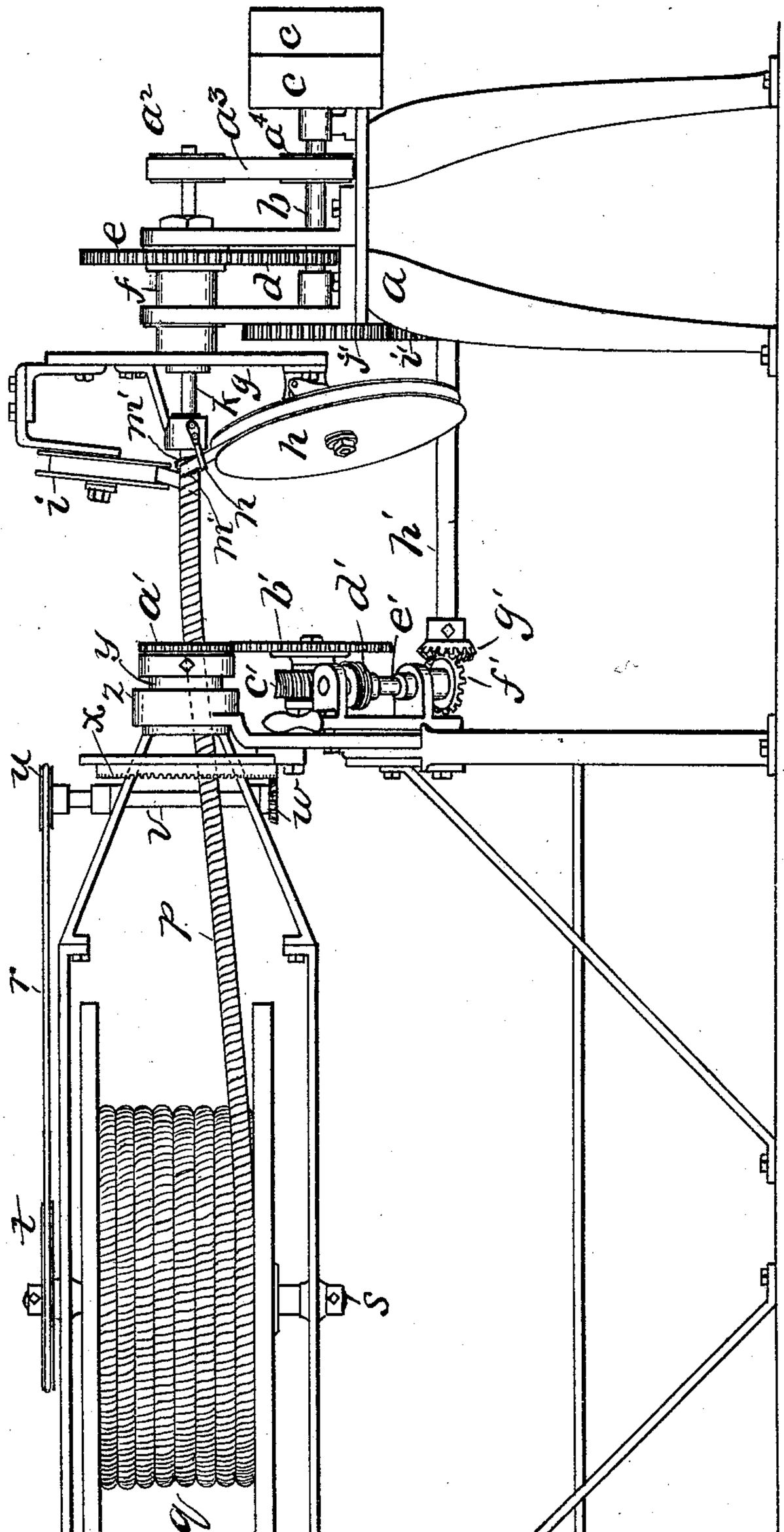
(No Model.) 3 Sheets—Sheet 1.

J. S. WILSON.

MACHINE FOR MAKING TUBING.

No. 543,587. Patented July 30, 1895.

FIG. 1.



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(No Model.)

3 Sheets—Sheet 2.

J. S. WILSON.

MACHINE FOR MAKING TUBING.

No. 543,587. Patented July 30, 1895.

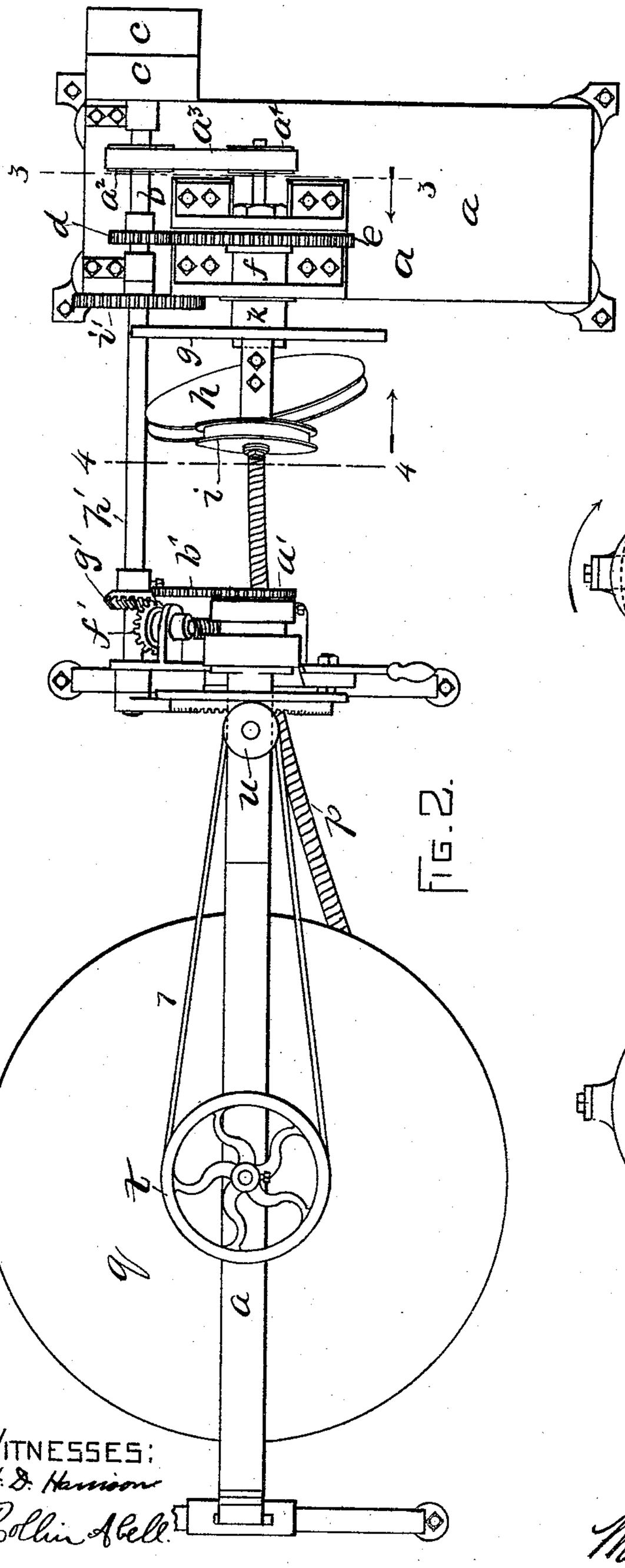

FIG. 2.

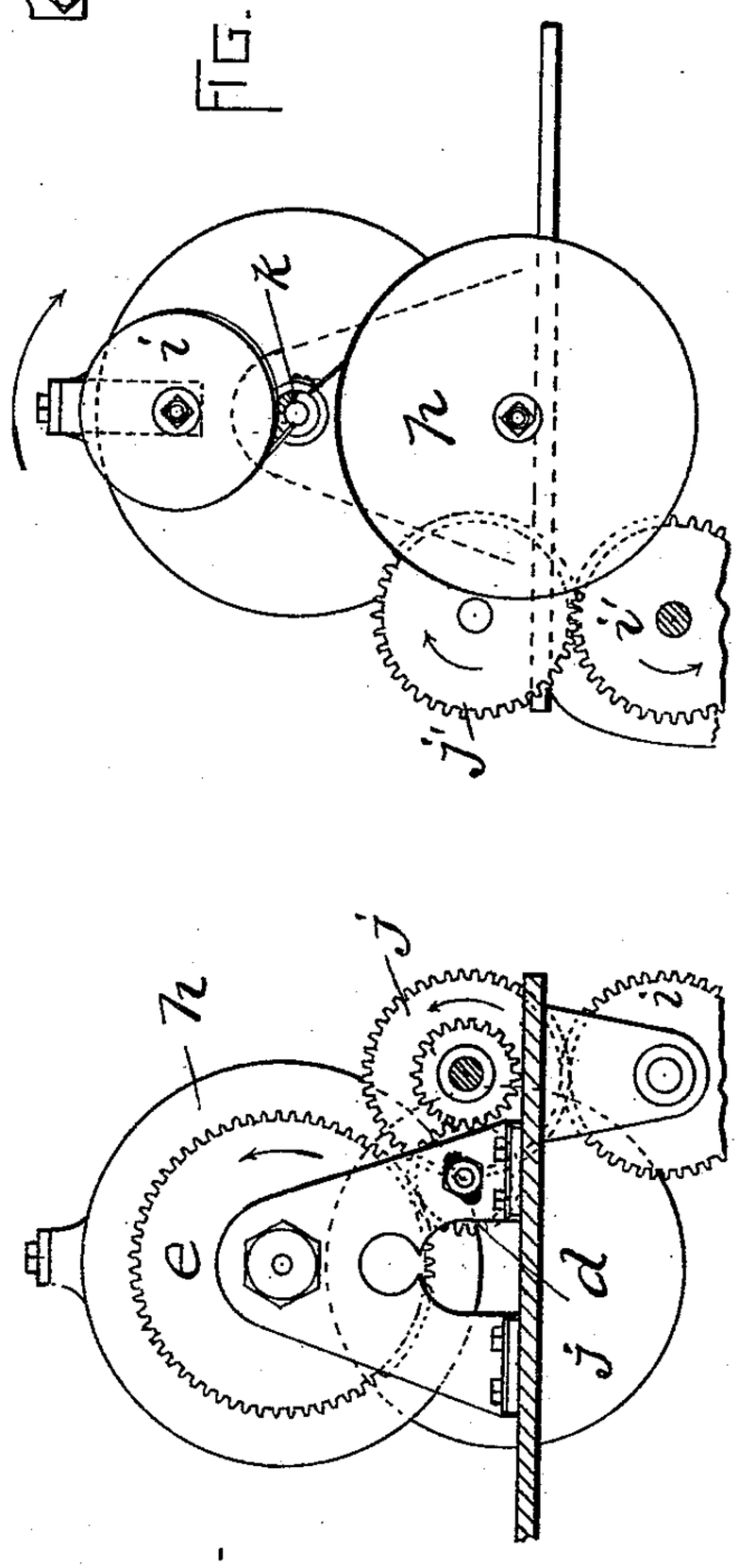

FIG. 4.

FIG. 3.

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(No Model.) 3 Sheets—Sheet 3.

J. S. WILSON.

MACHINE FOR MAKING TUBING.

No. 543,587. Patented July 30, 1895.

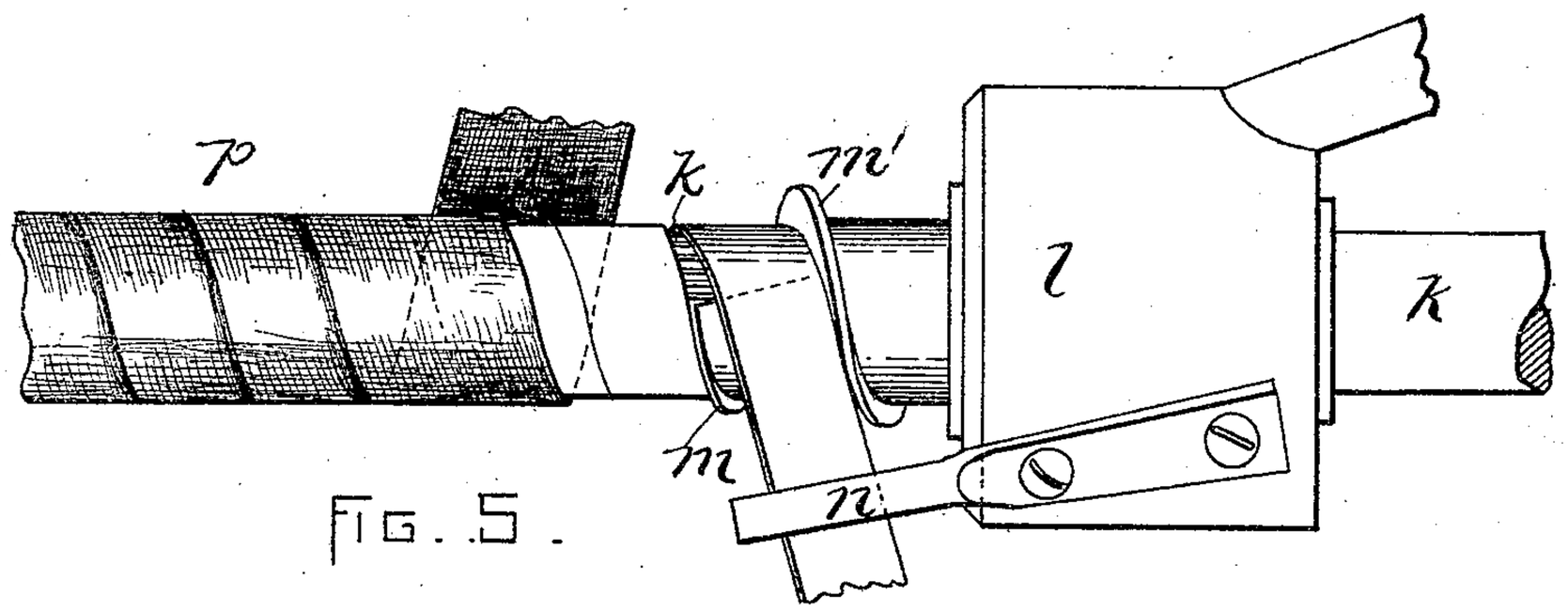

FIG. 5.

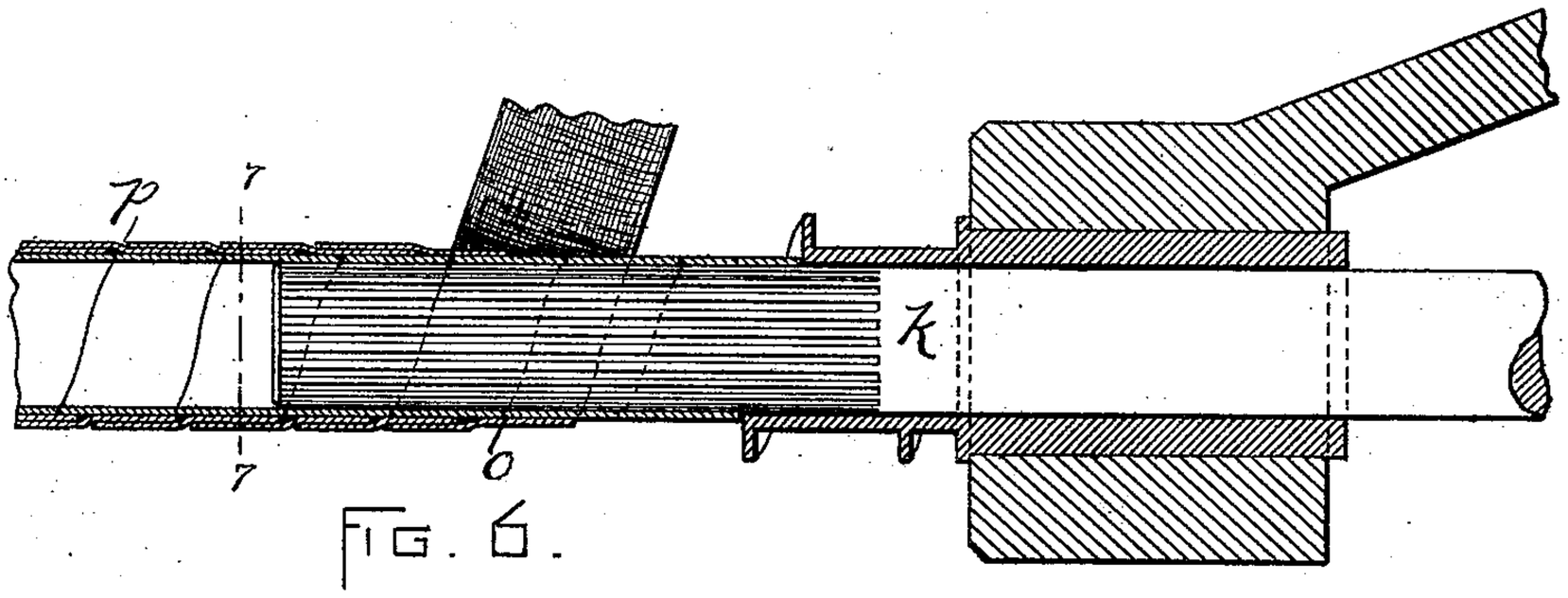

FIG. 6.

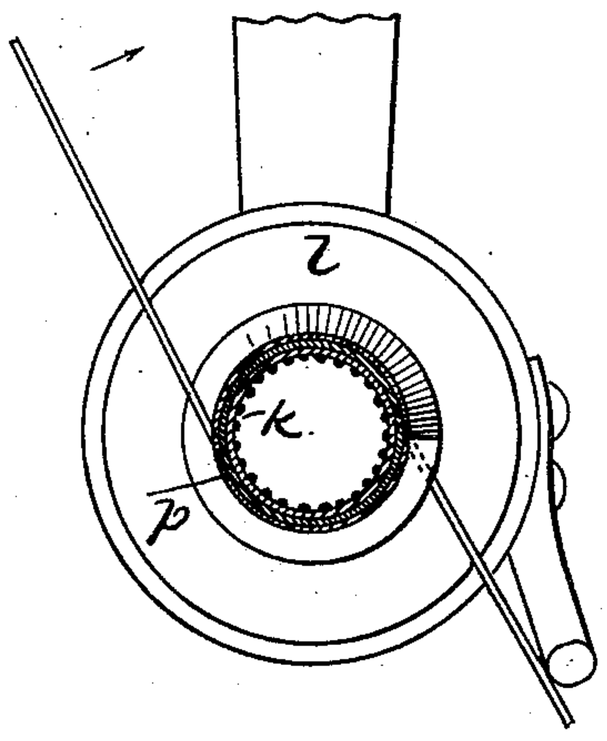

FIG. 7.

WITNESSES:
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UNITED STATES PATENT OFFICE.

JAMES S. WILSON, OF CHELSEA, MASSACHUSETTS.

MACHINE FOR MAKING TUBING.

SPECIFICATION forming part of Letters Patent No. 543,587, dated July 30, 1895.

Application filed June 7, 1894. Serial No. 513,796. (No model.)

To all whom it may concern:

Be it known that I, JAMES S. WILSON, of Chelsea, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Machines for Making Conduits for Electric Conductors and other Tubing, of which the following is a specification.

This invention has relation to means for winding tapes or strips of material spirally into the form of a tube to produce electrical conduits and tubes or pipes for other purposes.

It is the object of the invention to produce a machine which shall be capable of continuously producing conduits or tubes in any desired lengths and doing the work rapidly and efficiently.

To these ends the invention consists of the improved machine as a whole and of improved parts and groups of parts entering therein, as I will now proceed to describe and claim.

Reference is to be had to the annexed drawings, and to the letters and figures marked thereon, forming a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 is a side elevation of my improved machine for forming conduits for electric conductors and tubing generally. Fig. 2 is a top plan view of the same. Fig. 3 is a sectional view taken on the line 3 3 of Fig. 2, looking in the direction indicated by the arrow marked on the drawings in proximity to said line. Fig. 4 is a sectional view taken on the line 4 4 of Fig. 2, looking in the direction indicated by the arrow marked on the drawings in proximity to said line. Fig. 5 is a detail view drawn to an enlarged scale, showing the manner of operation of the laying-head and the position of the tapes on the mandrel. Fig. 6 is a longitudinal sectional view of Fig. 5. Fig. 7 is a sectional view taken on the line 7 7 of Fig. 6.

In the drawings, *a* designates the frame of the machine.

b is the driving-shaft, which may be operated by the pulleys *c c*, one of which is fast and the other loose on the driving-shaft.

d is a gear on the driving-shaft, which meshes with and drives a gear *e*, fast on a sleeve *f*, to the inner end of which is secured the frame *g*, which carries the tape or strip spools or bobbins *h i*.

k is a mandrel extended at its inner end through and a short distance inward beyond the laying-head *l*, formed on the inner end of the said sleeve. The said laying-head is constructed with spirally-arranged guide-flanges *m m'*, and the bobbin *h* is arranged relatively to said guide-flanges so that the tape or strip of material led from the said bobbin between the said guide-flanges and around the mandrel *k* will be wound spirally on the latter with the adjacent edges of the coils closely abutting, the flange *m'* serving, as the head is rotated, to crowd the inner edge of the coil being formed against the outer edge of the last previously-formed coil, as is clearly indicated in Fig. 5.

n is a guide-finger connected with the head, which serves to keep the tape or strip drawn from the bobbin *h* in place between the flanges *m m'*, so that centrifugal tendency may not displace it.

The spools *h i* are arranged on the head *g* obliquely to the axis of said head, so that when the strips of material are drawn therefrom they will be led to the mandrel in substantially the position that is necessary to lay them in spiral form thereon. The strip led from the bobbin *i* is of substantially twice the breadth as that led from the bobbin *h*, so that the strips from the two bobbins will break joints, as shown at *o*, Fig. 6, and the outer strip will overlap itself.

The mandrel at the point around which the tapes are laid to form the conduit *p* is fluted, as shown in the last-mentioned figure, this construction being provided in order to reduce friction in drawing the completed material off from the mandrel.

q designates the winding-on spool, which is arranged so as to be revolved in a rotary frame *r* forward of the mandrel. The shaft *s* of the said winding-on spool is provided on one end with a pulley *t*, to which motion is communicated by a belt from a pulley *u* on the end of the shaft *v*, which extends in the spool-frame parallel with the shaft *s*. The said shaft *v* is provided at its end opposite

that to which the pulley u is attached with a beveled gear w, which meshes with a stationary gear x supported on the frame a.

The material p is led from the mandrel to the take-up spool through the hollow head y, supported in a bearing z, and connected with so as to rotate the frame r. On the end of the said hollow head y there is fixed a gear a', which meshes with and is driven by a gear b' on a short hub or shaft, upon which is secured a worm-gear c', driven by a worm d' on a short shaft e', on the lower end of which is a miter-gear f', engaged by a smaller gear g' on a horizontal shaft h', the opposite end of which is provided with a gear i', which meshes with and is driven by a gear j fast on the driving-shaft b. In this way motion is communicated to the hollow head y, so as to rotate the winding-on spool axially, as it were, backward, so as to take out the kink formed in the material in the act of laying up the strips of material spirally on the mandrel, as before described. At the same time the gear w, by engagement with the fixed gear x, will turn the take-up spool or winding-on spool q through the medium of the shaft v, pulleys u t, and belt connecting the latter, so as to wind the material on the spool and draw it off the mandrel.

The gear b' may be supported in adjustable bearings, (not shown,) so as to render it a change-gear and drive the gear a' at varying speed.

An additional and thoroughly efficient means for relaxing the undue twist in the tube, so as to remove the kink therefrom, resides in the means provided for rotating the mandrel k, which extends outward from the bearing for the sleeve f and has a pulley a^2 fixed upon its outer end, which pulley is driven by means of a belt a^3 from a pulley a^4 on the driving-shaft. The organization is such that the mandrel k will be rotated in a direction opposite to that in which the spools revolve around the laying-head. The size of the pulley a^2 may be varied to suit circumstances.

There is sufficient friction between the mandrel and the tubing wound upon it to cause the mandrel in its rotation to have the effect of causing a slight rotation of said tubing in a direction contrary to that of its winding, thereby relaxing the twist in the tubing to prevent kinking.

Both of the untwisting means here shown are preferably employed in one machine; but one may be made to suffice without the other.

By the means and in the manner described I am enabled to form conduits for electric conductors and other kinds of tubing continuously in any desired lengths and to perform the work speedily and effectively.

I do not confine myself to the precise form of means shown for winding up the material formed on a take-up spool, since any means for drawing the material off from the mandrel in proper time will be suited to the purpose. In the present instance the inner strip is made of paper and the outer strip of adhesive fabric. It is evident, however, that the invention is not confined to any particular material.

It is well known that in rope-making and other arts where strands or strips of material are wound spirally about a mandrel or core or about themselves the hard twist necessarily imparted, in order to secure the proper initial formation, will cause kinking of the product when released, if something is not done to slightly relax the twist. This same difficulty is experienced in the manufacture of tubing in the manner described, and hence the provision of means such as those shown for relaxing the twist to prevent kinking is made necessary.

Having thus explained the nature of the invention and described a way of constructing and using the same, though without attempting to set forth all of the forms in which it may be made or all of the modes of its use, it is declared that what is claimed is—

1. A machine for forming conduits for electric conductors and other tubing, embodying in its construction a mandrel and means for rotating it, and a bobbin-carrying head revoluble about the mandrel in a direction opposite to that of its rotation, as set forth.

2. A machine for forming conduits for electric conductors and other tubing, embodying in its construction a mandrel, a bobbin-carrying head revoluble about the said mandrel, a winding-on spool for drawing the material laid up by the bobbins off the mandrel, and means for rotating the mandrel in a direction opposite to the rotation of the spools to take the kink out of the material drawn off from the mandrel, as set forth.

3. In a machine of the character described, the combination of a mandrel and means for rotating it, a bobbin-carrying head revoluble about the said mandrel in a direction reverse thereto, a winding-on spool in a rotatable frame or holder, and means for rotating said spool in the holder and for rotating the latter whereby the spool is axially revolved, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 21st day of March, A. D. 1894.

JAS. S. WILSON.

Witnesses:
ARTHUR W. CROSSLEY,
A. D. HARRISON.