(No Model.) 4 Sheets—Sheet 1.

O. PRESTON.

MACHINE TO PLAIT WIRE.

No. 482,589. Patented Sept. 13, 1892.

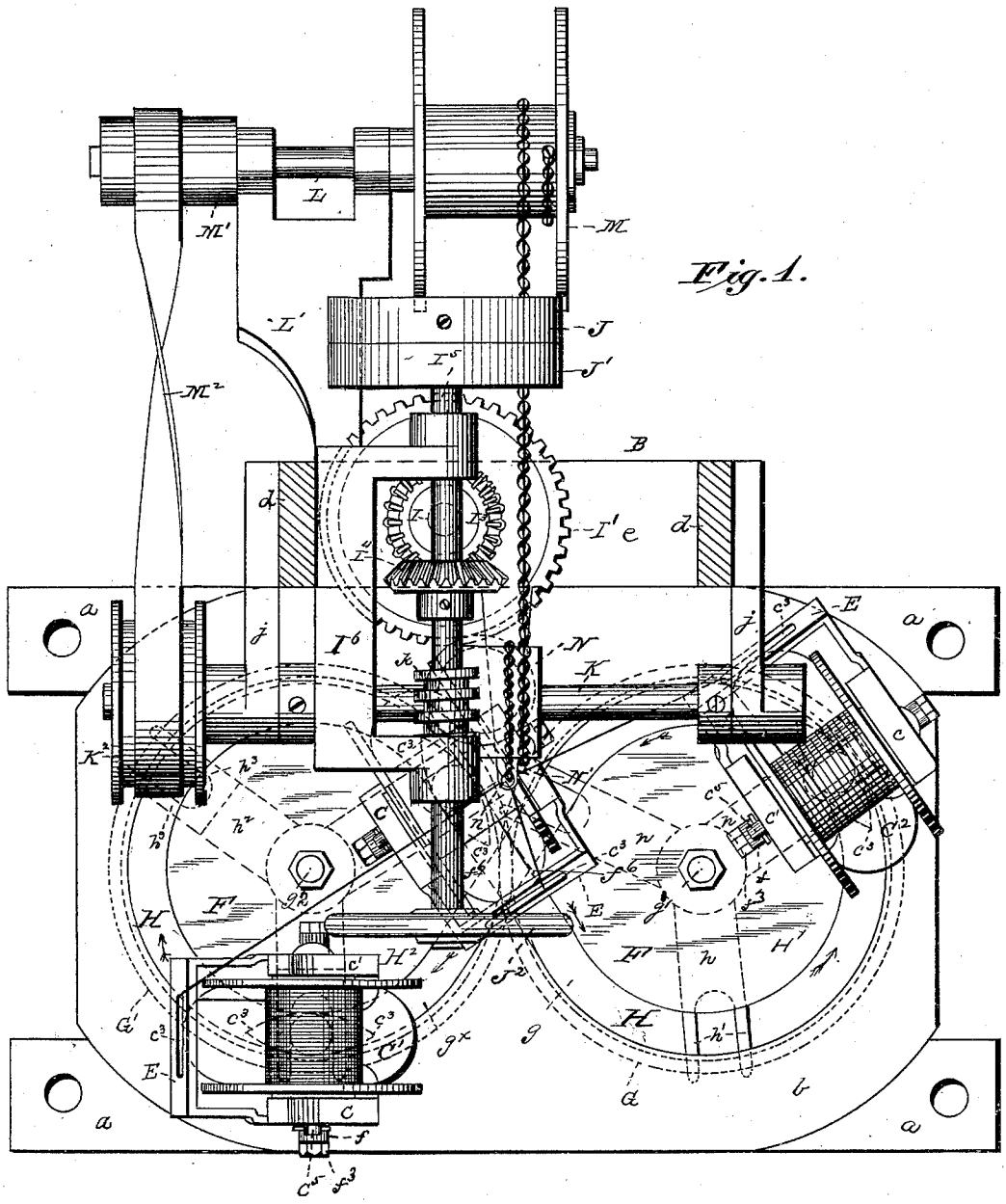

Fig. 1.

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O. PRESTON.

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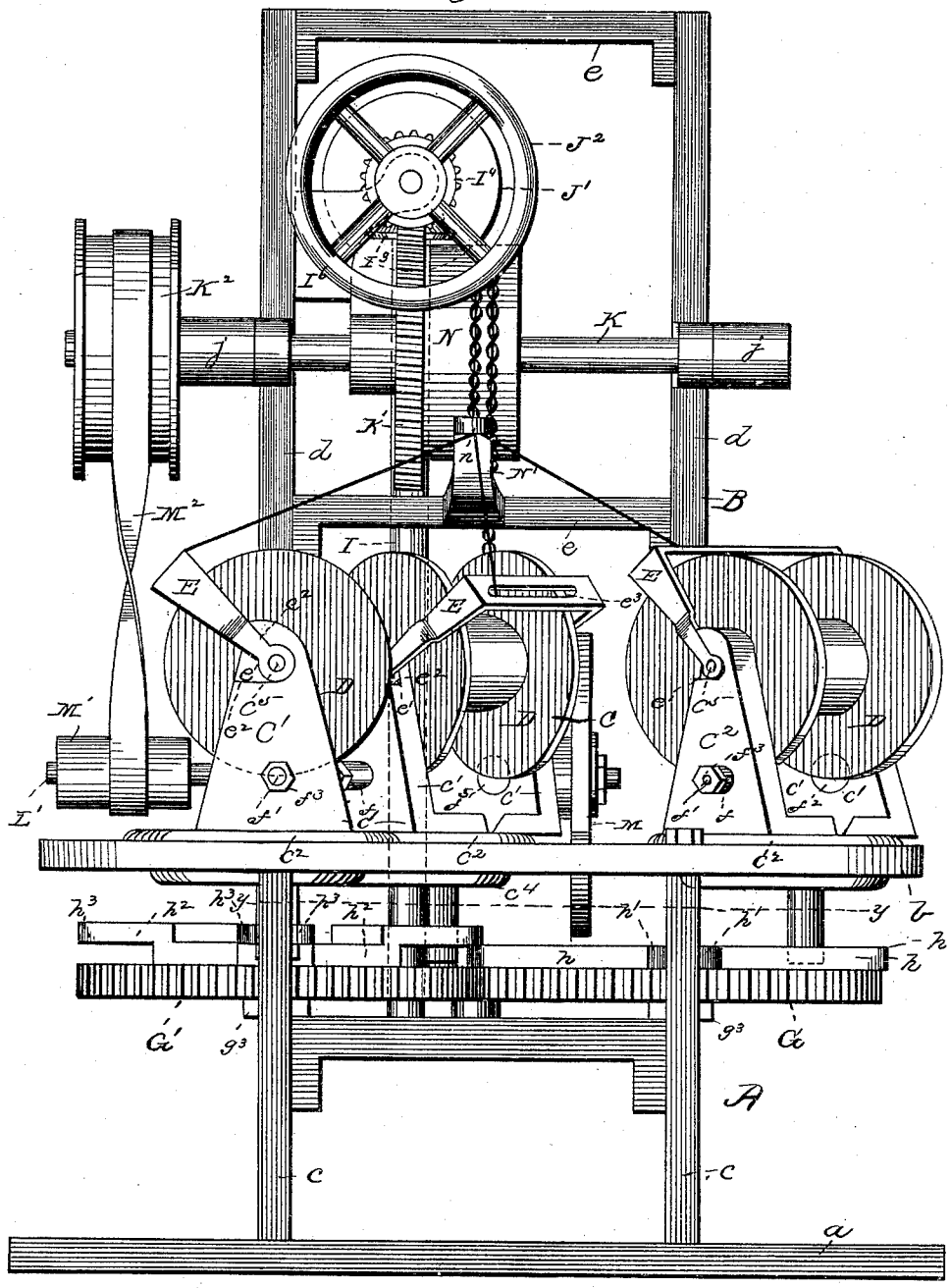
Fig. 2.



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(No Model.)

4 Sheets—Sheet 3.

O. PRESTON.

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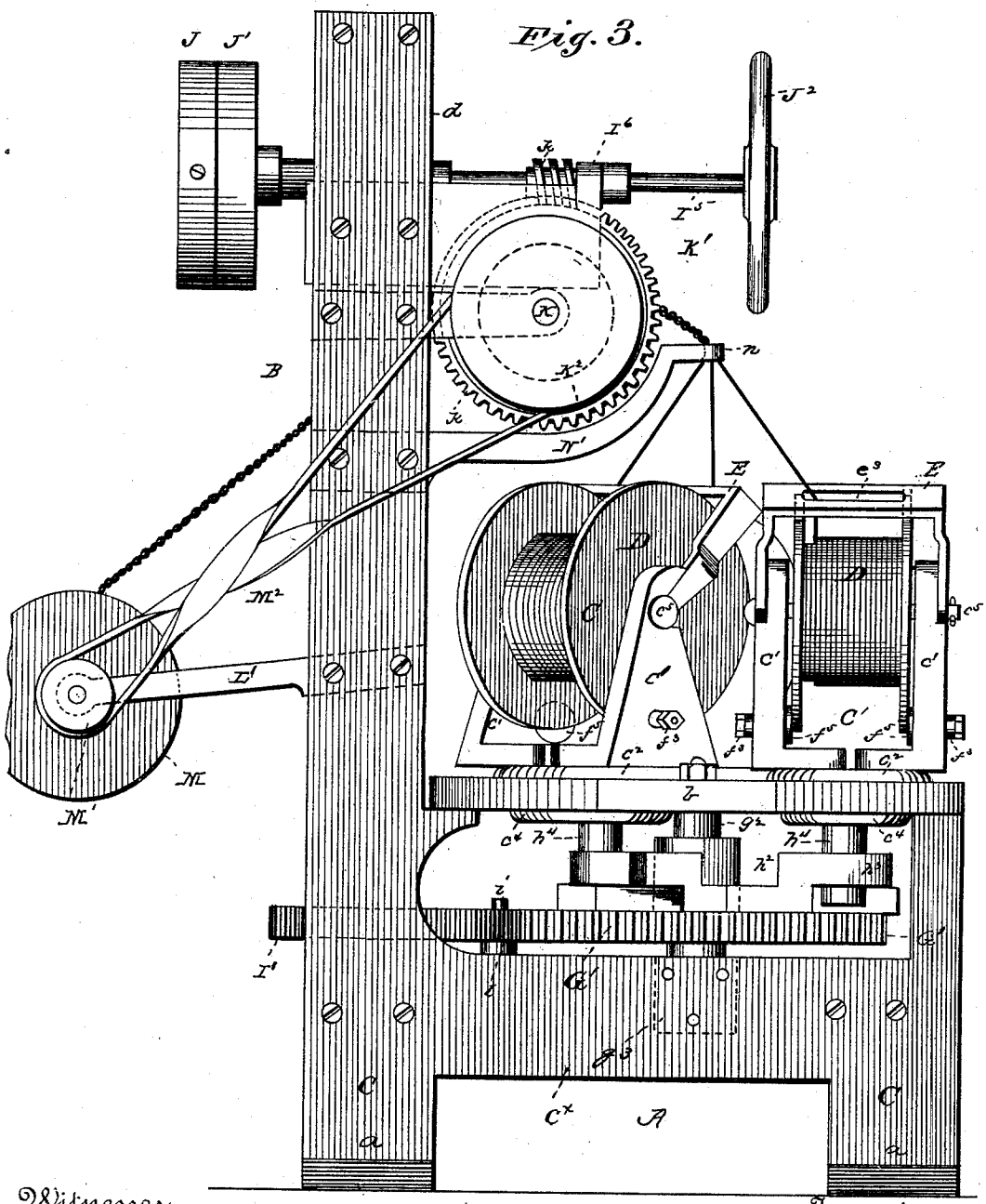
Fig. 3.



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4 Sheets—Sheet 4.

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MACHINE TO PLAIT WIRE.

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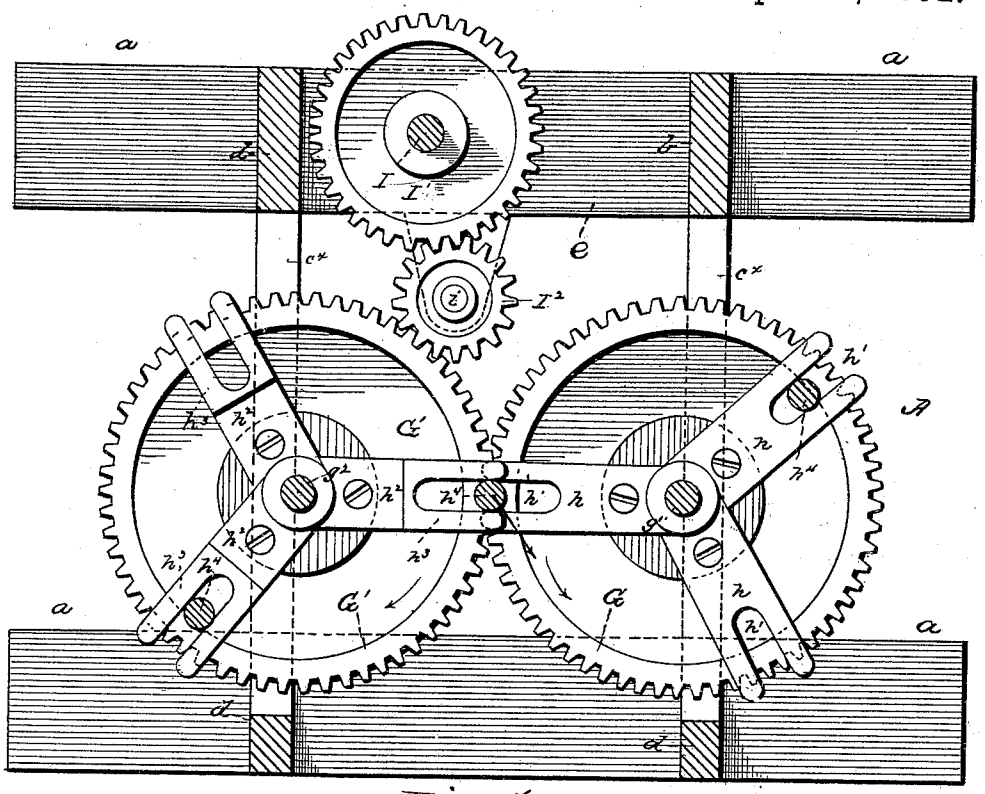

Fig. 4.

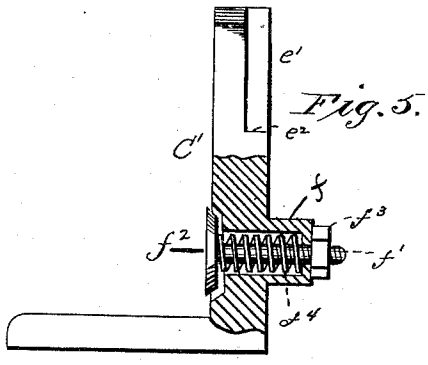

Fig. 5.

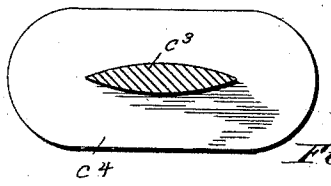

Fig. 7

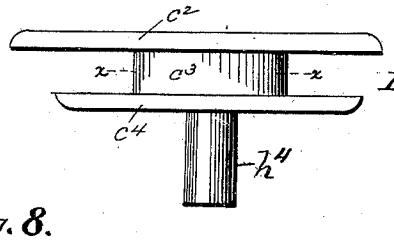

Fig. 6.

Fig. 8.

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UNITED STATES PATENT OFFICE.

OTHNIEL PRESTON, OF HORNELLSVILLE, NEW YORK, ASSIGNOR OF TWO-THIRDS TO H. C. PRESTON AND O. PRESTON, JR., OF SAME PLACE.

MACHINE TO PLAIT WIRE.

SPECIFICATION forming part of Letters Patent No. 482,589, dated September 13, 1892.

Application filed March 7, 1889. Serial No. 302,349. (No model.)

To all whom it may concern:

Be it known that I, OTHNIEL PRESTON, a citizen of the United States, residing at Hornellsville, in the county of Steuben and State of New York, have invented certain new and useful Improvements in Machines to Plait Wire; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The invention relates to machines for the production of continuous wire cables formed of several strands of wire plaited together, said wire cables being adapted for all the various purposes for which said cables are commonly used—as, for instance, electric conductors, in the construction of fences, &c.; and it consists in the construction, arrangement, and combination of parts, as hereinafter described, illustrated in the accompanying drawings, and pointed out in the appended claims.

The primary object of my invention is to provide a machine of this class in which the carriages carrying the wire-reels are caused to partake of such relative movement that they will effect the plaiting of the wire strands into a cable as said strands are unwound from the reels.

A further object of my invention is to provide suitable tension devices and guides between the reels and the receiving-drum, whereby the strands of wire are closely and uniformly plaited and said strands prevented from becoming entangled with parts of the machine.

My invention also has in view certain minor objects, as will become apparent from the description hereinafter.

In the drawings, Figure 1 is a top plan view of my machine with the frame in section. Fig. 2 is a front elevation thereof. Fig. 3 is a side elevation thereof. Fig. 4 is a horizontal section through the line *y y*, Fig. 2. Fig. 5 is a detail of one of the reel-brackets, partly in section, showing the friction-brake. Fig. 6 is a side elevation of the lower part of one of the reel-carriages with the reel-brackets removed. Fig. 7 is a transverse section through the center of the same on the line *x x*, Fig. 6. Fig. 8 represents a section of wire braid as plaited by the machine.

Referring to the drawings, wherein like letters of reference denote corresponding parts, A indicates a frame adapted to support the operative elements of my machine, said frame being provided with suitable feet *a* and a bed-plate or table *b*, supported upon uprights *c*, said bed-plate or table being adapted to support the reel-carriages and reels, as hereinafter described.

At the rear of the machine is a rectangular framing B, formed by the uprights *d* and the cross-pieces *e*, said framing supporting the main operating-shaft and other parts, as presently described.

In the formation of the cable I employ three strands of wire, and the construction, relative arrangement, and operation of the carriages and reels supporting said strands of wire will now be described.

C C′ C² are the reel-carriages, and D D D the reels. Inasmuch as the reel-carriages, as well as the reels, are similarly constructed, a description of one of said carriages and reels will therefore suffice for all. The reel-carriage C′, for instance, consists of brackets *c′*, bolted or otherwise secured to a plate c^2, which during the motion of the carriage rests upon the upper face of the bed-plate or table, said plate c^2 having formed integral therewith an elliptical neck c^3 and a lower plate c^4, which bears against the under face of said bed-plate.

In the upper ends of the brackets *c′* is mounted a shaft c^5, carrying the reel D for the wire, said reel being of the ordinary spool-shaped form straddling said reel, and loosely mounted upon the outer ends of the shaft c^5 is a yoke E, which serves as a guide for the wire as it is unwound from the reel and as a take-up for said wire, or device for taking up the slack thereof, said yoke being provided with an eye or opening e^3 for the passage of the wire.

To limit the vertical play of the yoke upon the shaft while the wire is being reeled off, I form recesses *e′* in the upper ends of the brackets *c′*, which form shoulders e^2, that limit the up-and-down play of the yoke E.

In the employment of wire which may have considerable "spring" it is sometimes the case that during the reeling off of said wire the reels, being loosely mounted upon their shafts, will be caused to rotate too freely, resulting in a loose plait and often in an entanglement of the wire with the parts of the machine. It is one of the objects of my invention to obviate these difficulties and enable me to employ wire of any temper and spring and yet obtain a uniform and close plaiting of the several strands into a cable, and for the accomplishment of this object I employ the following means: Projecting from the outer sides of the brackets c' are bosses f, each of which is cored to receive a bolt f', the inner end of each of said bolts being provided with a bearing surface or head f^2, which bears upon a flange of the reel, said bolts serving the purpose of a brake to prevent the reel from expending the wire too rapidly. The outer end of each bolt is threaded for the reception of a nut f^3, and within the hollow boss and surrounding the bolt is a coiled spring f^4, one end of which bears against the head f^2 of the bolt and its opposite end against the outer wall of the boss.

I have hereinabove stated that the plaiting of the strands of wire is effected by the relative movements of the reel-carriages, and I will now describe the manner in which and the means whereby the desired movements are imparted to said reel-carriages.

The bed-plate b is cut away to form two circular openings $g\ g^\times$, the outer edges of which openings converge to form a contracted space intermediate of said openings.

$g'\ g^2$ indicate vertical studs rigidly secured in brackets g^3, bolted to the cross-pieces $c^\times$. The upper end of each stud is provided with an offset or shoulder upon which is seated an approximately annular plate F, which is made slightly tapering at one side to form a nose f^6, as plainly shown. The diameter of these plates is somewhat smaller than the diameter of the openings $g\ g^\times$, so that when placed in position within the openings a guide way or channel H is formed, having the form of the figure **8**. The plates are placed in position with their noses f^6 opposite each other, as shown.

Upon the stud g' is loosely mounted a gear-wheel G, the stud g^2 carrying a like gear-wheel G', with which meshes the gear-wheel G. The gear-wheel G is provided upon its upper face with flat plates h, having the relative position shown. The outer ends of said plates are slotted to form fingers h', said fingers being of sufficient length to project beyond the teeth of the gear-wheel. The gear-wheel G' is also provided with three plates h^2, similar to the plates h, but which, however, are not flat, but are made angular or raised at their outer ends, so that they will pass over the fingers h' of the plates h when the gear-wheels revolve, the outer ends of the plates h^2 being slotted to form fingers h^3 of a length to project beyond the teeth of gear-wheel G'. In arranging, the gear-wheels they are made to mesh so that when revolved a plate h will come directly beneath a plate h^2, the fingers on the latter plate lying directly over the fingers of plate h.

I have above stated that the plaiting of the wire strands is effected by the relative movements of the reel-carriages. Said movements are accomplished through the media of the plates and their fingers in the following manner: Projecting from the under side of each of the plates c^4 of the reel-carriages is an annular boss or pin h^4 of sufficient length to pass down between the fingers of the plates $h\ h^2$ when said fingers occupy the position shown in Fig. 4.

We will suppose, for instance, that the carriages are in the position shown in Fig. 1. When the gear-wheels are revolved and the carriage C arrives at the central portion of the guideway H—that is to say, at the point where the portions H' H² are nearest each other—the boss or pin h^4 on said carriage will be standing between the fingers $h'\ h^3$, as shown in Fig. 4, and upon a continued revolution of the gear-wheels the nose of the elliptical neck c^3 will, owing to the nose f^6, be forced to project across the portion H' tangentially to the outer edge of the opening $g^\times$ and the boss or pin h^4 will be guided from the fingers h^3 to the fingers h'. Before the carriage C' arrives at the position just occupied by the carriage C the carriage C² will cross from the right to the left and be guided in the opposite direction to that taken by carriage C. When carriage C² has crossed, carriage C' will then come in position to be guided from the left to the right, and so on, each carriage being caused in its movements to follow the guideway, or, in other words, to describe the figure 8.

It will be seen that by imparting the above-described movements to the carriages there will be produced a plaiting of the wire strands into a cable.

For driving the gear-wheels by hand or other power I employ the following means: I indicates a vertical shaft stepped at its lower end in the lower cross-piece e of the framing B and its upper end passing through the central cross-piece e of said frame. Near the lower end of the shaft I is secured a gear-wheel I', which meshes with a pinion I² on a stud i, secured to the lower cross-piece, said pinion I² meshing with the gear-wheel G'. The upper end of the shaft I carries a bevel-wheel I³, which meshes with a like wheel I⁴ on the horizontal shaft I⁵, which has its bearings in the arms of a bracket I⁶, secured to the framing B. The outer end of the shaft I⁵ carries a fixed pulley J and a loose pulley J'. The inner end of the shaft I⁵ carries a hand-wheel J² to adapt said shaft to be operated by hand.

In order to provide means whereby the cable may be wound upon a receiving-drum as fast as it is formed, and thereby avoid any

danger of the entanglement of the cable, and whereby a drawing action may be exerted upon the cable to maintain the same under sufficient tension to produce a close plait, I employ the following means: Journaled in arms *j*, secured to the vertical posts of the framing B, is a transverse shaft K, carrying at its central portion a worm-wheel K′, which meshes with a worm *k* on the shaft I^5. One end of the shaft K carries a flanged belt pulley K^2. Rigidly mounted upon a transverse shaft L, supported in a bracket L′, which is secured to one of the posts of framing B, is a reel M, which is designed to receive the cable as it is formed. Upon the opposite end of the shaft is secured a belt-pulley M′, over which pulley and the pulley K^2 passes a crossed belt M^2. By this arrangement when the shaft I^5 is rotated in the proper direction—that is to say, to the right by hand or other power—the shaft K will be caused to revolve and with it the belt-pulley K^2, and through the medium of the belt M^2 the shaft L and reel M will be rotated in a direction to cause the cable to be wound upon said reel.

To provide suitable guides for the cable between the wire-reels and the receiving-reel, I employ a guide-drum N, rigidly mounted on the shaft K, and in an arm N′, projecting forward of the central cross-piece *e* is formed an eye *n*, which serves as a point of bearing for the strands of wire to enable them to be plaited together, as will be readily understood.

The operation of the machine may be described as follows: The wire-reels having been filled with wire and placed in position in the carriages, the ends of the wire strands are passed through the openings e^3 in the yokes E, then through the eye *n* and a turn made around the drum N, and thence backward and secured to the receiving-reel. Motion is then imparted to the shaft I^5, and through the media of the bevel-gears I^3 and I^4, shaft I, gear-wheel I′, and pinion I^2 the gear-wheels G and G′ are revolved in the direction indicated by the arrows in Fig. 1. The carriages C C′ C^2 will thereby be caused to partake of the relative movements hereinbefore described, causing the strands to be plaited into a cable as they pass through the eye *n*. The receiving-reel will, simultaneously with the revolution of the shaft I^5 be caused to revolve in a direction to wind the cable as fast as formed and effect a drawing action upon the same through the media of worm *k*, worm-wheel K′, shaft K, pulley K^2, belt M^2, pulley M′, and shaft L.

It will be seen that with my machine wire having any desired temper and spring can be employed, that a suitable tension is always exerted upon the cable and strands by the drum N and reel to produce a uniform and close plait, that there is no danger of the wire strands or the completed cable becoming entangled in the machine, and that the cable as fast as it is formed is wound upon the receiving-reel by the machine itself, thus obviating the necessity of coiling said cable upon the reel by hand.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, with a reel-carriage provided with vertical arms or brackets, of a shaft having its bearings in the upper end of said arms, a wire reel mounted upon said shaft, and a guide and bracket pivoted upon the ends of said shaft and straddling the reel and provided with a guide eye or slot, the upper ends of the arms of the reel-carriage being provided with recesses forming shoulders to limit the vertical play of the tension-bracket, substantially as described.

2. The combination, with the bed-plate provided with the guide-channel, as described, of the reel-carriages provided with vertical brackets supporting the reel-shaft and having at their upper ends recesses or stops to limit the motion of the take-up yoke, and the take-up yoke pivoted to the top of the reel-carriages and straddling the same and provided with a guide-eye, substantially as described.

3. The combination, with the bed-plate provided with the guide-channel, as described, of the reel-carriages provided with vertical brackets supporting the reel-shaft and reel and having at their upper end recesses or stops to limit the motion of the take-up yoke, the take-up yoke provided with a guide-eye and pivoted to the top of and straddling the reel-carriage, and the automatic friction-brake consisting of the spring-surrounded bolt seated in a recess in the brackets of the reel-carriage and adapted to bear against the flange of the reel, substantially as specified.

4. In a wire-braiding machine, the combination, with the reel-carriages, the reels mounted therein, the take-up yokes, and the automatic friction-brakes, of the bed-plate provided with guide-channels, the intermeshing gearing by which motion is imparted to the reels, the intermediate bracket and guide-eye, the receiving-drum, and the gearing by which it is caused to revolve with a speed corresponding to the delivery from the reels, the whole arranged to give a yielding delivery to and produce an automatically-regulated draft upon the strands during the operation of braiding to compensate for the spring of the wire, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

OTHNIEL PRESTON.

Witnesses:
J. H. MACDONALD,
W. F. GARDNER.