No. 859,216. PATENTED JULY 9, 1907.

C. E. HADLEY.

WIRE COVERING MACHINE.

APPLICATION FILED DEC. 10, 1903.

5 SHEETS—SHEET 1.

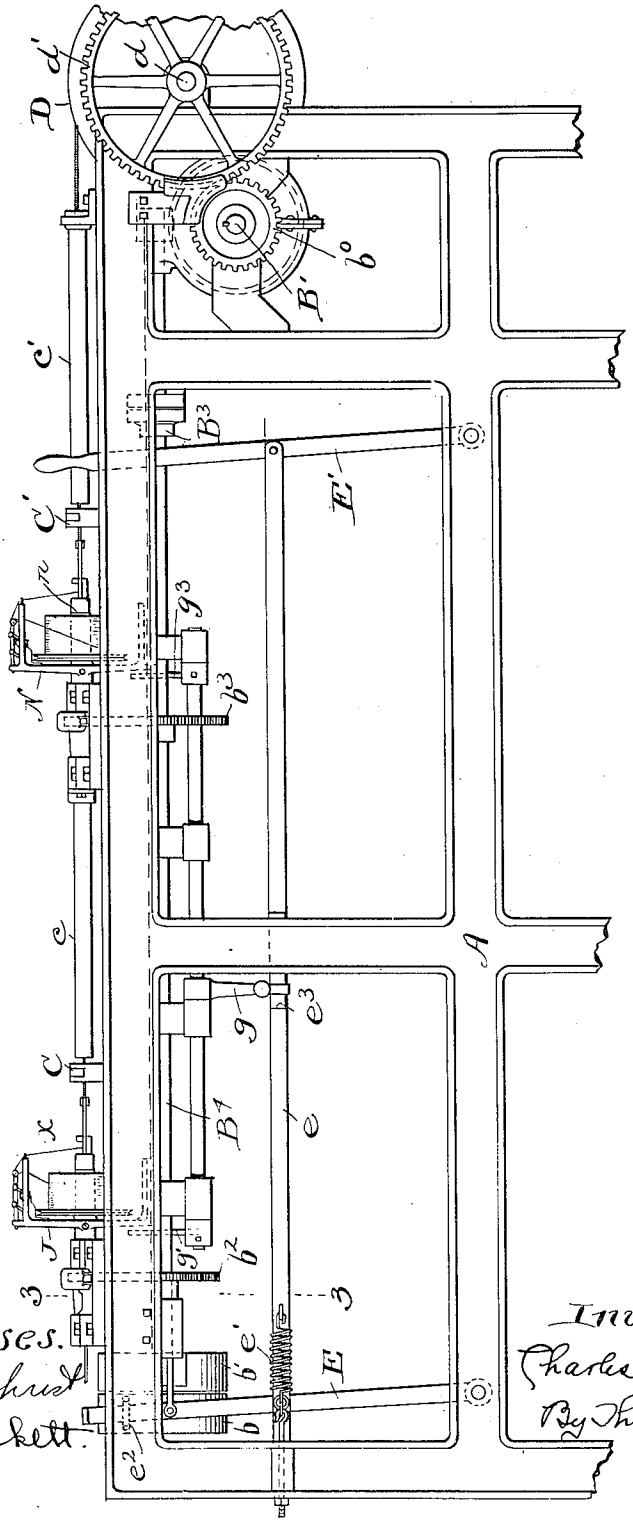

Fig. 1.

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

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

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5 SHEETS—SHEET 2.

Fig. 2a.

Fig. 2.

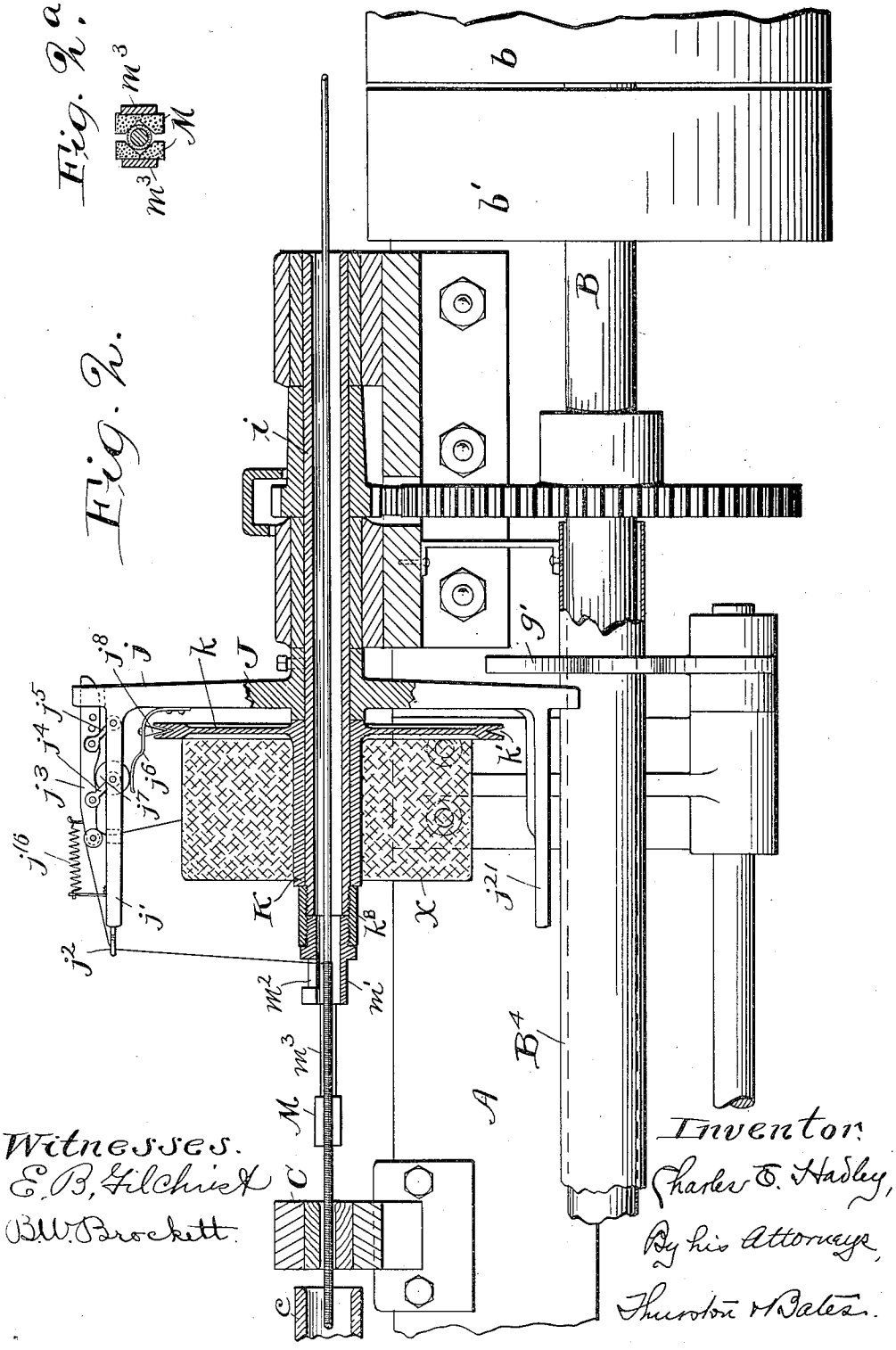

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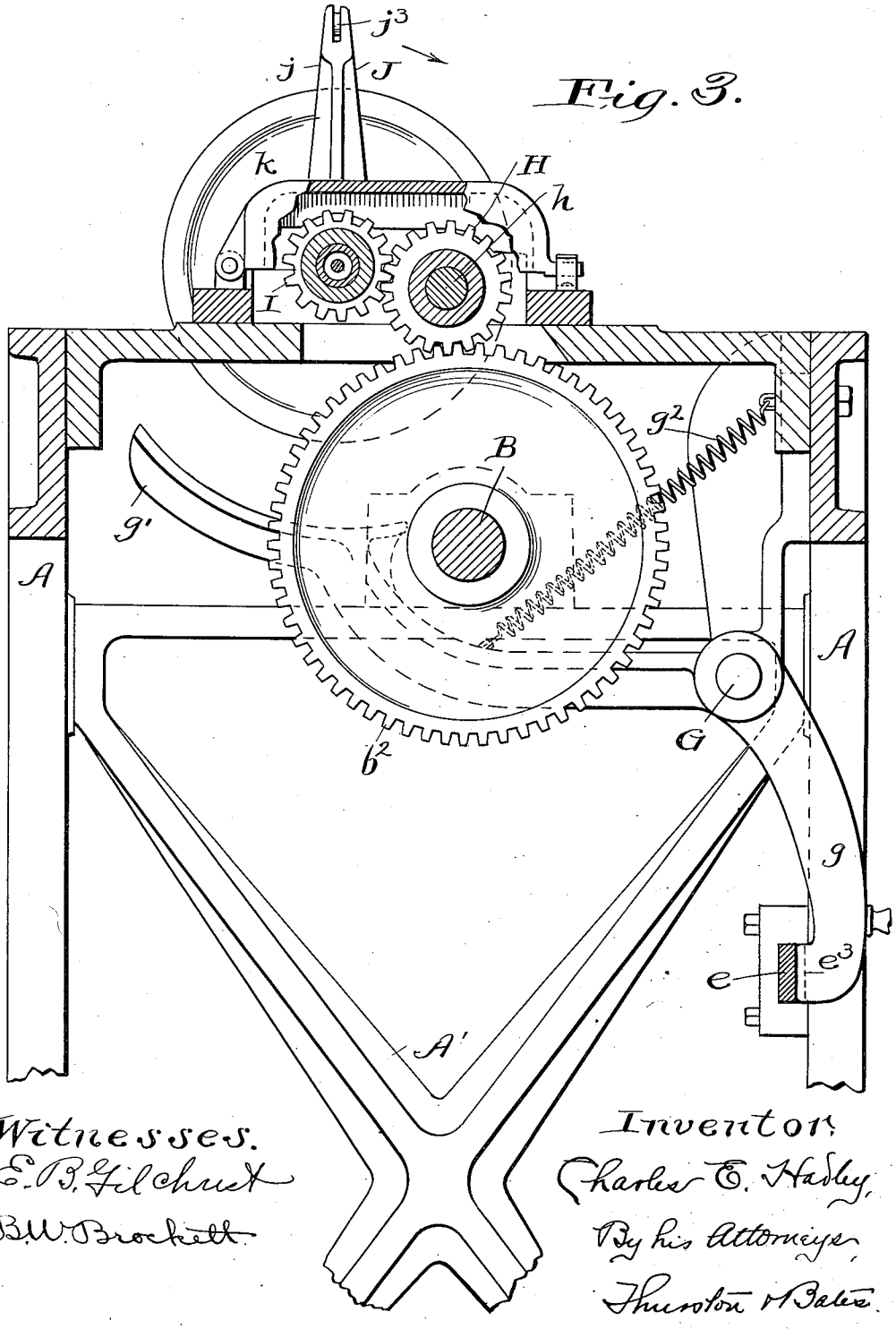
Fig. 3.



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5 SHEETS—SHEET 4.

Fig. 4.

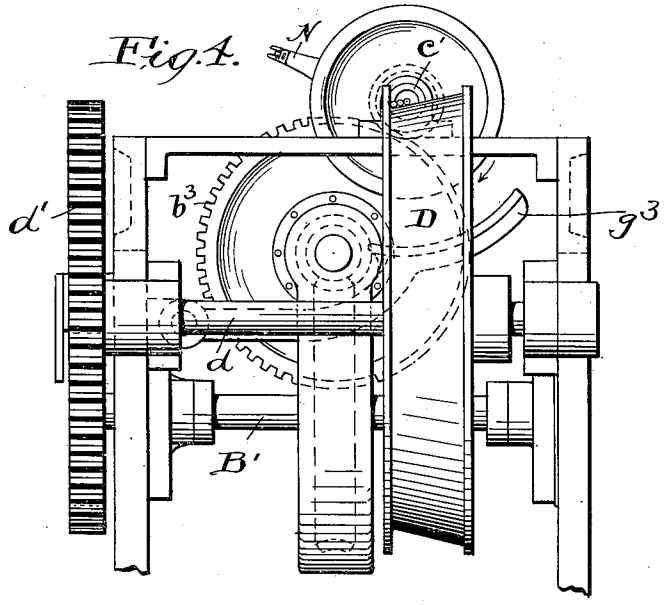
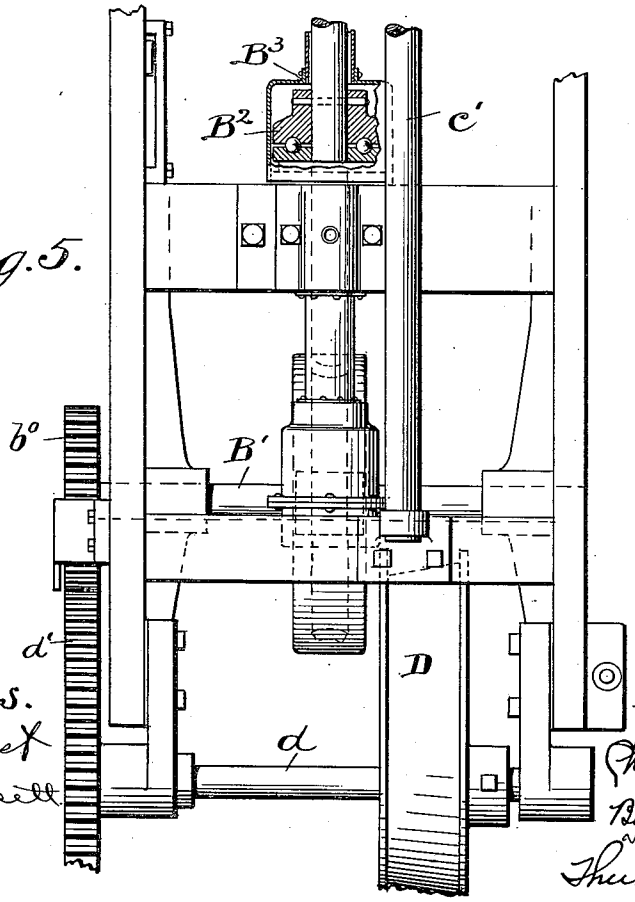


Fig. 5.



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5 SHEETS—SHEET 5.

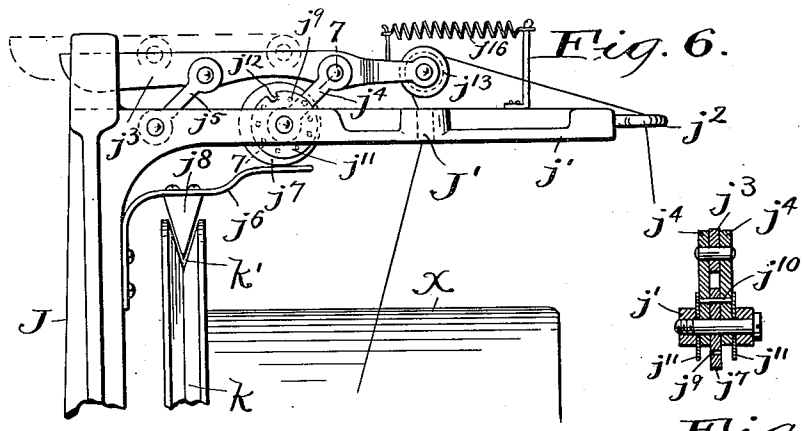

Fig. 6.

Fig. 7.

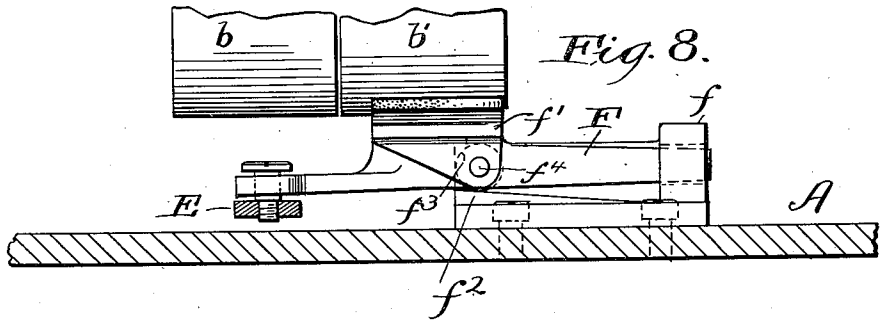

Fig. 8.

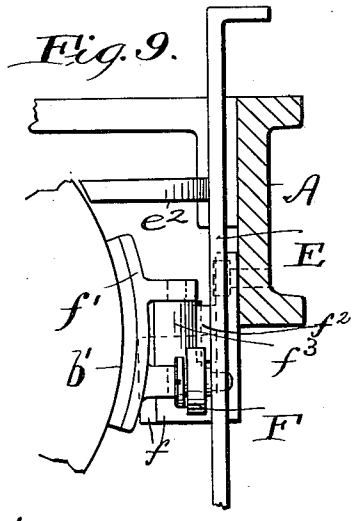

Fig. 9.

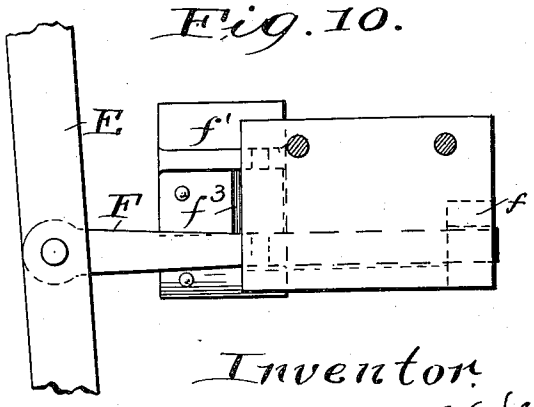

Fig. 10.

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

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

UNITED STATES PATENT OFFICE.

CHARLES E. HADLEY, OF CLEVELAND, OHIO.

WIRE-COVERING MACHINE.

No. 859,216. Specification of Letters Patent. Patented July 9, 1907.

Application filed December 10, 1903. Serial No. 184,544.

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 Wire-Covering Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention relates to wire insulating machines of that class wherein threads are wrapped around a continuous strand of wire.

As to features, the invention contemplates the use of certain mechanism for winding the thread about the wire, for laying it smooth upon the wire, for controlling the supply of threads to the winding device, for preventing the racing of the bobbin, and for stopping the whole machine upon the breaking of the thread. This last feature of the invention is one of the most important, since it prevents the machine from running ahead with the winding operation when the thread has been dropped or broken and insures a continuous insulation being laid on the wire.

The invention also embodies certain other features of construction which will be more fully hereinafter disclosed, and consists in the construction and combination of parts set forth in the following description, drawings and claims.

Description of the drawings.—Referring to the drawings, Figure 1 is a side elevation of the machine showing all the parts in their proper relation to each other. Fig. 2 is a side elevation of a portion of the machine representing parts in section to more clearly show their construction,—this view being taken about the parts at the forward end of the machine or the left hand end, as shown in Fig. 1, looking from the other side. Fig. 2^a is a cross section of the thread laying shoes. Fig. 3 is a sectional view upon the line 3—3 of Fig. 1. Fig. 4 is a rear elevation of the machine. Fig. 5 is a top plan view of the rear portion of the machine showing the thrust bearings in section. Fig. 6 is a detailed view of the thread laying device. Fig. 7 is a detailed view of a portion thereof on the line 7—7 of Fig. 6; Fig. 8 is a detailed view of the brake for stopping the motion of the entire machine. Fig. 9 is an end elevation looking from the left of Fig. 8; and Fig. 10 is a front elevation of the brake shown in Fig. 8 but with the mounting plate removed from the frame to more clearly show the construction.

The general construction of the machine is such that the wire is delivered from a reel or any other suitable means to the forward or left hand end of the machine, as shown in Fig. 1. From here it passes to the first thread laying device, where a series of threads is wound upon the wire in one direction. It passes direct from here to another thread laying device which is arranged to lay a series of threads in the opposite direction and upon the thread already laid. The wire then passes to the drawing drum which serves to feed the wire through the machine. From this drum it may pass to any suitable winding mechanism, not shown.

The frame.—The frame consists of two long standards A which are constructed in a manner such that they will support all the parts and give sufficient rigidity for the perfect operation thereof. To these standards are secured braces A′ which hold them spaced apart a sufficient distance to accommodate the different mechanisms.

The power mechanism.—Mounted longitudinally in substantially the center of the frame and between the standards A, and upon the braces A′, is the main driving shaft B which runs through the entire machine and has upon its end, at the forward part of the machine, a loose pulley b, and a tight pulley b'. A belt from any suitable driving shaft may be carried by these pulleys. Keyed to the shaft B is a thread laying driving gear b^2 near the forward end of the machine, and another thread laying driving gear b^3 at a considerable distance therefrom. This shaft B is also connected through a train of worm gearing to a shaft B′ which has keyed thereto a gear wheel b^0. The end thrust of the shaft B, caused by the worm gearing, is taken up by a thrust bearing B^2.

Wire delivery and guiding mechanism.—The mechanism for delivering the wire to the machine and for drawing it through the same consists of any suitable guiding means at the forward end for delivering the wire in position to the first thread laying device, of a guiding block C adjacent to said device, a protecting tube c for protecting the insulation between this device and the next thread laying device, another guiding block C′, a second protecting tube c' and a drum D, which is secured upon a shaft d mounted in suitable bearings to the frame. The wire takes several turns around this drum D and the operating face thereof is made to taper, as shown in Fig. 4 to keep the wire in substantially the center of the protecting tube c'. The shaft d receives its rotation from the gear d' which meshes with the gear b^0, which in turn is rotated by the main driving shaft B.

The belt shipper and brake.—Pivoted to one of the standards A is a pair of shipper arms E and E′ which are pivoted substantially at the midway point of their length to a cross bar e. A spring e' secured at one end to the frame has a tendency to draw this bar e to the left and swing the two shipper arms E and E′ to the left also. A belt hook e^2 is secured to the arm E for engaging the belt and shipping it from the loose to the tight pulley, as desired, the normal tendency being for the shipper to hold the belt upon the loose pulley b through the tension of the spring e'. The belt, however, during the operation of the machine, is held upon the tight pulley b' by means of a trip engaging the stop

e^3 upon the bar e. This trip and its operating mechanism will be hereinafter described.

In order to stop the rotation of the main driving shaft B immediately upon the stoppage of the machine, a brake is provided, as before stated. This brake consists of an arm F, arranged so that one end thereof is loosely mounted on a stud in arm E and is adapted to slide in a block f secured to the frame A, and carrying a shoe f' having a leather covered face for engagement with the crown of the pulley b'. When the belt is operating upon the pulley b' this shoe, by reason of its connection with the arm E, is shifted out of engagement with the crown of said pulley, but upon the arm E being thrown to shift the belt upon the loose pulley, a friction roller f^3 on the back of this shoe, travels along the cam face f^2 rigid with the block f, whereby the shoe is forced rigidly against the crown of the pulley, thus stopping the motion of the pulley and of the main driving shaft B. The roller f^3 is mounted loosely upon a pin f^4 carried by the shoe f.

The mechanism for setting free the brake to the action of the spring e' consists of a trip, mounted in suitable bearing brackets secured to the frame A and a rock shaft G having keyed thereto a trip g which is arranged to co-operate with the stop e^3 upon the bar e. This trip g engages upon the front side of the bar e and behind the stop e^3 and holds the arm E to the right, as shown in Fig. 1 against the tension of its spring e', while the belt is operating upon the pulley. An operating arm g' is keyed to the rock shaft G in a position to be engaged by a tripping mechanism carried by the winding device. A spring g^2 secured to the frame is arranged to draw this arm g' into the path of the device just mentioned and hold the trip g tightly against the bar e. There are two arms g' g^3, one for each of the winding devices.

Thread winding mechanism.—These devices are duplicates of each other in construction, therefore a description of one will suffice for both, except that the rotation of one is in a reverse direction to that of the other.

The thread winding device at the forward end of the machine receives its rotation through an idle pinion H loosely mounted upon a stud h secured to the frame. This pinion H meshes with a pinion I rigid with the hollow spindle i, arranged to carry the thread winding frame J, the bobbin K and the thread laying shoes M. The thread winding frame J is secured to the hollow spindle i, rotates therewith, and is constructed substantially as shown with the diametrically opposed arms j, each of which has projecting rearwardly an arm, as j' or j^{21}. This duplication of arms is provided in order to properly balance the frame and make its operation as regular as possible.

The arm j' carries an eye j^2 through which the series of threads pass. This same arm j' also carries the device for actuating the operating arm g', and this device is what may be termed a "centrifugal" device for throwing off the power, since it is thrown out by centrifugal force against the thread, and when the thread is removed therefrom, it will be moved into position, where it may operate the arm g'. This device consists of a member j^3, which is pivotally mounted upon a pair of links j^4 and another pair j^5, and carries at one end a sheave j^{13} for receiving the thread from the bobbin. These links are in turn pivoted to the arm j' so that the member j^3 may be thrown out by centrifugal force away from the arm j', but this member is constructed in a manner such that a portion of it, when thrown by such force, will travel in a path which is interrupted by the arm g' whereby when said arm is engaged, it will be operated, thus operating the trip g and setting free the bar e to the action of the spring with the results consequent thereto.

The member j^3 is preferably prevented from being thrown out, by the tension of the thread over the sheave j^{13} upon the end thereof. The machine, however, may be provided with a spring j^{19} which is arranged to draw said member to the right as shown in Fig. 6 and prevent it from being thrown only when the thread breaks or gives out. This construction, however, of the spring is only used in cases where the draw of the thread is insufficient to hold the member j^3.

Rigidly secured to the frame J is a spring lever j^6 arranged to rest upon the under side of a cam j^7 connected with the pair of links j^4, and carrying on the under side thereof a brake shoe j^8 which operates upon the bobbin wheel about to be described.

The bobbin K carries the thread X, wound tightly upon the same, and also has rigid therewith a large grooved wheel k, as shown. A groove k' of this wheel is engaged by a shoe j^8 rigidly carried by the spring lever j^6. The arrangement of the cam j^7 and of the mounting of the spring lever j^6 upon the arm j, is such, that when the member j^3 is thrown outward, the cam will cause a downward movement of the free end of the spring lever j^6, and force the shoe j^8 into the groove k', thus increasing the resistance to rotation of the bobbin, but since the increasing of the resistance to rotation of the bobbin necessarily operates to draw the thread tighter over the sheave j^{13}, the member j^3 will be drawn in toward the arm j', and, through the cam connection with the bobbin brake, the drag on the bobbin wheel will be removed and the thread will be loosened. These different parts coöperate to retain the thread taut at all times.

The connection between the pair of links j^4 and the cam is an adjustable one, and is arranged in a manner such that there is a concentric circle of holes j^9 in the cam j^7, to be engaged by a pin j^{10} carried in suitable openings in the pair of links j^4. Plates j^{11} are arranged to retain this pin in place, but are provided with peripheral notches j^{12} which serve the purpose of permitting the pin to be removed when the links are moved to bring the pin to register with the same. From this, it will be seen that the cam may be adjusted relative to the links j^4, and the member j^3 made to exert a greater or a less pressure upon the grooved bobbin wheel k according to the speed of the frame and according to the position of the member j^3.

An opening J', shown in dotted lines in Fig. 6, receives the thread from the bobbin and delivers it to the sheave j^{13} carried by the member j^3. From here the thread passes to the eye j^2 at the forward end of the arm j', and is then wound about the wire, which is being fed through the machine. As long as there is a continuous web of thread from the bobbin through the opening J', over the sheave j^{13}, through the eye j^2, and to the wire to be covered, there is a restraining action brought to bear upon the member j^3 dependent upon

the force exerted by the brake shoe j^8, but since the pressure of this brake is dependent upon the position of the cam j^7, and the position of the cam is dependent upon the position of the member j^3, and further, since the position of the member j^3 is dependent upon the centrifugal force brought to bear upon said member by the rotation of the same, there will be an equalization through these parts, and the thread will always be kept taut from the bobbin to the wire regardless of the size of the ball of thread upon the bobbin. Should the thread give out, however, or should it become broken, a restraining action of the thread upon the member j^3 will necessarily cease, consequently this member will be thrown out further by centrifugal force, and its rear end will engage the operating arm g' of the tripping mechanism with the consequent result; the brake shoe j^8 in the meantime through the cam engaging the bobbin wheel k and preventing the racing of the bobbin.

The bobbin K is held against the thread winding frame J by means of a nut k^8 screwed onto the hollow spindle i. This nut carries a thread guide m' in a position to register with the eye j^2 on the thread carrying frame. This thread guide m' also carries a pair of thread winding shoes M, which are preferably made of fiber and are mounted upon the free ends of arms m^3 rigid with the guide m' in a manner such that they bear with considerable force upon the insulation. Thus it will be seen that when the thread is wound upon the wire it will be smoothed or ironed out, as it were, upon the wire.

This completes the description of the operation of the entire machine with respect to the first thread winding device. The other thread winding device, as before stated and represented by the frame N, is of the same construction as the one previously described, but its operating spindle n receives its rotation from the gear wheel b^3 in a manner such that it rotates in the opposite direction to the spindle i. An operating arm g^3 is arranged to be operated in a similar manner to the arm g' whereby the power will be thrown off upon the breaking or the giving out of the thread in connection with this thread winding device.

Shaft and bearing casings.—A case B^3 is provided about the thrust bearing and it extends under the thread winding device to prevent the hanging threads from being wrapped around the main driving shaft B. Another casing B^4 is arranged upon the main driving shaft B underneath the first thread winding device for a similar purpose.

Having described my invention, I claim:

1. In combination in a wire covering machine, of a brake which tends to retard the feeding of the thread, and means for operating said brake held in equilibrium between centrifugal force tending to apply the brake and the tautness of the thread tending to relieve the brake.

2. In a wire covering machine, in combination a brake for retarding the feeding of the thread, and means adapted to be operated by centrifugal force for throwing on the brake and held out of operation by the tautness of the thread.

3. In a wire covering machine, the combination of a thread holding device, a brake therefor, means for operating said brake to retard the giving off of the thread from said device, said means being adapted to be operated by centrifugal force and to be held inactive by the tautness of the thread.

4. In a wire covering machine, a brake which tends to retard the unwinding of the bobbin, and means for operating said brake held in equilibrium between centrifugal force tending to apply the brake and the tautness of the thread tending to relieve the brake.

5. In a wire covering machine, in combination, power mechanism, a thread winding device, a member carried by said device for normally exerting a tension on the thread, a spring for resisting the operation of said member, and means carried by said member whereby it may operate said power mechanism to throw off the power on the breaking or giving out of the thread.

6. In a wire covering machine, in combination, power mechanism, a thread winding device, a member carried by said device for exerting a tension on the thread, means for opposing the action of said member, and means carried by said member whereby it may operate said power mechanism to throw off the power upon the breaking or the giving out of the thread.

7. In a wire covering machine, in combination, power mechanism, a thread winding device, a member carried by said device and adapted to have a loop of the thread pass around a portion thereof whereby it may exert a tension on the thread, means for opposing the action of said member, and means carried by said member whereby it may operate said power mechanism to throw off the power upon the breaking or giving out of the thread.

8. In a wire covering machine, in combination, power mechanism, a thread winding device, a member carried by said device and adapted to be thrown outward by centrifugal force and adapted to have a loop of the thread pass around a part thereof whereby it may exert a tension on the thread, a spring for resisting the movement of said member, and means carried by said member so that when it is in its extreme position it may operate said power mechanism to throw off the power.

9. In a wire covering machine, in combination, power mechanism, a thread winding device, a movable member carried by said device and adapted to have a loop of the thread pass around a portion thereof whereby when it moves out it may exert a tension on the thread, means for resisting the movement of said member, and means carried by said member whereby when the thread is removed therefrom it may be thrown out by centrifugal force to throw off the power.

10. In a wire covering machine, in combination, power mechanism, a thread winding device, a pivoted member carried by said device for exerting a tension on the thread, means for resisting the movement of said member, and means carried by said member whereby it may operate said power mechanism to throw off the power.

11. In a wire covering machine, in combination, power mechanism, a rotary thread winding device, a member pivotally carried thereby and adapted to have a loop of the thread pass over a part thereof, said member being arranged to be thrown out by centrifugal force and thereby normally create a tension upon the thread, means for normally resisting the complete movement of said member, and means carried by said member whereby when completely operated it may operate said power mechanism to throw off the power.

12. In a wire covering machine, in combination, power mechanism, a thread winding device having a bobbin for carrying the thread, a member carried by said device and adapted to have a loop of the thread pass over a part thereof, said member being arranged to control the tension on the thread as it is drawn from the bobbin, and means carried by said member whereby it may operate said power mechanism to throw off the power upon the breaking or the giving out of the thread.

13. In a wire covering machine, in combination, power mechanism, a thread winding device having a bobbin for carrying the thread, a member pivotally carried by said device and adapted to have a loop of the thread pass over a part thereof, said member being arranged to control the tension on the thread as it is drawn from the bobbin, and means carried by said member whereby it may operate said power mechanism to throw off the power.

14. In a wire covering machine, in combination, power mechanism, a thread winding device including a bobbin, a member pivotally carried by said device and adapted to have a loop of the thread from said bobbin pass over a

part thereof, said member being arranged to exert tension on the thread, means for retarding the drawing off of the thread from said bobbin, and connections between said means and said member whereby when said member moves beyond a predetermined limit said retarding means of said bobbin may operate to resist the giving off of the thread therefrom.

15. In a wire covering machine, in combination, power mechanism, a thread winding device including a bobbin, a member pivotally carried by said device and adapted to have a loop of the thread from said bobbin pass over a part thereof, said member being arranged to exert tension on the thread, means for retarding the drawing off of the thread from said bobbin, connections between said means and said member whereby when said member moves beyond a predetermined limit said retarding means of said bobbin may operate to resist the giving off of the thread therefrom, and means carried by said member whereby it may operate said power mechanism to throw off the power.

16. In a wire covering machine, in combination, power mechanism, a thread winding device including a bobbin, a member pivotally carried by said device and adapted to have a loop of the thread from said bobbin pass over a part thereof, said member being arranged to exert a tension upon said thread, means for retarding the drawing off of the thread from said bobbin, connections between said means and said member whereby when said member moves beyond a predetermined limit said retarding means of said bobbin may operate to resist the giving off of the thread therefrom, and a trip operated by said member to permit said power mechanism to throw off the power.

17. In a wire covering machine, in combination, power mechanism, a thread winding device having a bobbin, a brake for controlling the rotation of said bobbin, a member carried by said thread winding device and adapted to have a loop of the thread pass over a part of the same, and a connection between said brake and said member whereby the draw of the thread upon said member and the friction of said brake on said bobbin, co-operate to keep the thread taut as it is fed to the wire.

18. In a wire covering machine, power mechanism in combination with a thread winding device carrying a bobbin, means including a brake for controlling the rotation of said bobbin, a pivoted member carried by said thread laying device, and adapted to have a loop of the thread pass over a part of the same, a spring lever connection between said controlling means for the bobbin and said member whereby the draw of the thread upon said member and the application of said brake to said bobbin will coact to keep the thread taut as it is wound upon the wire, and means carried by said member for operating the power mechanism to throw off the power upon the breaking or the giving out of the thread.

19. In a wire covering machine, in combination, power mechanism, a thread laying device, a member carried by said device and adapted to have a loop of the thread pass over a part thereof, said member being arranged to be thrown outward by centrifugal force, means for retarding the giving off of the thread, a cam connection between the same and said member whereby when said member is thrown outward said controlling mechanism will tend to retard the feeding of the thread, and means whereby said member may engage the power mechanism upon the breaking or the giving out of the thread.

20. In a wire covering machine, in combination, power mechanism, a thread laying device, a member pivotally mounted upon the thread laying device and adapted to have a loop of the thread pass over a part thereof, said member being arranged to be thrown outward by centrifugal force, a spring fixed to said thread laying device, a shoe carried by said spring for retarding the giving off of the thread, and means between said spring and said member whereby when the latter is thrown outward said shoe will be thrown into operation to retard the drawing off of the thread.

21. In a wire covering machine, in combination, power mechanism, a thread laying device, a member pivotally mounted upon said device and adapted to have a loop of the thread pass over a part thereof, links connecting said member and said device, a cam connected to said links, a shoe for controlling the giving off of the thread, a spring for operating said shoe, said cam being adapted to engage said spring and apply the shoe when said member is thrown outward, and means whereby said member may also operate the power mechanism to throw off the power when said member passes beyond a certain point.

22. In a wire covering machine, in combination, power mechanism, a thread winding device, a member carried by said device for exerting a tension on the thread, and means whereby said member may retain the thread taut irrespective of the size of the ball of thread.

23. In a wire covering machine, in combination, power mechanism, a thread winding frame, a member pivotally carried by said frame and adapted to have a loop of the thread pass over a part thereof, said member being arranged to swing outward, links pivoted to said member and to said frame, a cam secured to one of said links, a spring carried by said frame, a shoe for the bobbin, said cam being adapted to engage said spring whereby upon the outward movement of said member said shoe will be applied to resist the giving off of the thread from the bobbin.

24. In a wire covering machine, in combination, power mechanism, a thread winding frame, a member carried by said frame and adapted to have a loop of the thread pass over a part thereof, links intermediate of said member and said frame whereby said member may swing outward, a cam secured to one of said links, a bobbin wheel, a shoe operating upon said wheel, a leaf spring fixed to said frame and carrying said shoe, and means for adjusting said cam with respect to said links.

25. In a wire covering machine, in combination, power mechanism, a thread winding frame, a member carried by said frame and adapted to have a loop of the thread pass over a part thereof, a link intermediate of said member and said frame whereby said member may swing outward, a cam having a row of sockets concentric with the pivotal point of said cam, a pin carried by said link for engaging any one of said sockets, a bobbin wheel, a shoe operating upon said wheel, and a leaf spring fixed to said frame and carrying said shoe whereby it may operate upon said bobbin wheel, said spring being arranged to bear against said cam and be moved thereby.

26. In a wire covering machine, in combination, a frame, a hollow spindle rotatably mounted therein, a thread winding frame fixed to said spindle, a bobbin wheel, a member carried by said frame and adapted to have a loop of the thread pass over a part thereof, links intermediate of said member and said frame whereby said member may be thrown outward, a cam secured to one of said links, a spring secured to said frame, a brake shoe upon said spring for engagement with said bobbin wheel, said spring engaging upon the under side of said cam, and means to be engaged by said member when in an extreme outward position, for operating the power mechanism to throw off the power.

27. In a wire covering machine, in combination, power mechanism including an operating lever, means for normally retaining said lever in one position, a rotating thread winding frame, carrying a bobbin, a member carried by said frame and adapted to have a loop of the thread pass over a part thereof, said member being arranged to be thrown outward by centrifugal force, means whereby said member may control the giving off of the thread from the bobbin, a trip for holding said power operating lever in an operative position against its normal tendency, and an arm rigid with said trip whereby when in its outward position said arm may be operated and said operating lever released to throw off the power.

28. In a wire covering machine, in combination, power mechanism, a thread winding device, a member carried by said device and arranged to be thrown out by centrifugal force, said member having a loop of thread passing over a part thereof, an operating lever for said power mechanism, a spring for holding said lever in one position, a bar secured to said lever, a rock shaft, an operating arm secured to said rock shaft and having a portion thereof extending to a point where it may be engaged by said member when in its outermost position, and a trip on said rock shaft, a stop on said bar adapted to be engaged by said trip for holding said lever in an operative position against the tension of said spring.

29. In a wire covering machine, in combination, a rotary thread winding device, a pair of links pivoted thereto, a bar pivoted to said links, power mechanism, an arm for throwing off the same, said arm being in position to be engaged by said bar when the links are in their outermost position, and means adapted to be controlled by the thread for normally preventing the links assuming such position.

30. In a wire covering machine, in combination, a rotary thread winding device, a pair of links pivoted thereto, a bar pivoted to said links, power mechanism, means for throwing off the same, said means being in position to be engaged by said bar when in its outermost position, means adapted to be controlled by the thread for normally preventing the bar assuming such a position, a brake retarding the giving off of the thread, and means for applying the same operated by the outward movement of such bar.

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

CHARLES E. HADLEY.

Witnesses:
J. B. HULL,
B. W. BROCKETT.