as their construction is well understood. The wires pass from the guide-die downward through what we term a "retaining-die," which is also a fixture upon the frame. The perforation in this last-named die conforms in size and shape to the aggregated wires, which, in passing through the retaining-die, are brought compactly together. The associated wires pass from the retaining-die downward to the twisting device. This part of the machine rotates. It consists, preferably, of a series of rollers, there being a roller to each wire. These rollers are arranged relatively to each other, so as to inclose a space in size that of the intended strand or rope. The rollers also are grooved in their peripheries, and they are each arranged at an inclination from a perpendicular to conform suitably to the twists of the wires in the completed strand or rope, the inclination of each roller conforming to the twist of the particular wire that comes opposite it. The desired twist is then imparted to the various wires, and the strand formed by the rotation of the twisting device. The wires are drawn through the dies and twisting device by means of drawing-rolls arranged beneath the twisting device and acting upon the completed strand, and operated as hereinafter described. The strand passes thence to and is wound upon a spool that is hung in the lower part of the machine. The spool has three movements—the usual rotary movement for the purpose of winding the strand, and also the lateral sliding movement upon its shaft at stated intervals as the tiers are formed upon the spool; and, further, a rotary movement around the vertical axis of the machine, which movement is in the same direction and in exact accordance with the rotation of the twisting device above, the object of the last-named movement of the spool being to prevent the twist from being taken out of the strand as it is wound upon the spool.

Referring to the drawing, A represents the frame of the machine, consisting of two uprights, *a a*, connected below by a cross-bar, B, and above by the cross-bar C. The latter, at the center, is perforated vertically and suitably to receive the guide-die D, which is conical in form and arranged with its apex downward, as shown in Figs. 7, 8. The die is slotted in its periphery, as shown at *d d d*, and also has a central vertical perforation, d^1. The slots *d d* are considerably wider at their upper ends than at their lower ends, being at

the last-named point just large enough to receive the wire. The aim in making the perforations larger at their upper ends is to provide for kinks in the wire, which are removed by drawing the wires into a perforation gradually decreasing in size. The central perforation may also, for the same purpose, be enlarged at its upper end. The die is held in place by means of a screw, d^2, passing through the support of the die and engaging in a groove, d^3, in the die.

E represents the retaining-die. It is arranged beneath the guide-die and held in the same support C, and is fastened by the screw *e*. This die is perforated vertically, as shown in Figs. 9 and 10. The wires, in passing through the retaining-die, are brought closely together.

F F F represent the twisting device, consisting of a series (one to each wire, saving the central wire) of rollers, arranged beneath the retaining-die, and as shown in Figs. 1, 2, 3—that is, so as to inclose a space just large enough to receive the strand coming from the retaining-die, and also so that the rollers are inclined to correspond to the pitch or twist of the wires of the strand. The rollers are grooved in their peripheries, as shown at *f*, Fig. 12. The rollers are held in brackets F′ F′ F′, which, in turn, are fastened to a plate, G. The brackets F′ F′ are adjustable in a radial direction upon the plate G, to provide for strands or ropes of different diameters. The bar C is also made adjustable vertically upon the uprights *a a*, in order to bring the twisting device and retaining-die closer together or farther apart, according to the pitch or twist that it is desired to give to the strand. The plate G is fastened to a journal, H′, that is arranged vertically in and fitted to a bearing, H, which, in turn, is supported by the uprights *a a*. The rim of the journal H′ rests and turns horizontally upon the upper end of the bearing H. The shaft H′, at its lower end beneath the bearing H, is provided with a spur-wheel, I.

Motion is communicated to the machine through a vertical shaft, J, Figs. 1, 2, 3, which is held in bearings *j j′*. The shaft is furnished with a pinion, K, that engages with the wheel I and causes the latter to rotate. This causes the plate G and twisting device to rotate also and impart the desired twist to the strand.

L L represent drawing-rolls, arranged beneath the wheel I. They are arranged as shown in Fig. 4, being far enough apart to receive the strand, which passes down through the plate G and the hollow shaft H′, and also through the wheel I. The rolls L L are grooved in their peripheries, as shown in Fig. 2, to better receive and hold the strand. By means of these rolls the strand is drawn into and through the machine, as thus far described. The rolls L L are attached to shafts L^1 L^1, that are held in boxes *l l*. The latter, in turn, are supported in a frame, L^2 L^2, that is fastened to and turns with the wheel I. The shafts L^1 L^1 are each provided with spirally-grooved pinions L^3 L^3. The latter engage with a screw-shaft, M, that is arranged vertically and held in a bearing, M^1, which, in turn, is made an extension of the frame L^2. The shaft M, at its lower end, is furnished with a pinion, M^2, that is made to engage with the internal gear N, which is fastened to the uprights *a a*.

By means of the gearing last above described—viz., the pinions L^3 L^3, shaft M, pinion M^2, and internal gear N—a rotary movement is imparted to the rolls L L as the wheel I revolves, and the strand is drawn down through the rolls. The boxes *l l* are made adjustable to and from each other in the frame L^2 L^2, to provide for strands of different sizes. The strand passes from the rolls L L to a spool, O, upon which it is wound. The spool is attached to a shaft, O′, so that it can be slipped laterally upon the shaft, but also so that it rotates with the shaft.

The mechanism for slipping the spool laterally upon the shaft is not shown, as any approved device can be used therefor; but to rotate the spool for the purpose of winding the strand upon it, and, further, to carry the spool around the vertical axis of the machine in the same direction, and evenly, with the twisting device, we make use of the following means: Upon the lower end of the shaft J a pulley, P, is attached. A belt, P′, passes from this pulley, as shown in Figs. 1, 5, 6, around a pulley, Q, that is attached to a shaft, Q′. The latter is arranged vertically, and is held in bearings in the cross-bar B. A frame, R, is attached to the upper end of the shaft, turning with the latter. The frame is provided with uprights *r r*, that serve to support the spool-shaft O′. Now, as the shaft J rotates the pulley P communicates its motion through the belt P′, pulley Q, shaft Q′, and frame R to the spool O, causing the latter to revolve around the vertical axis of the machine in the same direction, and evenly, with the twisting device. In this way the strand can be wound upon the spool without untwisting it. To rotate the spool-shaft O in the bearings *r r*, a belt, S, is arranged to pass from around a fixed pulley, S^1, upon the cross-bar B over rollers S^2 S^2, and thence over a pulley, S^3, that is fastened to the spool-shaft. Then, as the frame R is caused to revolve, as above described, the action of the belt causes the spool-shaft to rotate and the strand to be wound upon the spool.

As thus far described, the making of a single strand only has been shown.

The formation of a double strand is as follows: The central perforation, d^1, in the guide-die and the remaining parts of the apparatus are suitably enlarged to receive the central strand. The wires that are to be laid around the central strand are then drawn through the slots *d d d*, as above described. The operation otherwise is as in making a single strand, with this addition, that, owing to the fact that the twisting of the outer layer of wires

around the central strand has a tendency to untwist the latter, provision must be made for the prevention of such untwisting. We accomplish this by giving a rotary movement to the central strand in the same direction in which the outer wires are twisted or laid around the central strand.

In Fig. 13 is shown the device preferably used in carrying out this feature of the operation. U represents a reel, upon which the central strand is wound. The reel is held in a frame, W, that, by means of a belt passing around a pulley, V, upon the frame, is caused to rotate in the same direction as the twist of the outer wires around the central strand. The latter passes down through the frame W and pulley V to the guide-die D.

The making of a rope composed of several strands is similar to the making of a strand from several wires.

We claim—

1. The combination, in a wire-rope machine, of the stationary retaining-die E, the rotating twisting device consisting of a series of rollers, F F F F F F, inclined and arranged as shown, and attached to the plate G, and suitable mechanism for rotating such twisting device, and also for drawing the rope or strand through the same, substantially as described.

2. The combination, in a wire-rope machine, of the stationary retaining-die E, the guide-die D, the rotating twisting device consisting of a series of rollers, F F F F F F, inclined and arranged as shown, and attached to the plate G, and suitable mechanism for rotating such twisting device, and also for drawing the rope or strand through the same, substantially as described.

3. The combination, in a wire-rope machine, of the twisting device consisting of a series of rollers, F F F F F F, inclined and arranged as shown, and attached to the plate G, and suitable mechanism for rotating such twisting device and for drawing the rope or strand through the same, substantially as described.

4. The combination of the die E, rollers F F F F F F, inclined and arranged as shown, the plate G, shaft H′, bearing H, wheel I, shaft J, pinion K, rolls L L, shafts L^1 L^1, frame L^2 L^2, pinions L^3 L^3, shaft M, bearing M^1, pinion M^2, and internal gear N, substantially as described.

5. The combination of the inclined rollers F F F F F F, plate G, shaft H′, wheel I, frame L^2 L^2, rolls L L, shafts L^1 L^1, pinions L^3 L^3, shaft M, bearing M^1, pinion M^2, and rack N, substantially as described.

6. The combination of the reel U, frame W, pulley V, dies D E, inclined rollers F F F F F F, shaft H′, plate G, wheel I, pinion K, and shaft J, substantially as described.

Witness our hands.

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ROBERT BURNS.

Witnesses:
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PAUL BAKEWELL.