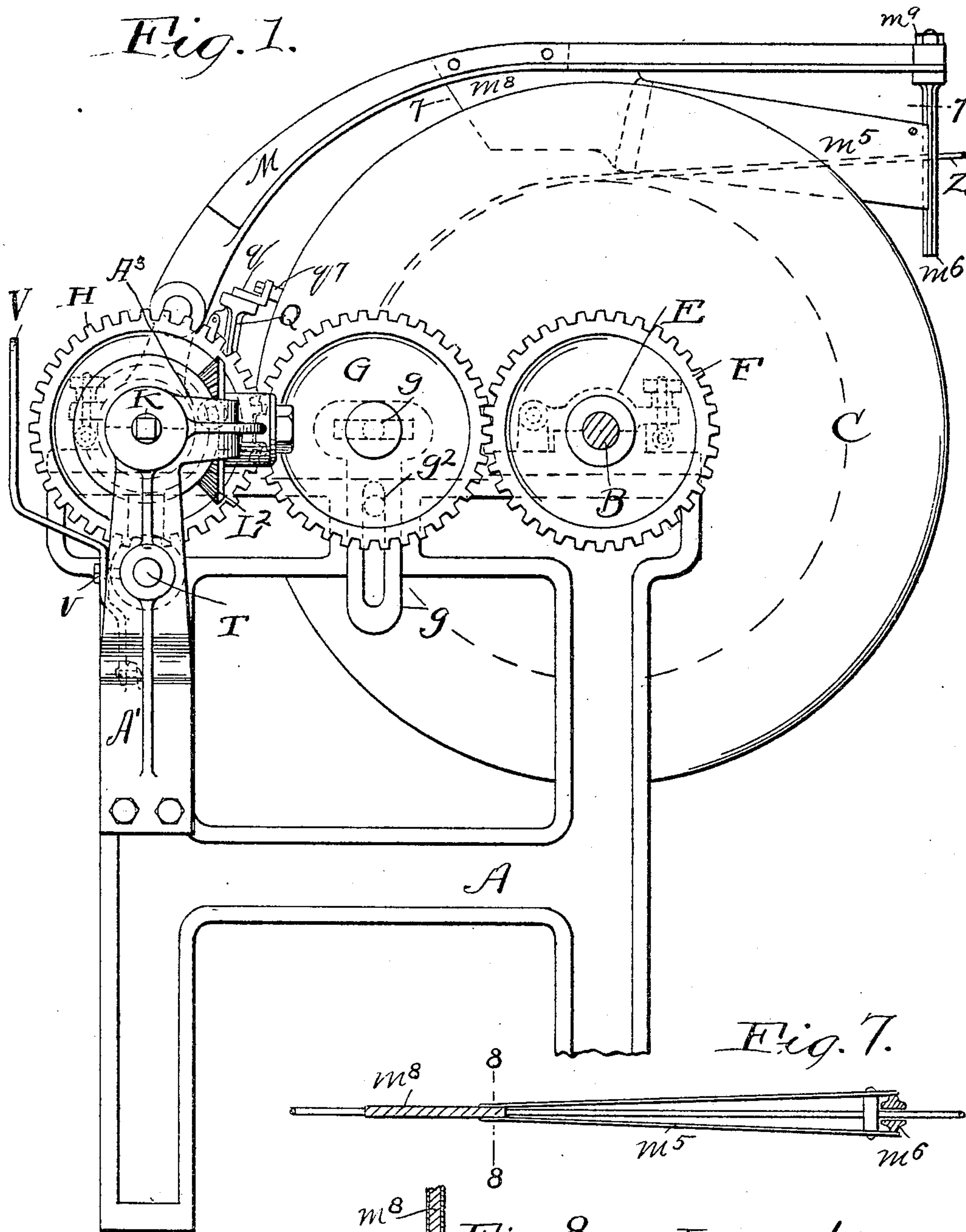


No. 795,279.

PATENTED JULY 25, 1905.

C. E. HADLEY.
WINDING MACHINE.
APPLICATION FILED DEC. 10, 1903.

4 SHEETS—SHEET 1.



Witnesses.
E. B. Gilchrist
B. W. Brockett.

Inventor:
Charles E. Hadley,
By his Attorneys,
Thurston & Bates.

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4 SHEETS—SHEET 2.

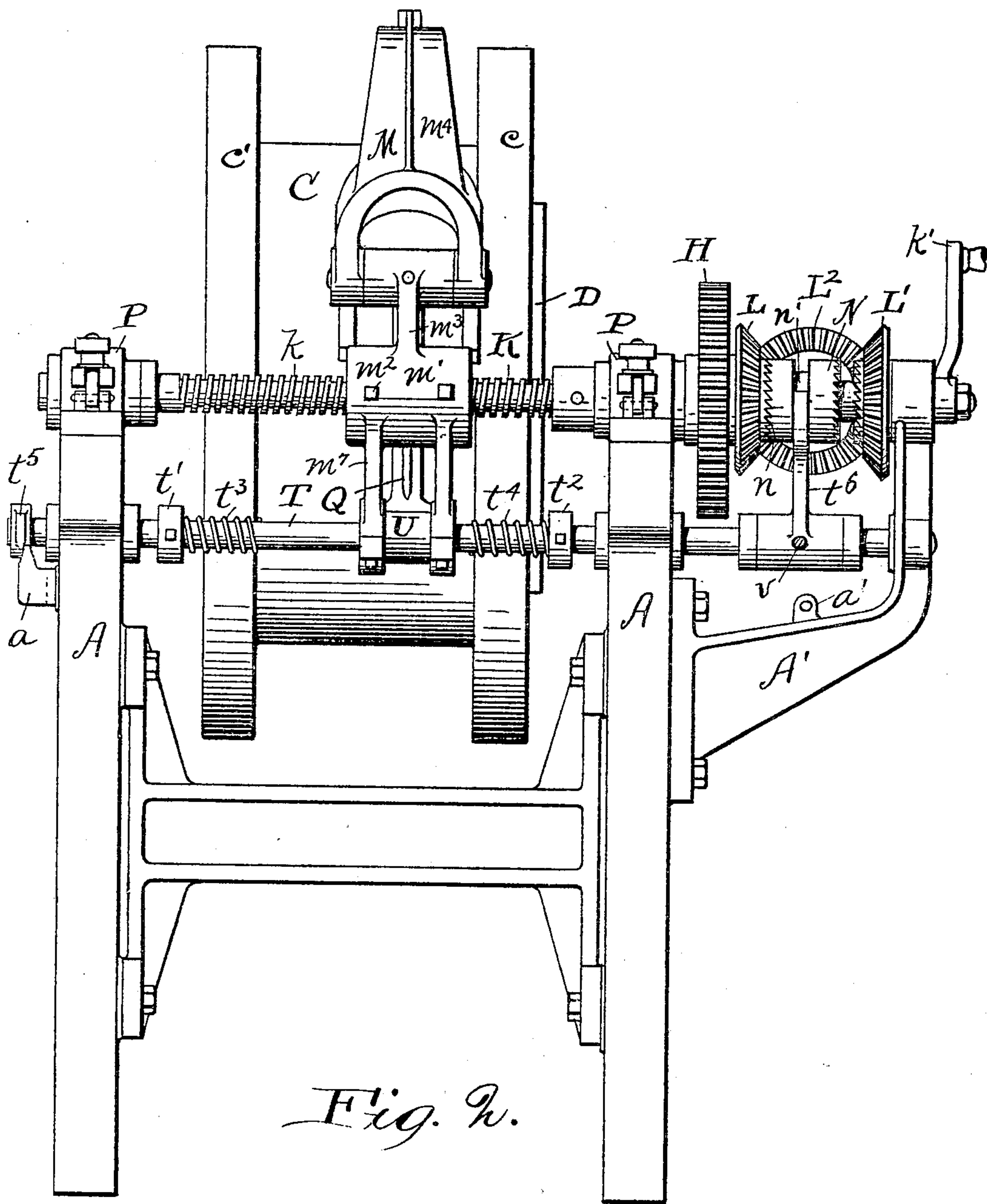


Fig. 2.

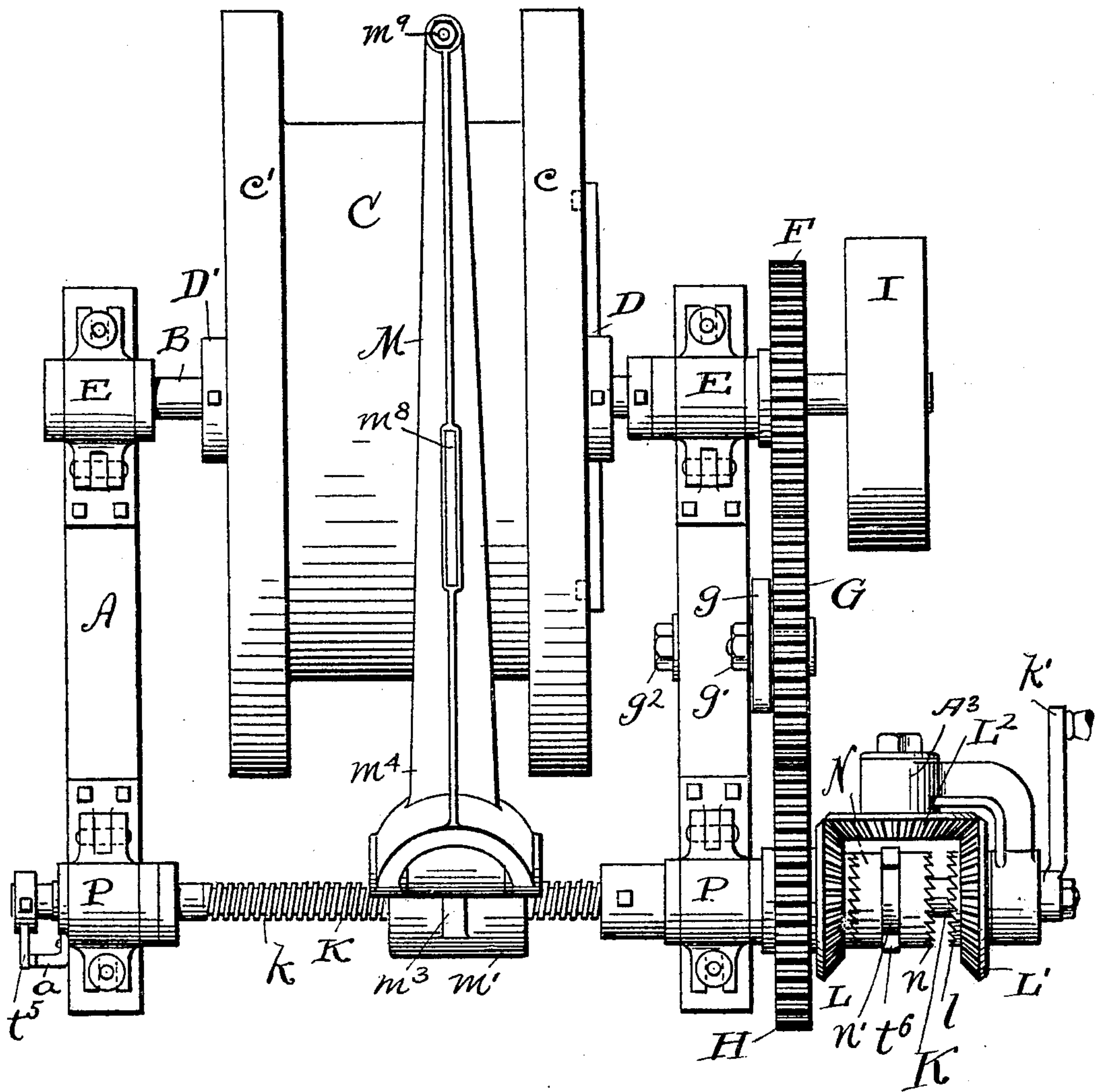
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4 SHEETS—SHEET 3.

Fig. 3.



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B. W. Brackett.

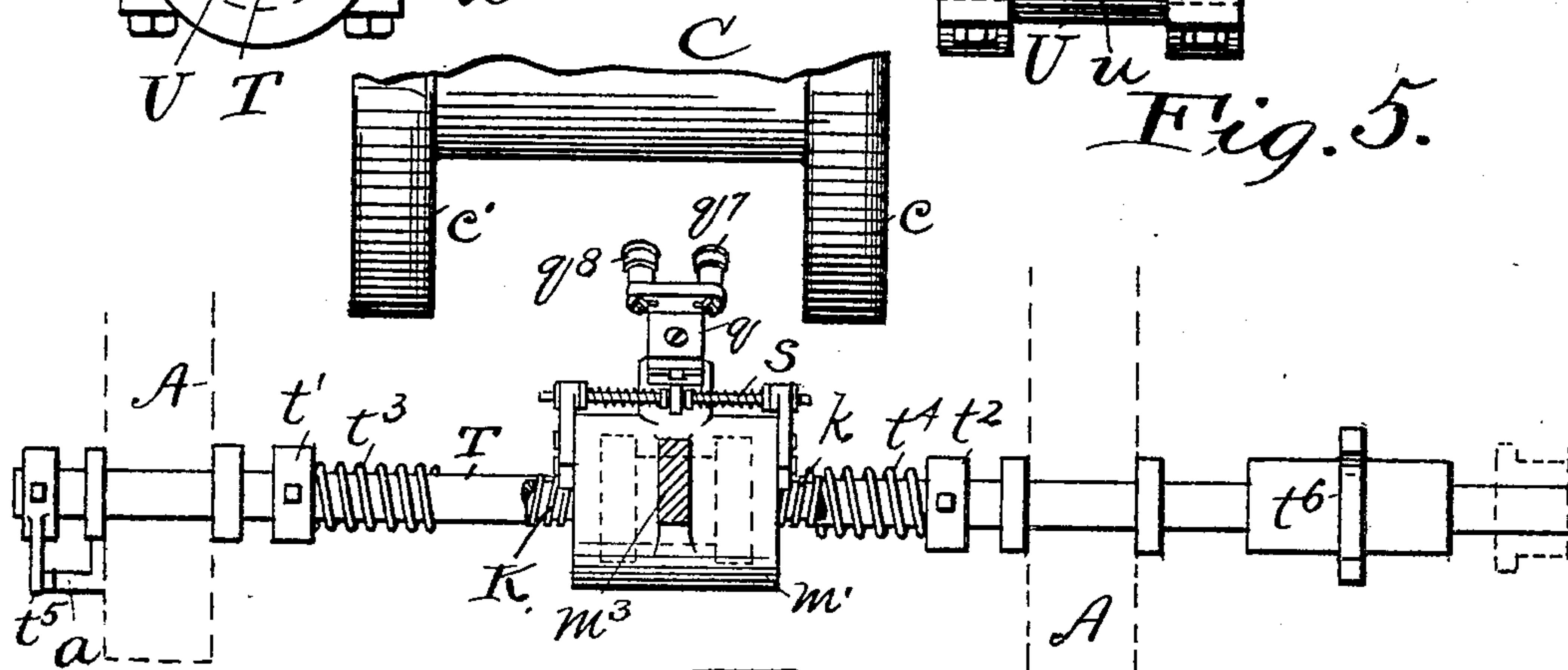
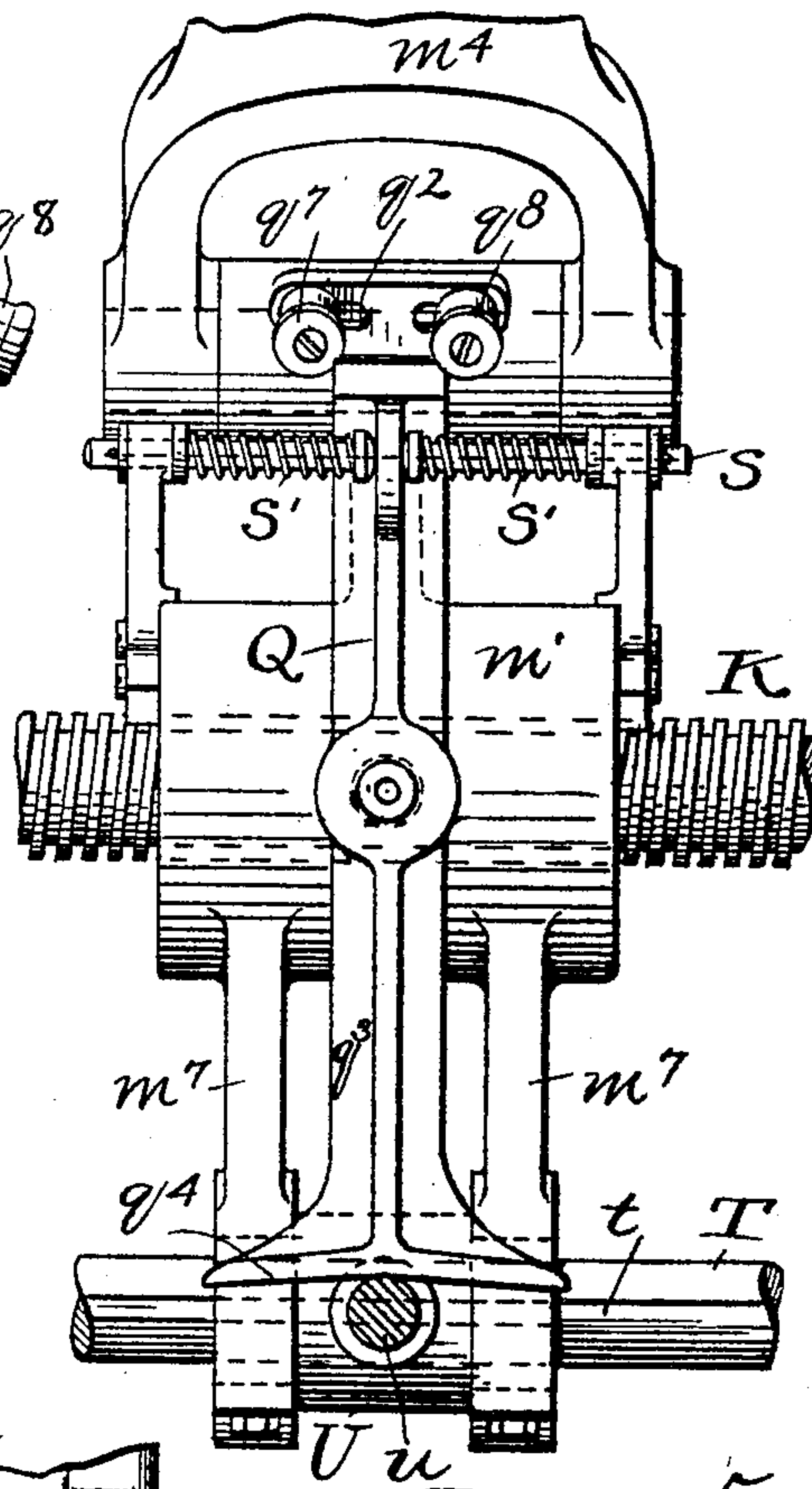
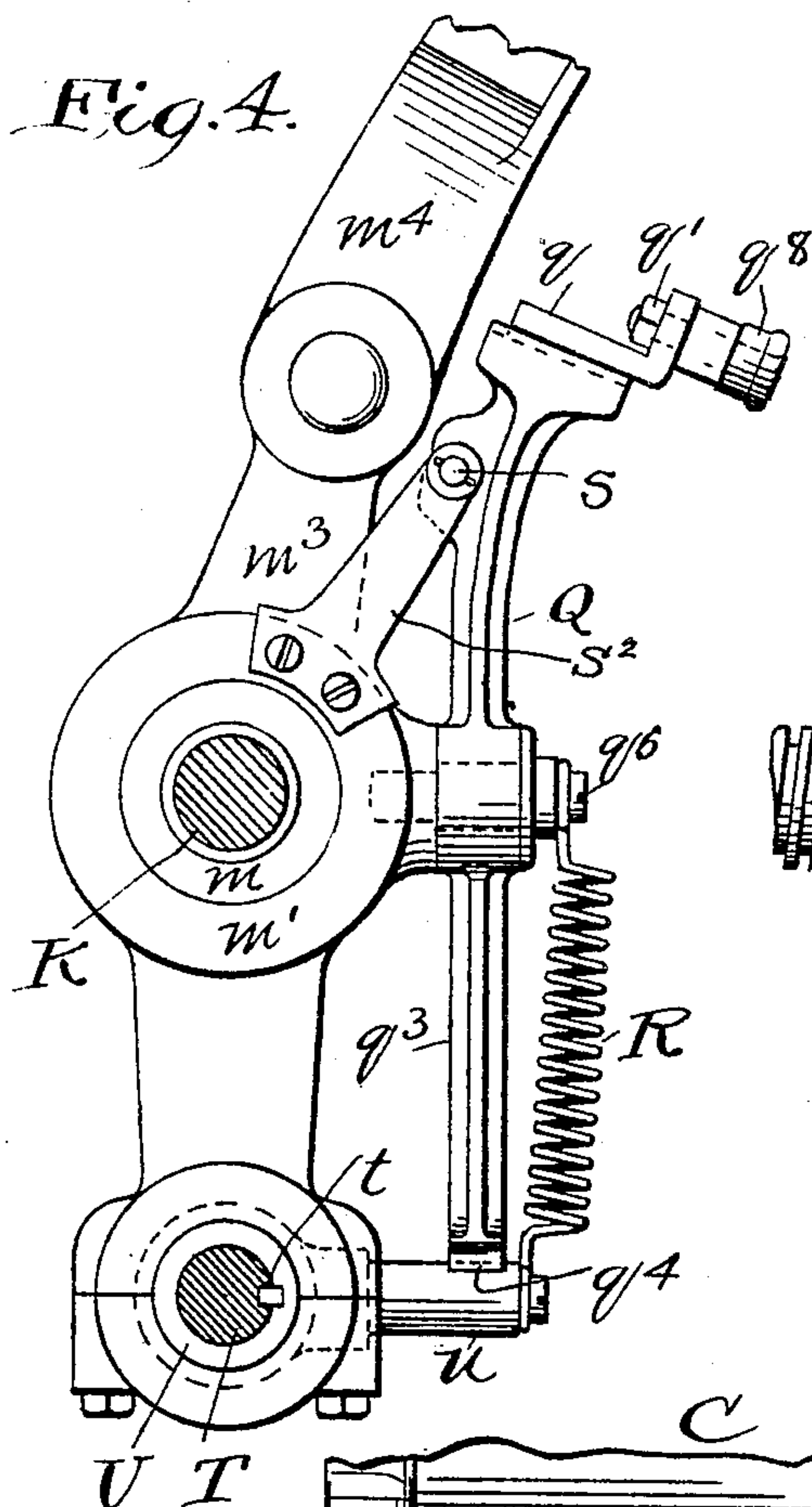
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UNITED STATES PATENT OFFICE.

CHARLES E. HADLEY, OF CLEVELAND, OHIO, ASSIGNOR TO FEDERAL MANUFACTURING COMPANY, OF HARTFORD, CONNECTICUT, A CORPORATION OF NEW JERSEY.

WINDING-MACHINE.

No. 795,279.

Specification of Letters Patent.

Patented July 25, 1905.

Application filed December 10, 1903. Serial No. 184,545.

To all whom it may concern:

Be it known that I, CHARLES E. HADLEY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Winding-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide a simple and efficient mechanism for winding wire upon a spool. The mechanism rotates the spool and guides the wire gradually across the same, at the proper time automatically reversing itself to guide the next layer of wire.

The invention may be summarized as consisting of the combination of coöperative parts as hereinafter more fully explained.

Figure 1 is a side elevation of the winding-machine. Fig. 2 is an elevation at right angles to Fig. 1, at the left thereof, and may be termed a "rear" elevation. Fig. 3 is a plan. Fig. 4 is in the side elevation of the reversing-trip. Fig. 5 is a front elevation of such mechanism, and Fig. 6 is a somewhat diagrammatic sectional plan of the same. Fig. 7 is a detail of the guide-wings, being a section on lines 7 7, Fig. 1. Fig. 8 is a vertical cross-section on the lines 8 8, Fig. 7.

Referring to the parts by letters, A represents the frame of the machine, which may be made in any suitable form. Journaled in the frame is the main shaft B, which carries the spool C, on which the wire is to be wound. The spool is held to the shaft by suitable collars or spiders D D' or other arrangements, as desired, and the shaft is rotated by the belt-pulley I thereon. The bearings E of this shaft are provided with hinged caps, as shown, which allows the convenient removal of the shaft. After the shaft is removed a removal of the collar D' allows the spool to be removed from the shaft.

On the shaft B is a gear F. This gear meshes with an intermediate gear G, journaled on the frame, and this latter gear meshes with a gear H, which is loosely journaled on the shaft K. This shaft is journaled in frame-bearings P, which have removable caps, and between these bearings it is screw-threaded, as at *k*, this thread engaging and driving the guide-arm M, which guides the wire being wound. The shaft K when desired may be rotated by hand by means of the small crank *k'*. In ordinary

running it is driven by the gear H, as will now be explained.

Loose on the shaft K are a pair of bevel-gears L and L', the former being rigid with the gear H. These two bevel-gears each mesh with an intermediate bevel-gear L², mounted in the bracket A³. On the inner faces of the hubs of the bevel-gears L and L' are clutch-teeth *l*. Intermediate of these faces is a collar N, which has clutch-teeth *n* on each of its faces. This collar is slidable upon the shaft K, but is splined to that shaft, and hence compelled to rotate with it. With the collar in either extreme position its teeth *n* mesh with the teeth *l* of the corresponding bevel-gears L or L'. This locks the shaft K in the first instance directly to the gear H. In the second instance it locks it to the bevel-gear L', and this, through the gear L², communicates motion in the reverse direction to the shaft K. Thus the shaft K may be revolved in either direction from the constant rotation of the pulley I, according to the position of the collar N.

As stated, the guide-arm M is screw-threaded on the shaft K, and hence travels in one direction or the other, according to the rotation of this shaft. This operative connection is accomplished by having a nut *m* with internal threads which occupies an opening in a boss *m'* of the guide-arm and is clamped therein by set-screws *m*². Extending upwardly from the boss *m'* is a short arm *m*³, and to this is pivoted the guide-arm proper, *m*⁴. This arm *m*⁴ has depending from it intermediately a plate *m*⁵, to which is secured a guiding device, preferably a pair of sheet-metal wings *m*⁵, between which the wire Z travels. These wings terminate in a pair of parallel members *m*⁶ of a fork, which is held by a nut *m*⁹ at the formed end of the arm *m*⁴.

As the shaft B rotates and the spool winds up the wire the guide-arm is caused by the screw *k* to travel crosswise of the spool and properly lay the wire. The speed of travel of the guide-arm relative to that of the spool should vary with different sizes of wire and is regulated by substituting other sized gears for the gears F and G, the gear G being adjustably journaled by a pivot-pin *g'* on a bracket *g*, which is itself adjustably held by the bolt *g*².

Pivoted to the front side of the boss *m'* of the guide arm M is a lever Q. At the upper end of this lever, projecting diagonally for-

ward, are a pair of rolls q^7 q^8 , adjustably carried on the bracket q by journal-bolts q' , extending through slots q^2 in the upturned portion of the bracket. This lever Q is given a tendency to remain in a neutral intermediate position by the plungers S , which are pressed toward the same by surrounding springs S' . These plungers S are mounted in brackets S^2 , secured to the boss m' . Below its pivot the lever continues in the form of an arm q^3 , which has at its lower end an approximately T-shaped head q^4 , which actuates the reversing mechanism, as hereinafter described.

Journaled in the frame is a rock-shaft T . Loosely surrounding this shaft, but splined to the same by a feather extending into a groove t therein, is a collar U . This collar has reduced portions mounted in the ends of the arms m' , which depend from the boss m' of the guide-arm and which surround the shaft T . Extending forward from the collar is a stud u . This stud stands directly beneath the T-head q^4 of the lever Q and is drawn upward against that head by the spring R , which is secured at its lower end to the stud and at its upper end to the stud q^6 , on which the lever is pivoted. From this construction it results that whenever the lever Q is swung in one direction or the other its T-head depresses the stud u , and this rocks the shaft T .

Secured to the shaft T at points beyond either extreme position of the arms m' of the guide-arm are set-collars t' and t'' , and between these collars and said arms are the short helical springs t^3 , t^4 . On the extreme end of the shaft T is a short locking-arm t^5 , which is adapted to engage the side of an L-shaped bracket a , carried by the frame.

With the parts positioned as shown in Figs. 2 and 6 the guide-arm is traveling to the right. In this movement it compresses the spring t^4 . As the guide-arm reaches the extreme right of its movement the roller q^7 engages the flange c of the spool C . This stops the upper end of the lever, and the continued movement of the guide-arm swings the lever on its pivot, causing its T-head to depress the stud u and rock the shaft T , thus raising the locking-arm t^5 out of engagement with the bracket a . Thereupon the compressed spring t^4 moves the shaft T to the right. This shaft carries a shipper-arm t^6 , which is journaled on the shaft, but moves longitudinally with it and yokes into a groove n' in the collar N , wherefore this movement of the shaft T shifts this collar out of engagement with the gear L and into engagement with the gear L' , and this reverses the direction of rotation of the shaft K . Under this reverse direction of movement the guide-arm travels toward the left, and this relieves the pressure on the roller q^7 , allowing the lever Q to assume its upright position and the shaft T to rock upward slightly, thus swinging the locking-arm t^5 downward on the inner side of the L-shaped bracket a . When the arm M

reaches the extreme left of its movement, the roller q^8 engages the flange c' of the spool, and this swings the lever Q and rocks the shaft T , and the spring t^3 , which in the meantime has become compressed, operates to draw the shaft T to the left, shifting the collar N back into the position shown in Fig. 2 and again reversing the direction of rotation of the shaft K .

It will be seen from the foregoing description that the shaft K is automatically reversed as each layer of the wire is completed, so that power being supplied to the pulley I the machine automatically operates to wind onto the spool its supply of wire irrespective of the increasing diameter of the layers of wire upon the spool, this latter contingency being met by the slipping of the belt upon the pulley I . If it should be desired at any time to reverse by hand the shaft K , this is easily accomplished by throwing the hand shipper-lever V , which is pivoted to an ear a' on the frame-bracket A' and carries a stud v , loosely engaging the hub of the shipper-arm t^6 . The shaft T will be readily shifted, and the locking-arm t^5 will readily disengage itself from the bracket a on account of the inclined faces of the arm t^5 and bracket a . The L-shaped end of the bracket a and the engaging face of the locking-arm t^5 are beveled to reduce the friction between the parts as they are forced past each other in the releasing of the arm t^5 .

I claim—

1. In a winding-machine, in combination with a screw-threaded shaft, means including a clutch for rotating said shaft in either direction and a guide-arm engaging said screw-threaded shaft and means carried by the guide-arm and adapted to be operated by engaging the flange of a spool for throwing the clutch.

2. In a winding-machine, in combination, a screw-threaded shaft, mechanism including a clutch for rotating it in either direction, a rock-shaft shiftable longitudinally for shifting said clutch, a guide-arm screw-threaded on said first-mentioned shaft, springs on said rock-shaft and adapted to be compressed by the movement of said guide-arm, means for holding the rock-shaft, and means for releasing said means to allow one of said compressed springs to operate the clutch, said releasing means comprising a stud on said rock-shaft and a lever pivoted to said guide-arm adapted by its movement to rock said stud.

3. In a winding-machine, in combination, a screw-threaded shaft, mechanism including a clutch for rotating it in either direction, a guide-arm adapted to be operated by said shaft, a shipper-arm adapted to operate said clutch, a lever pivoted to said guide-arm and adapted by its movement to shift said shipper-arm, said lever carrying at its free end a roller for engaging a flange of a spool, and a spring tending to maintain said lever in a neutral position, substantially as described.

4. In a winding-machine, in combination, a

traveling guide-arm, a lever pivoted thereto, a roller carried by said lever, a pair of plungers and springs operating on the lever and tending to maintain it in a neutral position, and a clutch mechanism adapted to be thrown by the swinging of said lever, substantially as described.

5. In a winding-machine, in combination, a screw-threaded shaft, a rock-shaft parallel therewith, a guide-arm engaging said screw-threaded shaft and guided by said rock-shaft, a stud slidably connected with said rock-shaft, a lever pivoted to said guide-arm and having a T-head adapted to engage and rock said stud, and mechanism governed by said arm for controlling the direction of rotation of said screw-threaded shaft, substantially as described.

6. In a winding-machine, in combination, a screw-threaded shaft, means including a clutch for rotating it in either direction, a rock-shaft parallel with said shaft and shiftable longitudinally to operate said clutch, a guide-arm engaging said screw-threaded shaft and guided by said rock-shaft, springs surrounding said rock-shaft on opposite sides of said guide-arm and adapted to be compressed by said guide-arm to give said rock-shaft a tendency to move longitudinally, a locking device tending to prevent such longitudinal movement, a stud slidably mounted on said rock-shaft and adapted to rock the same to release the locking device, a lever pivoted on said guide-arm and adapted to rock said stud, and means carried by said lever and adapted to engage a flange of the spool to automatically move said lever.

7. In a winding-machine, in combination, a movable guide-arm, a clutch for controlling the direction of movement thereof, a rock-shaft for throwing the clutch, springs on opposite sides of said guide-arm and adapted to be compressed thereby to give the rock-shaft a tendency to move longitudinally, a locking device tending to prevent such longitudinal movement, a stud slidably mounted on said rock-shaft and adapted to rock the same to release the locking device, a lever pivoted on said guide-arm and operating said last-mentioned arm, means carried by said lever and adapted to engage a flange of the spool to automatically move said lever, and a spring tending to return said lever to a neutral position, substantially as described.

8. In a winding-machine, in combination, a movable guide-arm, means for moving it in either direction, a rock-shaft shiftable longitudinally for governing the direction of movement, springs on said rock-shaft on opposite sides of said guide-arm and adapted to be compressed by the same to give the rock-shaft a tendency to move longitudinally, a locking device tending to prevent such longitudinal movement, a lever pivoted on said guide-arm and adapted when rocked to release said locking device, means carried by said lever and

adapted to engage a flange of the spool to automatically rock the lever, and a pair of spring-plungers carried by said arm and adapted to bear on said lever tending to return it to a neutral position, substantially as described.

9. In a winding-machine, in combination, a movable guide-arm, a rock-shaft shiftable longitudinally, springs surrounding the same on opposite sides of said guide-arm and adapted to be compressed by the guide-arm to give the rock-shaft a tendency to move longitudinally, a locking device tending to prevent such longitudinal movement, a stud slidably mounted on said rock-shaft and adapted to rock the same to release the locking device, a lever pivoted on said guide-arm and adapted to rock said stud, means carried by said lever and adapted to engage a flange of the spool to automatically move said lever, said lever having its lower end in the form of a T-head for engaging said second-mentioned arm to rock it when the lever is swung, means for giving said lever a tendency to remain in a neutral position, and means controlled by said rock-shaft for governing the direction of movement of said guide-arm, substantially as described.

10. In a winding-machine, in combination, a clutch for controlling the direction of movement of the guiding device, a rock-shaft shiftable longitudinally to operate said clutch, springs adapted to be compressed by the guiding device to give the rock-shaft a tendency to move longitudinally, a locking device for preventing such longitudinal movement, a stud slidably mounted on said rock-shaft and adapted to rock the same to release the locking device, and means carried by said guiding device and adapted to engage a flange of the spool to automatically rock said stud.

11. In a winding-machine, in combination, a screw-threaded shaft, means including a clutch for rotating it in either direction, a rock-shaft parallel with said shaft and shiftable longitudinally to operate said clutch, a guide-arm engaging said screw-threaded shaft and guided on said rock-shaft, springs surrounding said rock-shaft on opposite sides of said guide-arm and adapted to be compressed by the same to give the rock-shaft a tendency to move longitudinally, a locking device tending to prevent such longitudinal movement, a stud slidably mounted on said rock-shaft and adapted to rock the same to release the locking device, a lever pivoted on said guide-arm and means carried by said lever and adapted to engage a flange of the spool to automatically move said lever, and a spring tending to return said lever to a neutral position.

12. In a winding-machine, in combination, a screw-threaded shaft, means including a clutch for rotating it in either direction, a rock-shaft parallel with said shaft and shiftable longitudinally to operate said clutch, a guide-arm having a portion engaging the threads

of said screw-threaded shaft, said guide-arm extending around said rock-shaft, springs surrounding said rock-shaft on opposite sides of said guide-arm and adapted to be compressed by the same to give said rock-shaft a tendency to move longitudinally, a locking device tending to prevent such longitudinal movement, a stud slidably mounted upon said rock-shaft between spaced portions of said guide-arm, a lever pivoted on said guide-arm and adapted to engage a flange of the spool to au-

tomatically move said lever, said lever having its lower end in the form of a T-head for engagement with said stud to rock it when the lever is swung, substantially as described.

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

CHARLES E. HADLEY.

Witnesses:

J. B. HULL,

B. W. BROCKETT.