(No Model.) 4 Sheets—Sheet 1.

H. SPLITDORF.

WIRE COVERING MACHINE.

No. 300,403. Patented June 17, 1884.

Fig. 2

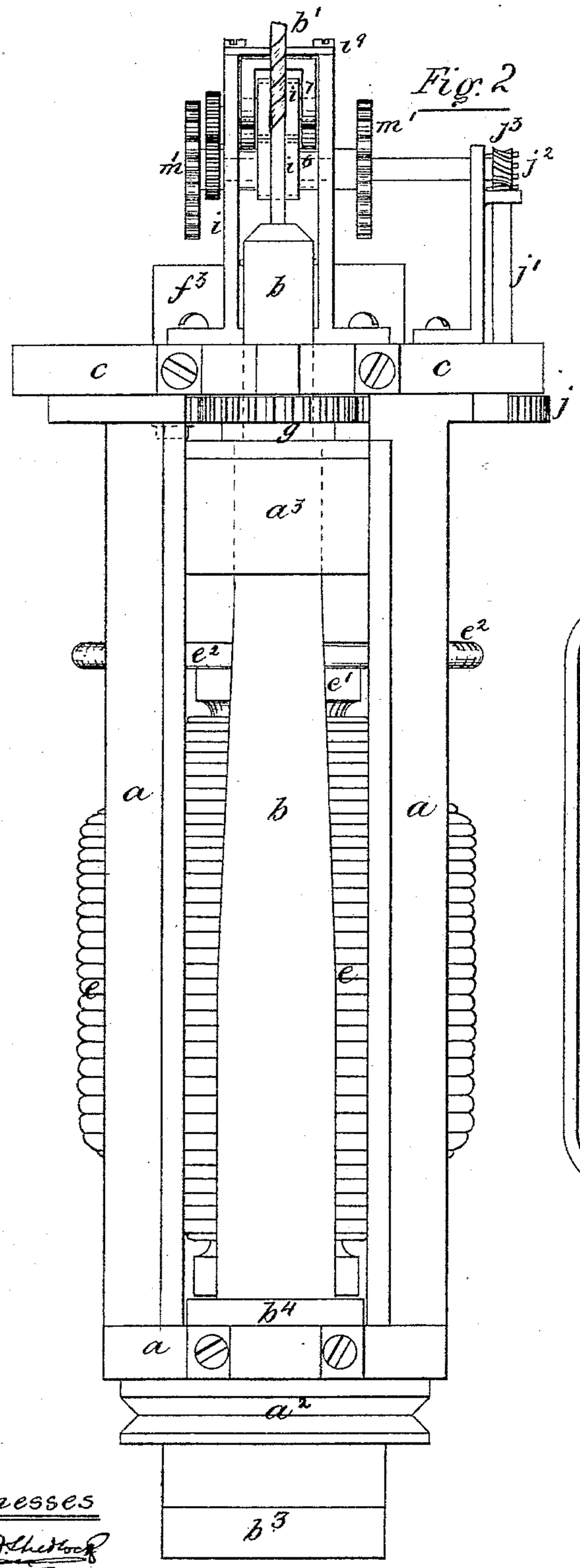
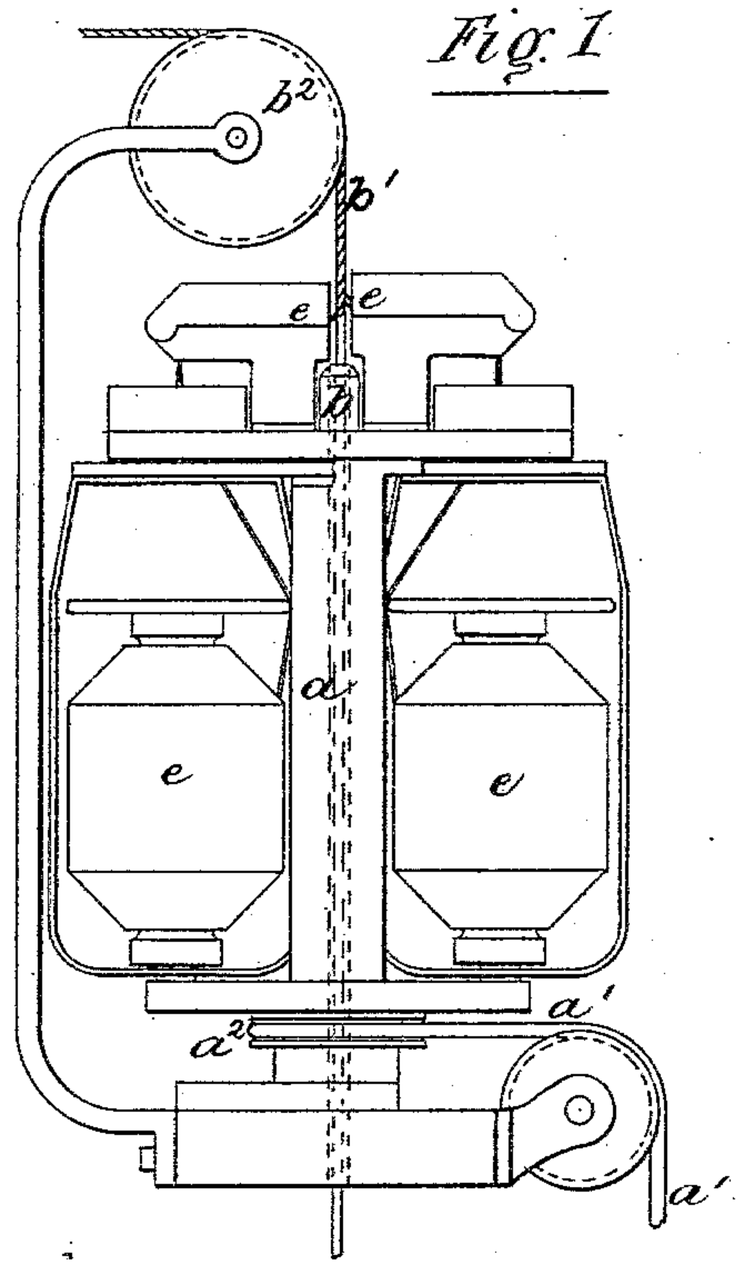


Fig. 1



Witnesses
John D. Shedlock
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WIRE COVERING MACHINE.

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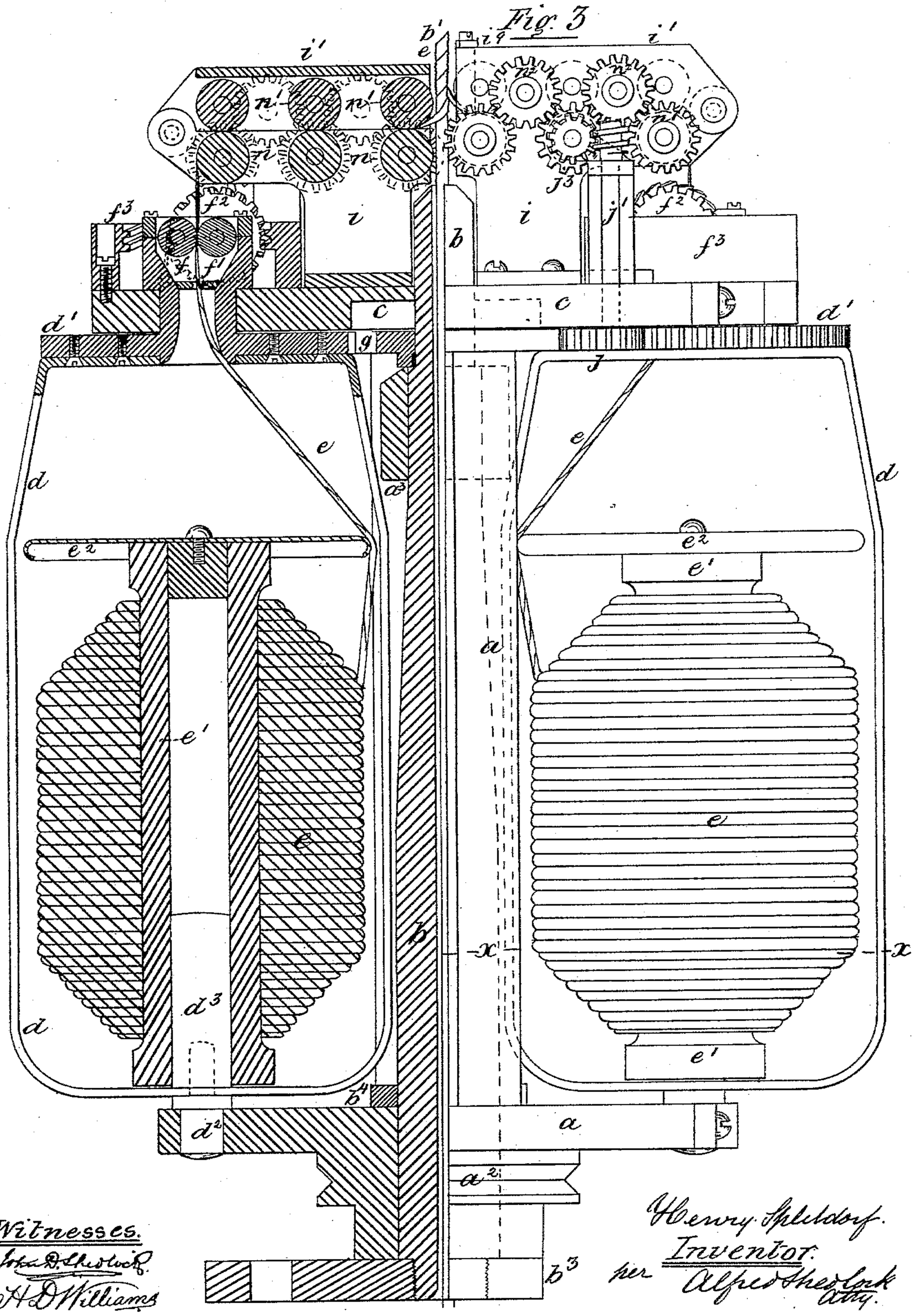
Fig. 3



Witnesses.
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(No Model.) 4 Sheets—Sheet 3.

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WIRE COVERING MACHINE.

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Fig. 4

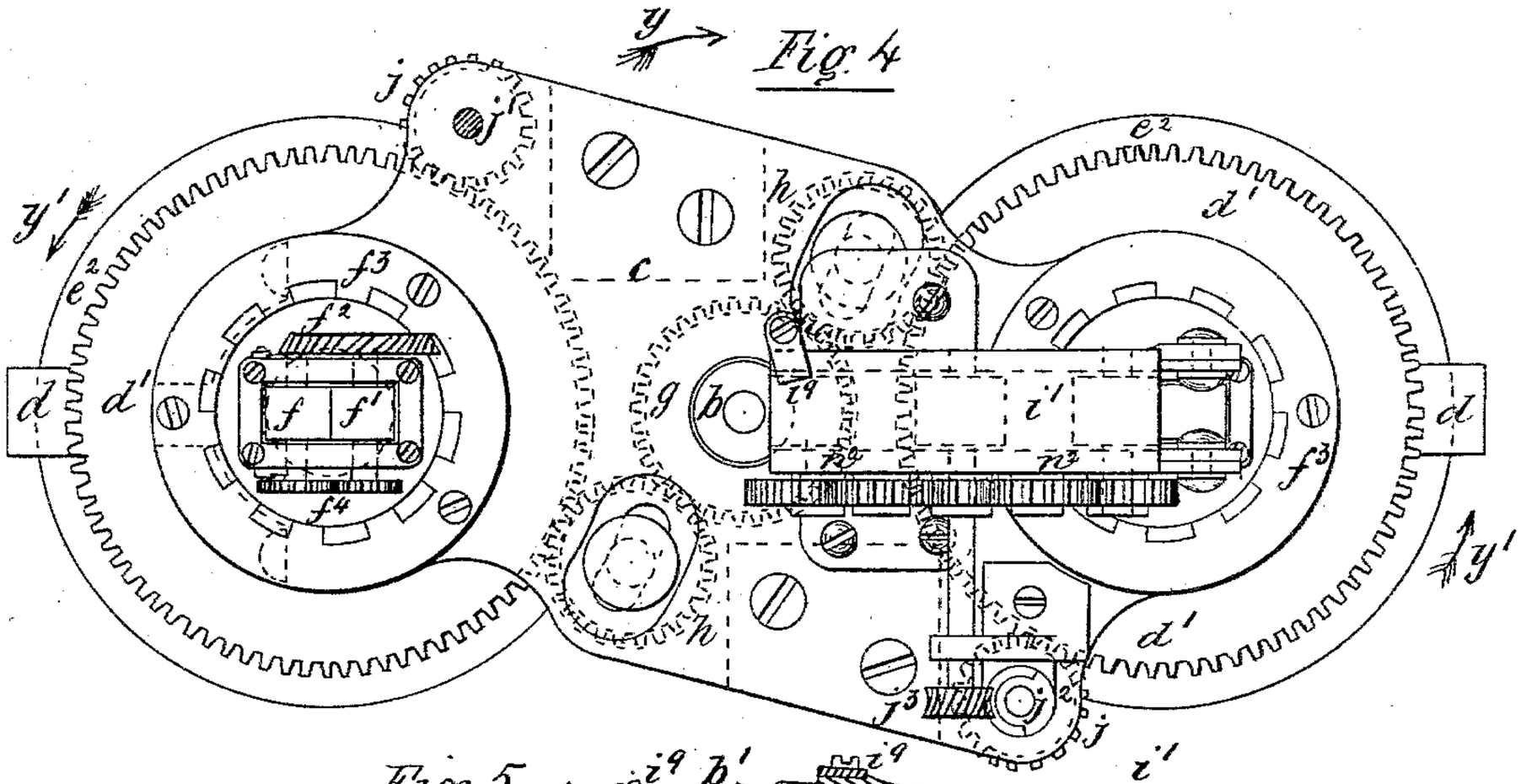

Fig. 5

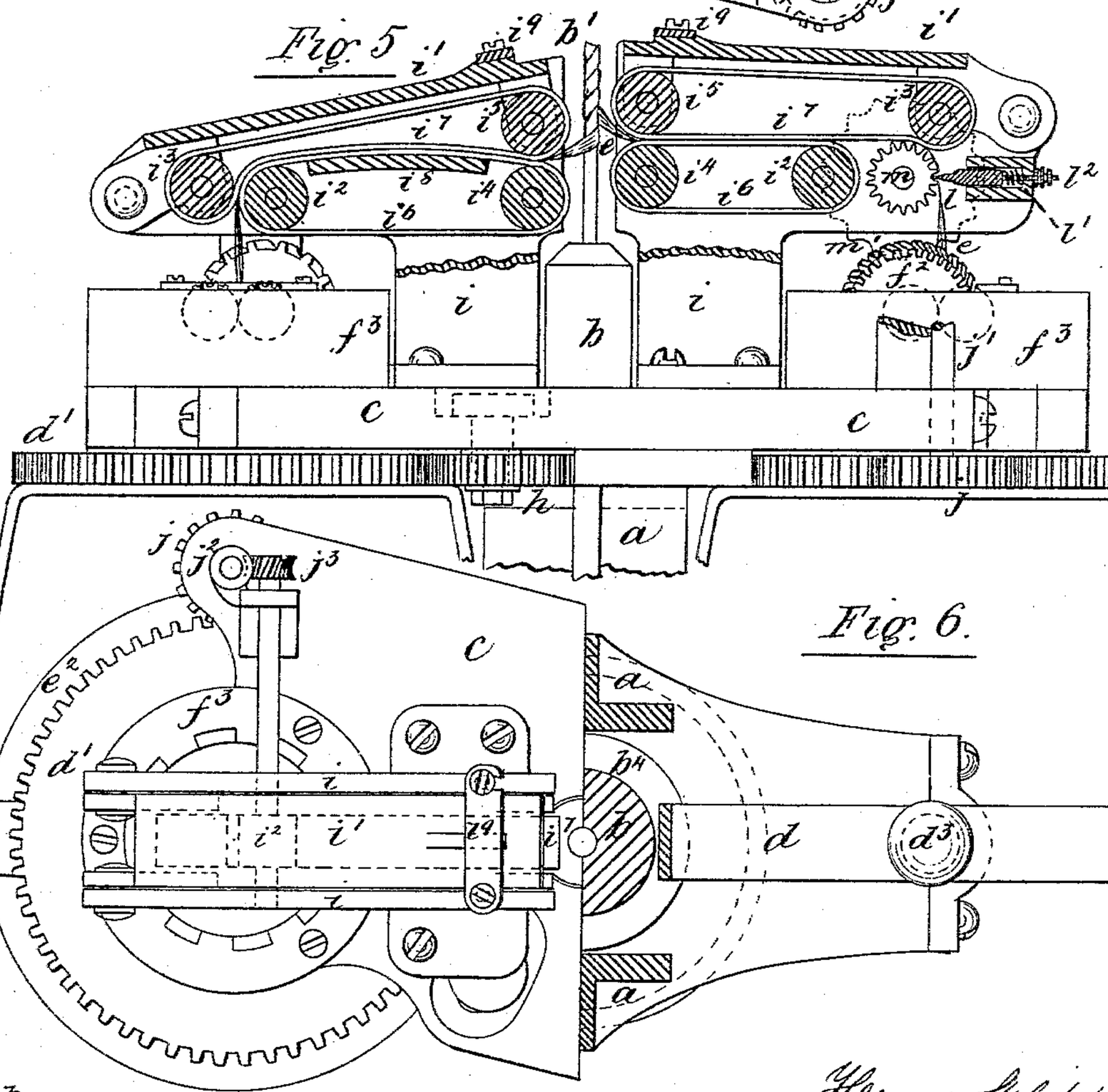

Fig. 6.

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(No Model.) 4 Sheets—Sheet 4.

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WIRE COVERING MACHINE.

No. 300,403. Patented June 17, 1884.

Fig. 9

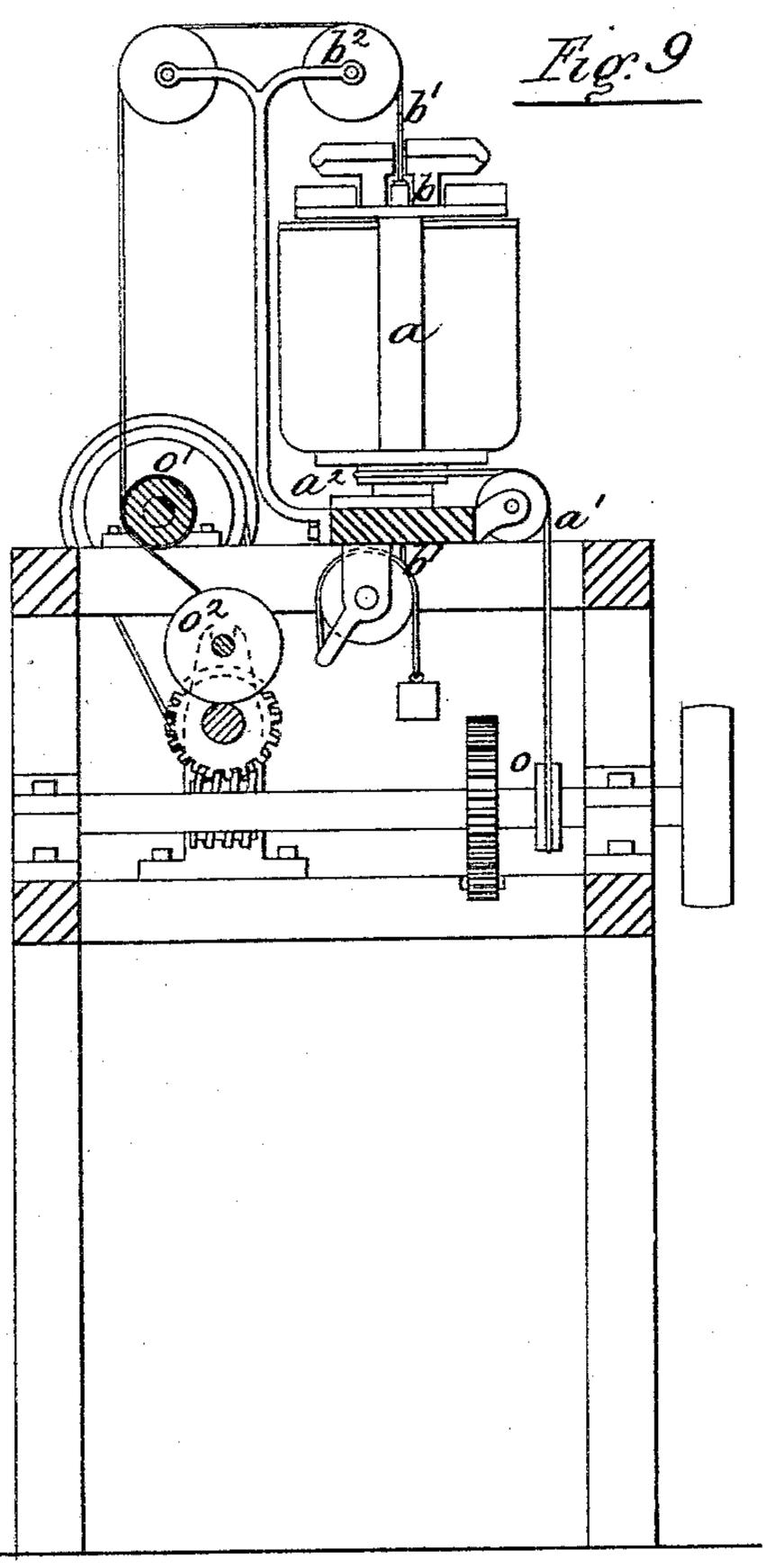


Fig. 10.

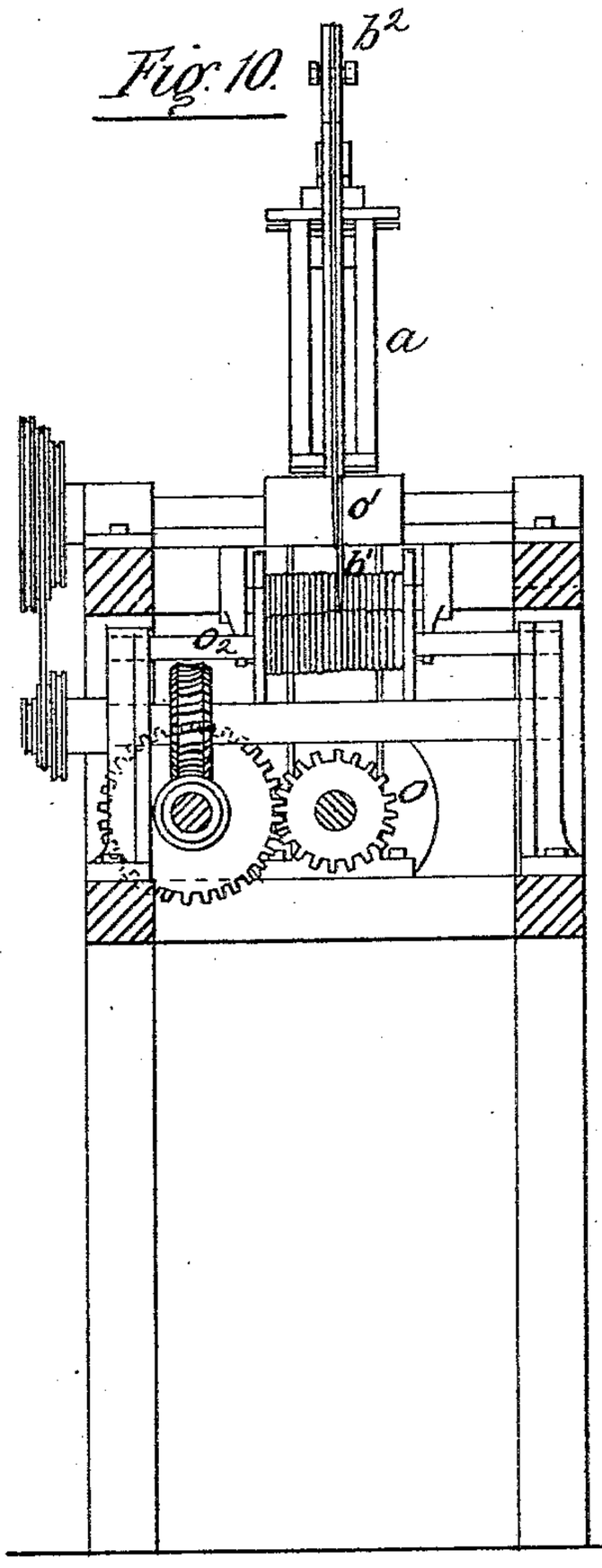


Fig. 7.

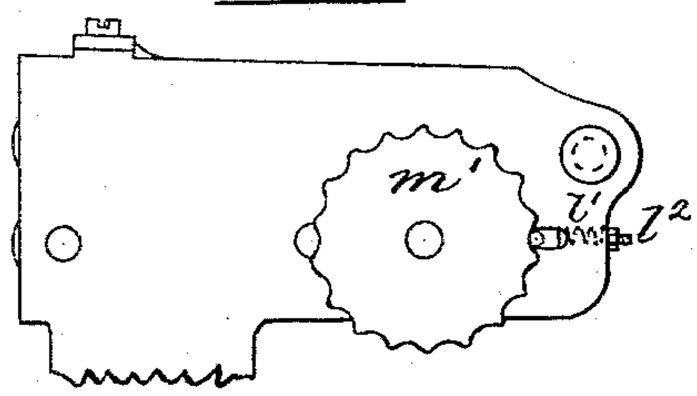
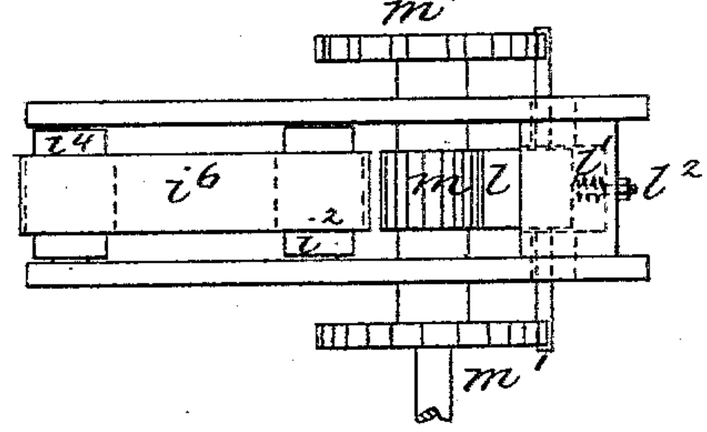


Fig. 8



Witnesses.
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UNITED STATES PATENT OFFICE.

HENRY SPLITDORF, OF NEW YORK, N. Y.

WIRE-COVERING MACHINE.

SPECIFICATION forming part of Letters Patent No. 300,403, dated June 17, 1884.

Application filed February 14, 1881. (No model.) Patented in England March 22, 1881, No. 1,272; in France May 27, 1881, No. 141,886, and in Germany October 22, 1881, No. 17,522.

To all whom it may concern:

Be it known that I, HENRY SPLITDORF, of New York, county and State of New York, have invented certain new and useful Improvements in Wire-Covering Machines, of which the following is a specification.

Letters Patent of the United States No. 239,070 were granted to me March 22, 1881, for the application of cotton fibers in their natural but straightened condition as a covering for wire for electrical and other purposes. Cotton in the form of slivers is the best adapted to be used for this purpose; and this invention consists of a machine designed to accomplish this object. The machine is composed of a sliver-carrier provided with feed-rollers constructed and operated to draw the sliver off its bobbin as the carrier rotates in bearings on the frame of the machine, and pass the sliver to a pair of rollers in line with the feed-rollers of the sliver-carrier. The sliver is untwisted between these two pairs of rollers by the rotation of the sliver-carrier. A spreading device acts on the sliver after it is untwisted to form it into a flat ribbon composed of parallel cotton fibers, and it acts on the principle of pressing the collected fibers to cause them to assume positions side by side by means of dull knife-edges passing rapidly by one another with the collected untwisted fibers between them. This spreading device may be dispensed with in using some kinds and sizes of slivers and when it is not required to lay a very thin covering on the wire, as the untwisting of the sliver spreads the fibers sufficiently for most purposes. After the sliver is untwisted, it is taken by conveying-belts or a system of rollers which carry the spread fibers to the last operating device of the machine, consisting of a pair of rollers or guides set close to the wire to be covered. The wire is drawn through a hollow fixed spindle on which the whole of the operating parts of the machine revolve. These rollers or guides are sufficiently close to the wire, so that tension may be applied to the spread fibers as they are wound around the wire without disturbing the continuity of the ribbon composed of the parallel and unconnected cotton fibers. The various devices are connected together by such an arrangement of gearing, &c., that a positive and uniform motion is imparted to them to perfectly control the sliver in its passage from the bobbin to the wire. To balance the machine, and also to enable the covering of the wire to be expeditiously performed, I propose to duplicate the working parts of the machine, as described, and arrange the corresponding parts of each machine diametrically opposite one another on the one revolving frame. The rollers or guides which pass the fibers to the wire of the one machine are set higher than those of the other, so that the two cotton fiber ribbons are wound on the wire in alternate spirals.

In the accompanying drawings, forming part of this specification, Figure 1, Sheet 1, is a diagram view showing the general construction and operation of my improved wire-covering machine. Fig. 2, Sheet 1, is an elevation with all the operative parts in front of the center line removed to show a front view of the complete wire-covering machine beyond the center line. Fig. 3, Sheet 2, is a side elevation of Fig. 2, showing one of the machines on one side in section and the other one in full, also showing certain modifications in the fiber-conveying device. Fig. 4, Sheet 3, is a plan view of the same, showing one of the fiber-conveyers removed. Fig. 5, Sheet 3, is a central sectional elevation of the upper part of the machine as shown at Fig. 2, taken at right angles thereto, and showing at one side the fiber-spreading device; and Fig. 6, Sheet 3, shows at the left hand of the center line a plan view of the same, and at the right hand a section taken on the line *x x*, Fig. 3, with the sliver-bobbin removed. Fig. 7, Sheet 4, is a part side elevation of the spreading device as shown in section at Fig. 5. Fig. 8, Sheet 4, is a plan view of the same with the upper conveying-rollers removed. Figs. 9 and 10, Sheet 4, show the connection of the wire-covering machine forming the subject of this invention, with the devices for causing the same to rotate and controlling and feeding the wire through the hollow spindle. The supporting-frame is shown in section.

Referring to Figs. 1, 9, and 10, the frame *a*, which carries all the operative parts of the machine in duplicate, is caused to rotate on the fixed spindle *b* by means of the belt *a'*,

passing around the grooved pulley a^2 on the lower end of the frame a and around a driving-pulley, o, Figs. 9 and 10. The wire b' is drawn through a longitudinal hole in the spindle b, and passes over the guide-pulley b^2 to its feeding device o' o^2, which is adjusted to move the wire at such a rate of speed as to cause it to be perfectly covered by the two ribbons of cotton fibers e e as the machine revolves around the wire.

Having shown the wire-feeding device and the driving-pulley for the belt a' in the drawings at Figs. 9 and 10, their construction and arrangement will be fully understood by those conversant with the art of wire covering, as they are similar in construction to the mechanism of this class of machines now in use and adapted to be used with my improvements, of which I will now describe the construction and operation, confining such description to the instrumentalities constituting a complete wire-covering machine.

The corresponding parts of the duplicate machine I mark by the same letters of reference, and where modifications and extra attachments are shown it will of course be understood that such will be applied, when used, to the duplicate machines.

The hollow spindle b, through which the wire b' passes, is secured to the base-plate b^3, which is fastened to the frame of an ordinary wire-covering machine.

The vertical parts of the frame a are cast in one piece with the pulley a^2 and the lower bearings of the sliver-carriers, and at their upper ends they are connected together by the bearing a^3, which fits over the upper end of the spindle b. The plate c is secured to the tops of the vertical parts of the frame a, and it is provided with bearings for the upper ends of the sliver-carriers directly in line with the bearings in the lower part of the frame a.

The sliver-carrier is composed of the light frame d, secured at one end to the gear-wheel d', the hub of which forms the journal for the upper bearing of the sliver-carrier. The lower journal, d^2, works in the bearing at the lower part of the frame a. Inside the frame d, at its lower end, and in line with its axis of rotation, is fixed the short post d^3, on which the bobbin e' of the sliver e is placed. On the top of the bobbin e' is secured the disk e^2, which is made of thin sheet metal, as shown, or of glass or other suitable material capable of receiving a fine polish on the rounded edge, to allow the sliver to be drawn over it with as little friction as possible. The hub of the gear-wheel d', above the plate c, is enlarged, and forms a rectangular box, in which are fitted the rollers f and f'. The roller f is pressed against the roller f' by means of small springs secured to the sides of the rectangular box, as shown in dotted lines in Fig. 3. Motion is imparted to these rollers when the wheel d' and sliver-carrier are rotated by means of the bevel screw-wheel f^2, secured to the shaft of the roller f' and meshing into the teeth of the internal screw, f^3, which is secured to the plate c concentric with the journal of the wheel d'. A bell-shaped hole is formed centrally through the wheel d' and its hub, and through which the sliver passes to the rollers f and f'. One or both of these rollers may be covered with rubber, and they are connected together by the pinions f^4.

On the spindle b, between the bearing a^3 and plate c, is secured by a key the pinion g, into which and the wheel d' meshes the adjustable intermediate pinion, h, so that as the frame a and sliver-carrier revolve around the fixed spindle b in the direction indicated by the arrow y the sliver-carrier and the feed-rollers f and f' are caused to rotate in the frame a, as indicated by the arrow y', and so untwist the sliver as it leaves the rollers f and f'. The number of revolutions made by the sliver-carrier in passing once around the spindle b is governed by the size of the fixed pinion g, which may be readily changed, to enable the machine to cover different sizes of wire, by loosening the collar b^4 and raising the frame a until the end of the spindle b is below the pinion g, when the pinion may be taken out and replaced by another, the edge of the bearing a^3 and under side of the plate c being cut away to allow of such removal. The sliver e, as it is fed upward by the rollers f and f', is gripped between rollers or conveying-bands, which carry the untwisted sliver to the center of the machine. The untwisting of the sliver occurs between the feed-rollers f and f' and the conveying device, so they are set as close together as possible.

At Fig. 5 one form of the conveying device is shown in section. The upper part of Fig. 3 shows a modification which will be hereinafter described. The frame i is secured to the plate c, and the top plate, i', is pivoted to it. In the frame i are fitted the rollers i^2 and i^4, around which is placed the apron i^6. In lugs on the top plate, i', are fitted the rollers i^3 and i^5, carrying the counter-apron i^7. The surfaces of the aprons i^6 and i^7 are caused to lie close together by means of the curved plate i^8, or by another roller placed so as to cause the aprons to travel in a curved line between the rollers i^2 and i^4. The top plate, i', with the rollers i^3 and i^5, is turned back away from the apron i^6, to allow the sliver being placed between the aprons i^6 and i^7 after it is drawn up through the rollers f f', and so secured to the wire b' in starting the machine. The plate i' is held down by the catch-bar i^9. The front rollers, i^4 and i^5, are arranged close to the wire b', so that some tension may be applied to the straightened and spread cotton fibers without disturbing the ribbon-like arrangement of the fibers as they leave the rollers or the aprons i^6 and i^7 to be wrapped on the wire as the rollers revolve around it. These rollers i^4 and i^5, I propose in some cases to set at an angle other than a right angle to the wire b'. Motion is imparted to the aprons i^6 and i^7 through the medium of the pinion j, secured to the vertical

shaft j', and meshing into the wheel d'. The worm j^2 on the upper end of the shaft j' actuates the worm-wheel j^3 on the shaft of the roller i^2. All the gears and pinions, &c., are so proportioned that the rolllers $f\,f'$ and aprons i^6 and i^7 move at the same rate of speed, and about equal to the spiral circumference of the wire being covered for every revolution of the machine on the spindle b, and the speed of rotation of the sliver-carrier is such that all the twist of the sliver is removed when the size of the sliver on the bobbin is at its mean size, leaving a very little twist in the sliver when it is above the mean size, and imparting to it a slight twist in the opposite direction when it is below the mean size. This irregularity in the untwisting of the fibers is caused by the variation of the twist imparted to it or the variation of the untwisting of the sliver as it is pulled off over the end of the bobbin, due to the gradual decreasing quantity taken off each revolution; but such variation is so little that the proper laying of the fibers on the wire is not materially affected. I propose in some cases to impart to the sliver-bobbin a rotation on its axis equal to the speed at which the sliver is drawn off the bobbin, independent of the motion of the sliver-carrier, so that the sliver will always approach the rollers $f\,f'$ from the same direction.

At the right hand of Fig. 5, and in Figs. 7 and 8, is shown a device for spreading the sliver after it is untwisted. The principle on which it operates consists in pressing the sliver between smooth dull knife-edges, which are caused to pass rapidly by one another, thereby causing the fibers to slip off one another where the sliver is more than one fiber in thickness, and so lie side by side. The extent to which the fibers are spread or divided is governed by the speed and the amount of movement imparted to said edges. In the application of this principle the knife-edge l is caused to press the fibers over the edges of and into the depressions of the grooves of the roller m, which takes the place of the roller i^2. The roller i^2 in this case is located just behind the grooved roller m, and the roller i^3 is placed above it. Motion is imparted to the grooved roller m, which is geared to the roller i^3 by similar means to that described as operating the roller i^2. On the shaft of the grooved roller m are secured the two cams m' m', each provided with as many rises as there are grooves in the roller m. These cams act against pins projecting from the sides of the slide which carry the knife l, said slide being pressed forward to cause the knife l to enter a groove in the roller m each time the pins fall into a depression of the cams m' m' by means of the spring l', and the movement of the knife is regulated by the nut on the rod l^2. The aprons i^6 and i^7 carry the fibers to the wire b' from the grooved roller m, their speed relatively to the roller m being increased to straighten out the corrugations in the sliver caused by the knife l pressing it into the grooves of the roller m. This spreading device is only required to be used with the larger sizes of slivers. The small slivers spread sufficiently upon being untwisted. The sliver, when untwisted, may also be reduced in thickness by causing the conveyer or the last pair of rollers to travel faster than the feed-rollers which pull the sliver off the bobbin, and so draw down the sliver to any desired extent.

In place of the conveying-aprons i^6 and i^7, a series of rollers, n and n', may be used, connected together by the gear-wheels n^2, as shown in Figs. 3 and 4.

This machine is also well adapted to be used for covering wire with the finest sizes of yarns or threads. Said operation on the ordinary wire-covering machines is, by reason of the frequent breaking of the fine yarns or threads, a slow and tedious operation. And the machine may also be used to impart more twist to the sliver and draw it out into a fine yarn by causing the conveying device to travel faster than the feed-rollers which pull the sliver off the bobbin, thus applying the covering to the wire in a twisted condition, and so converting the machine into a thread-spinner at the same time it is used as a wire-coverer, and saving the expense of previously spinning the sliver into a twisted thread or yarn.

It is obvious that the machine may be made single, to apply only one set of fibers to the wire; but I prefer to duplicate it, as shown, as thereby twice the amount of wire may be covered in a given time. Instead of the two sets of fibers being placed as alternate spirals on the wire, one may be caused to lie over the other when an extra thickness of insulating-covering is required; or two machines may be arranged one above the other, and constructed to revolve in opposite directions, so as to apply two layers of fibers on the wire in opposite directions. And it is also obvious that the positions of the various devices may be altered and any other suitable connecting and driving gears than those described may be used without departing from the principles on which the machine operates; so I do not wish to confine myself to the particular construction and arrangement of the devices shown; but

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

1. The combination of a rotating sliver bobbin-carrier provided with feed-rollers constructed and operated to untwist the sliver as it leaves the feed-rollers, with a conveying device for carrying the untwisted sliver to the wire to be covered, substantially in the manner hereinbefore set forth.

2. The combination, with the grooved roller m and the spring-acting knife-edge slide l, of the cams m', substantially as and for the purpose set forth.

3. The combination, with the fixed hollow spindle b and the frame $a\,c\,i'$, adapted to be rotated thereon, of the feed-rollers n and n',

carried in the upper part, *i*, of the frame, and system of gear-wheels *g*, *h*, *d'*, *j*, j^2, j^3, and n^2, substantially as and for the purpose set forth.

4. A rotating sliver bobbin-carrier provided with a pair of feed-rollers and operated to untwist the sliver as it leaves the feed-rollers, a conveying device composed of a series of rollers adapted to carry the untwisted sliver toward the wire being covered, and a pair of feed rollers or guides located in close proximity to the wire, in combination with suitable connecting-gearing to cause the various devices to move with a positive and uniform motion as the machine revolves around the wire, substantially as and for the purpose hereinbefore set forth.

5. A rotating sliver bobbin-carrier provided with a pair of feed-rollers, a spreading device composed of a grooved roller and a reciprocating knife for spreading the untwisted sliver, and aprons and their supporting-rollers for conveying the spread sliver to the center of the machine, in combination with their actuating-gearing, constructed and operated substantially in the manner and for the purpose hereinbefore set forth.

In witness whereof I have hereunto set my hand this 11th day of February, 1881.

HENRY SPLITDORF.

Witnesses:

ALFRED SHEDLOCK,

H. D. WILLIAMS.