No Model.)

3 Sheets—Sheet 1.

A. MORLEY.

BOBBIN WINDER FOR SEWING MACHINES.

No. 497,476. Patented May 16, 1893.

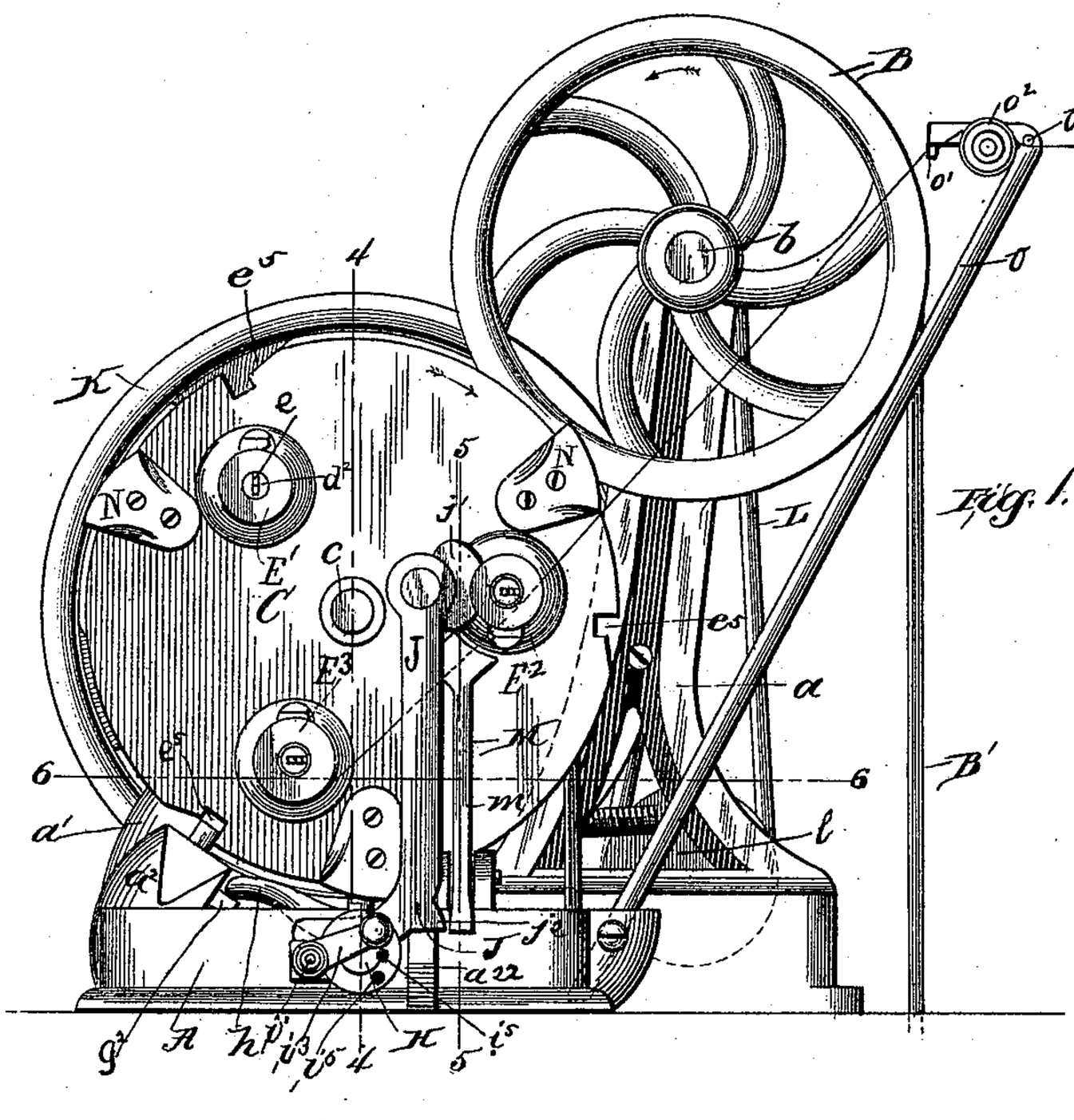

Fig. 1.

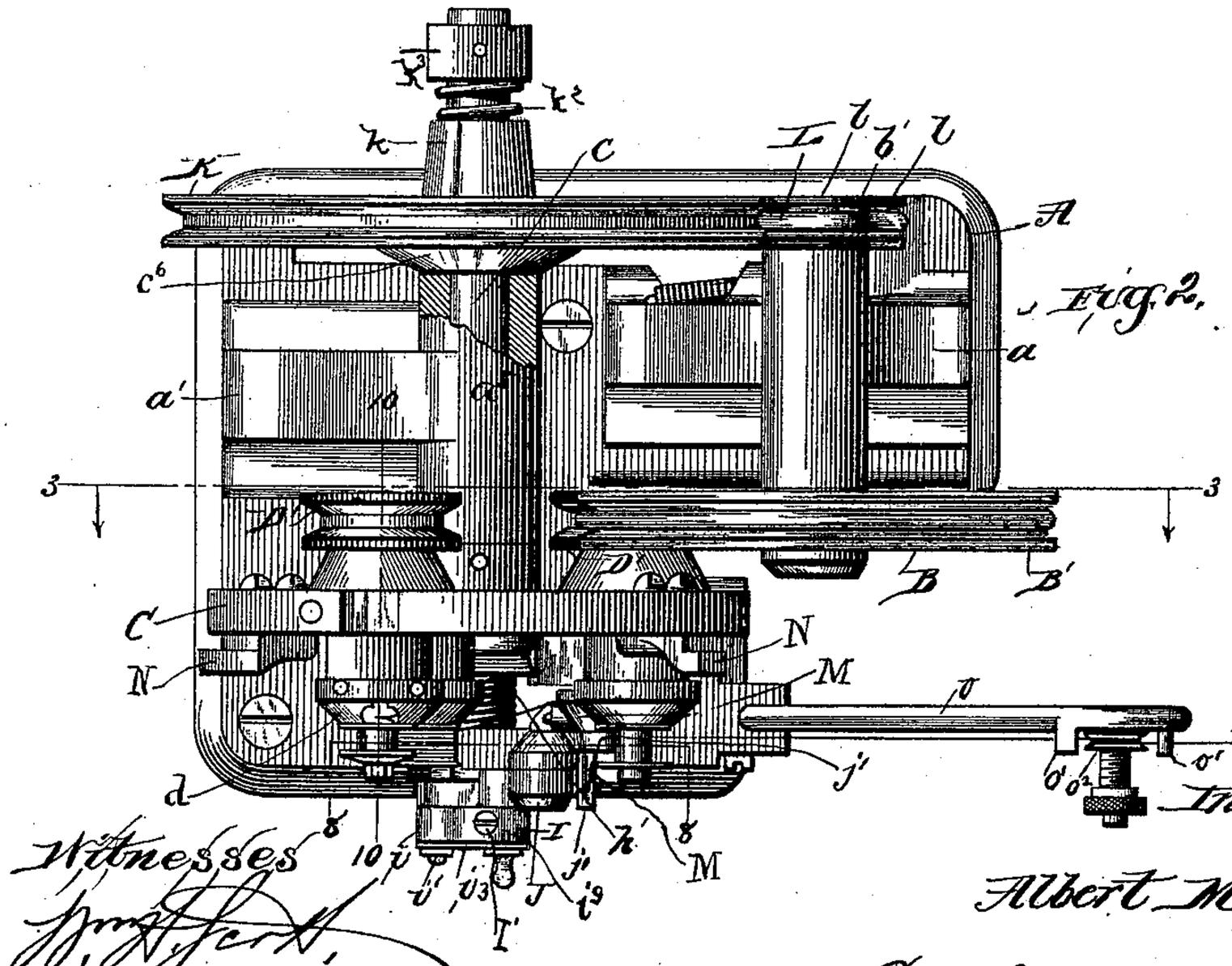

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

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BOBBIN WINDER FOR SEWING MACHINES.

No. 497,476. Patented May 16, 1893.

Fig. 3.

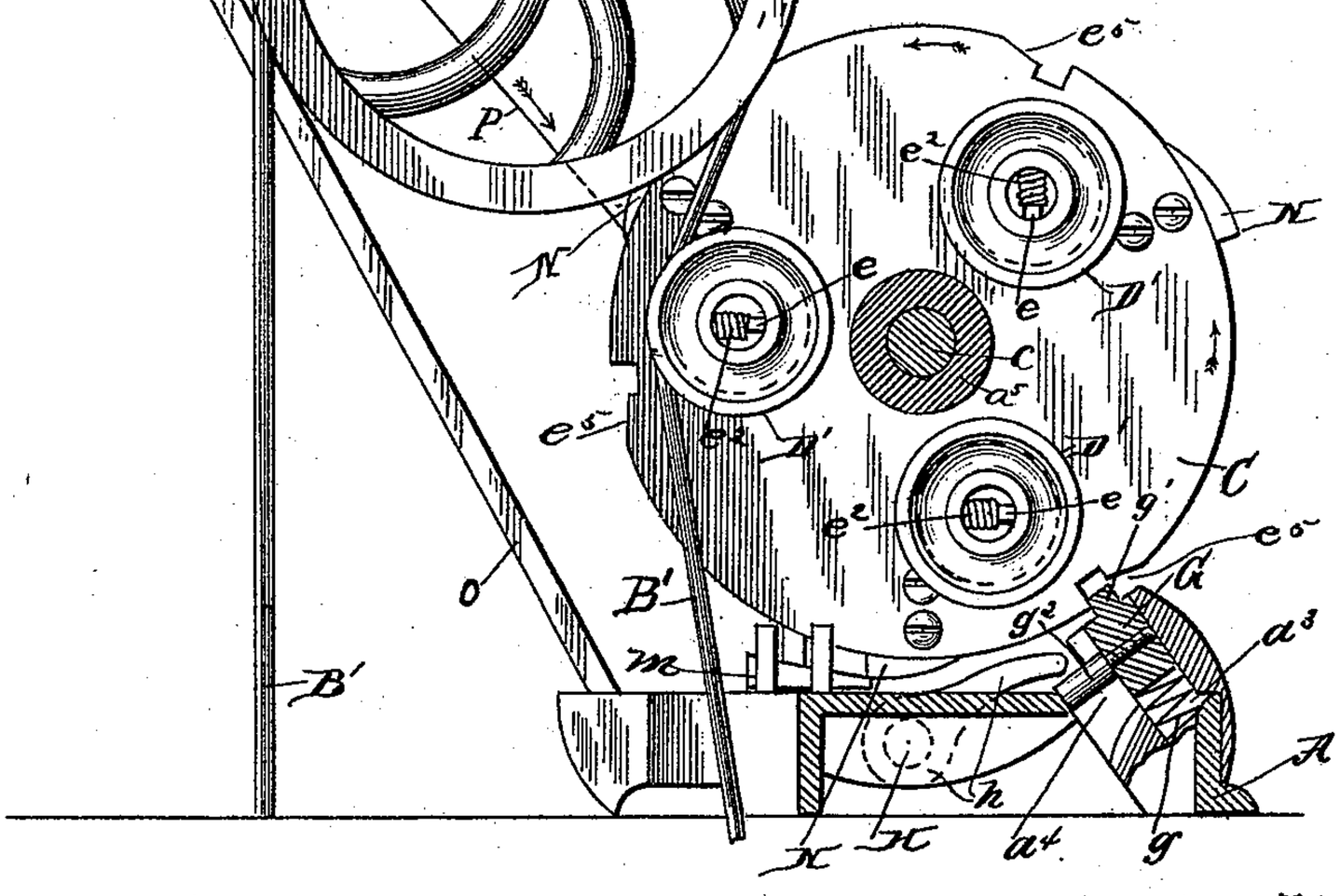


Fig. 4.

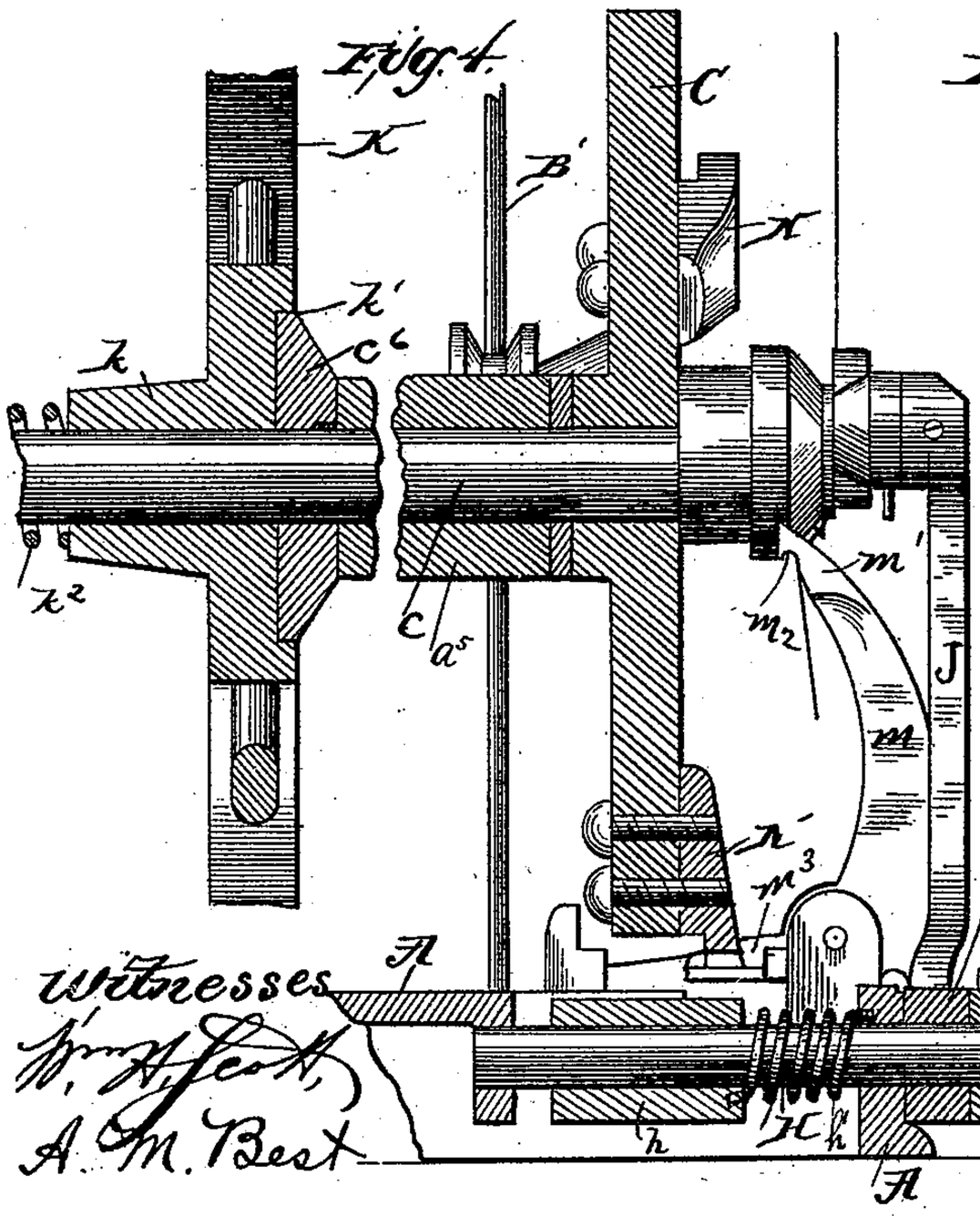
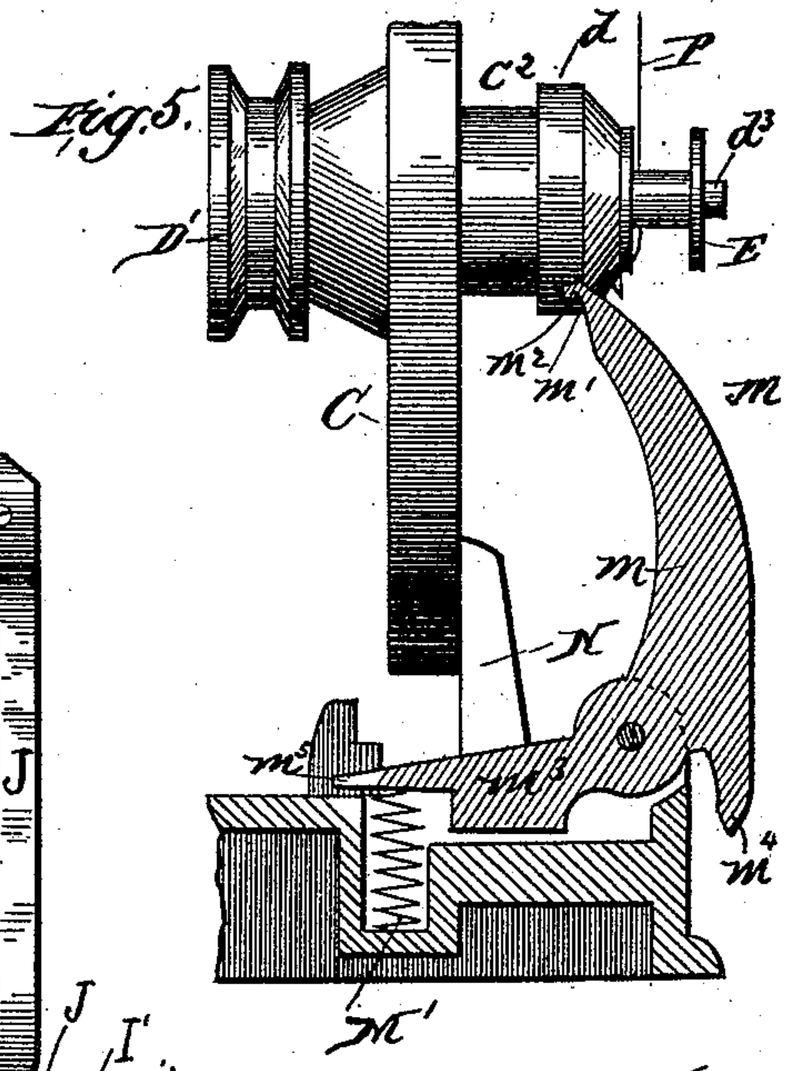


Fig. 5.



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BOBBIN WINDER FOR SEWING MACHINES.

No. 497,476. Patented May 16, 1893.

Fig. 6.

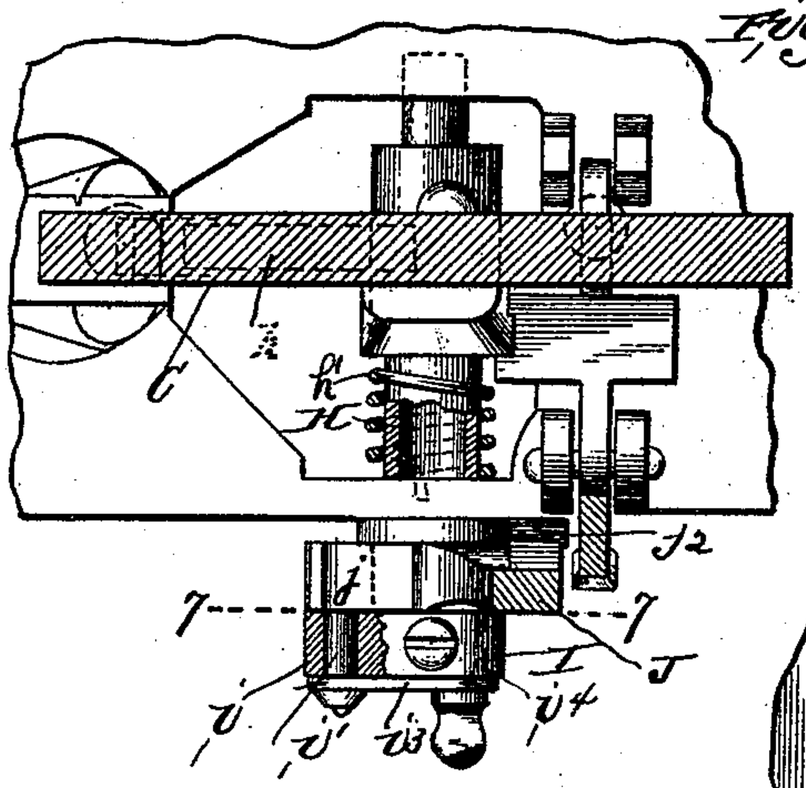


Fig. 8.

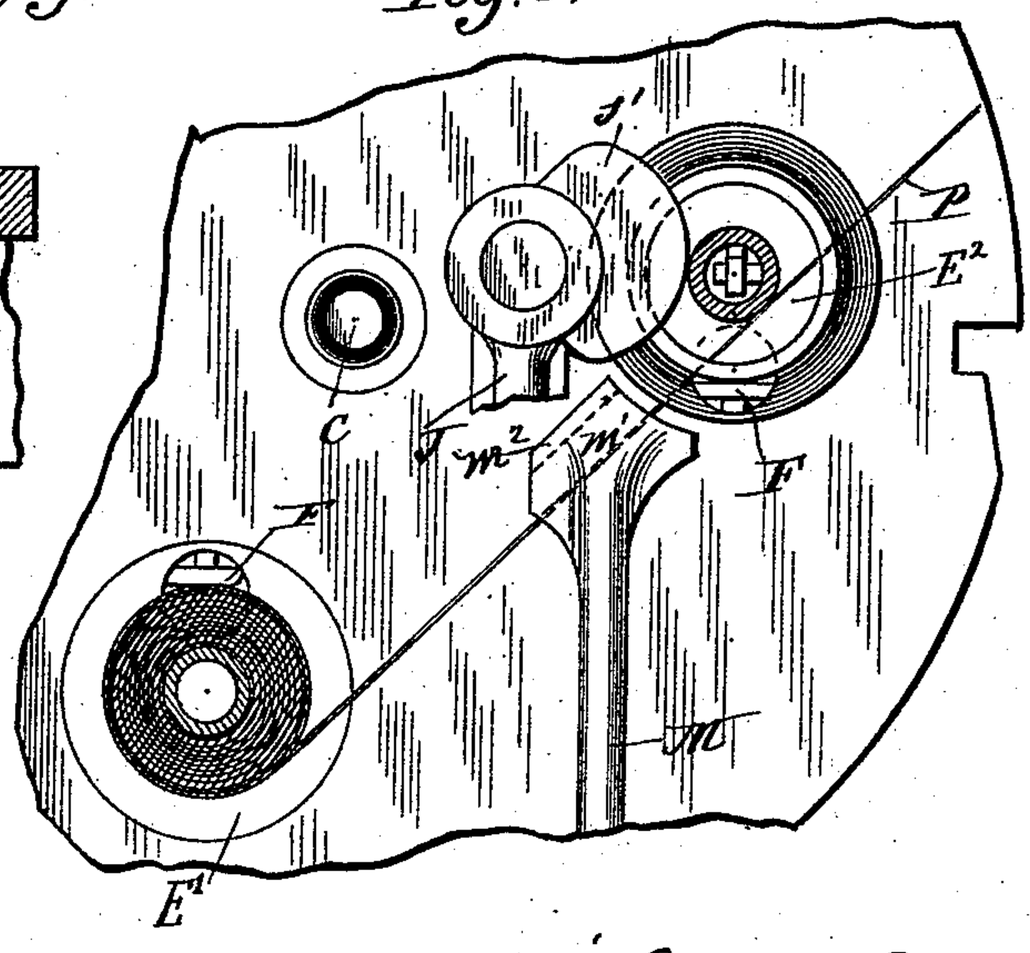


Fig. 7.

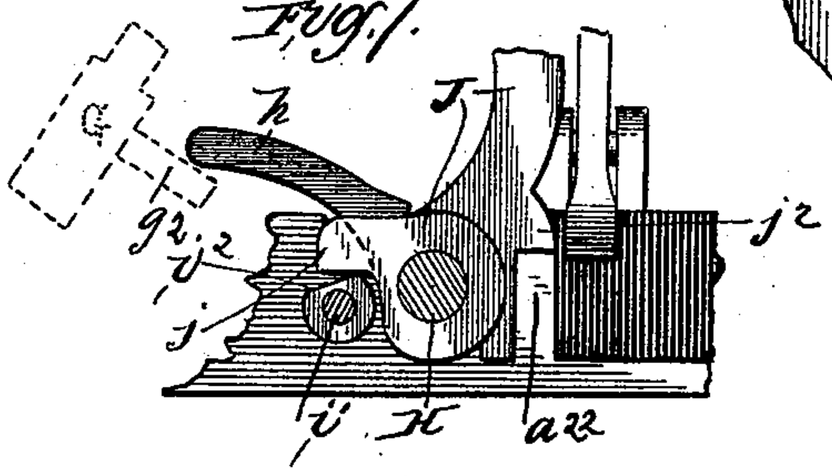
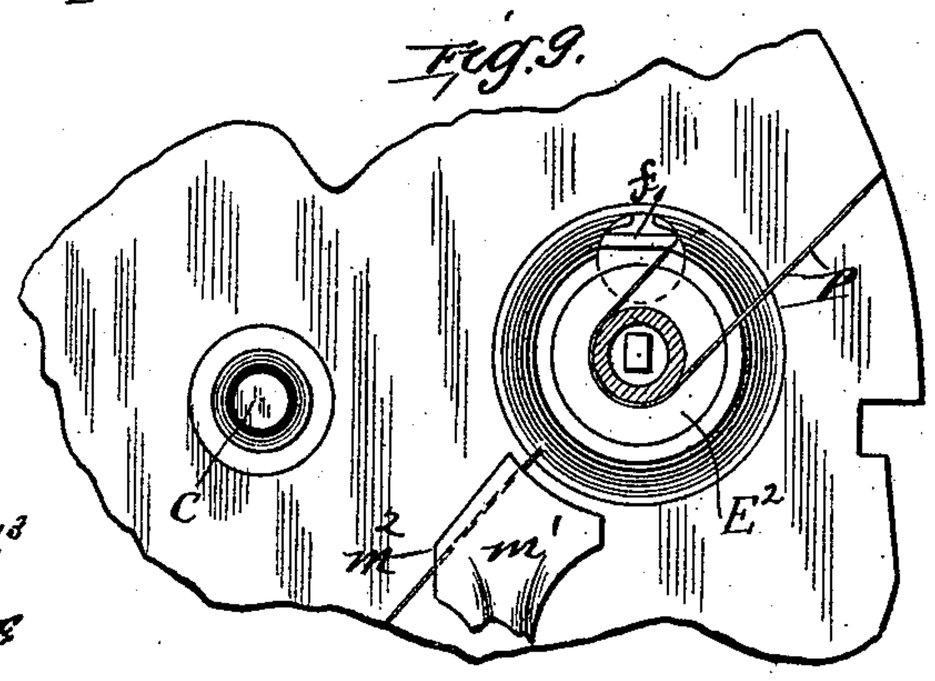


Fig. 9.



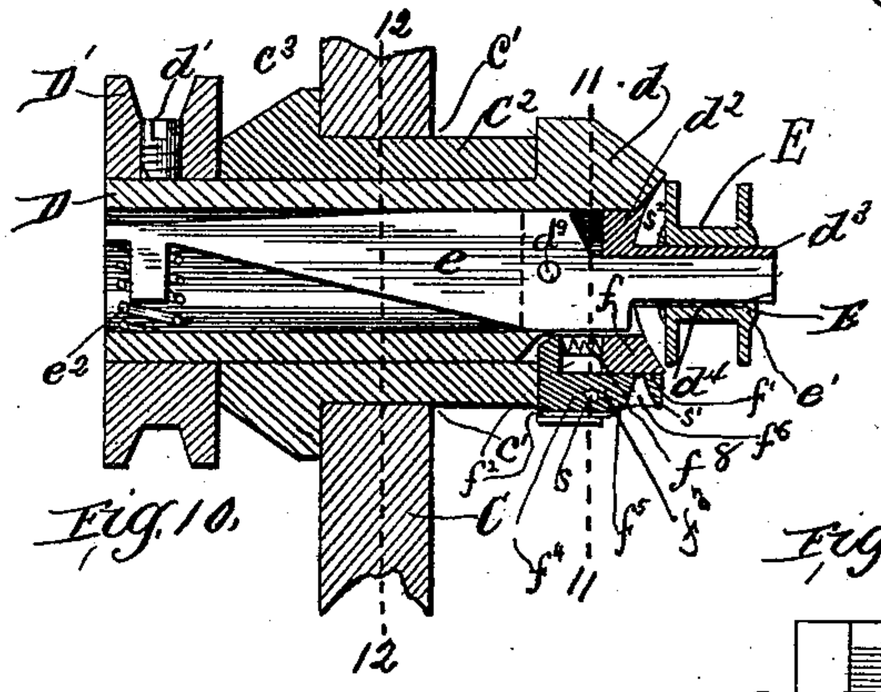


Fig. 10.

Fig. 13

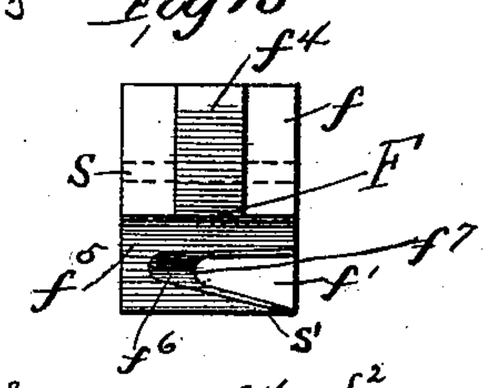


Fig. 12.

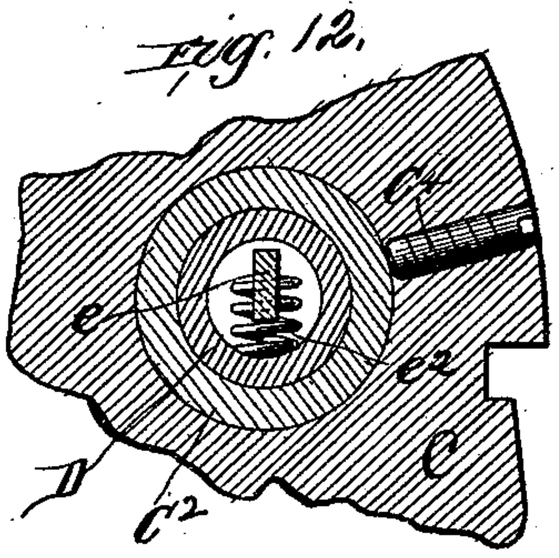


Fig. 11.

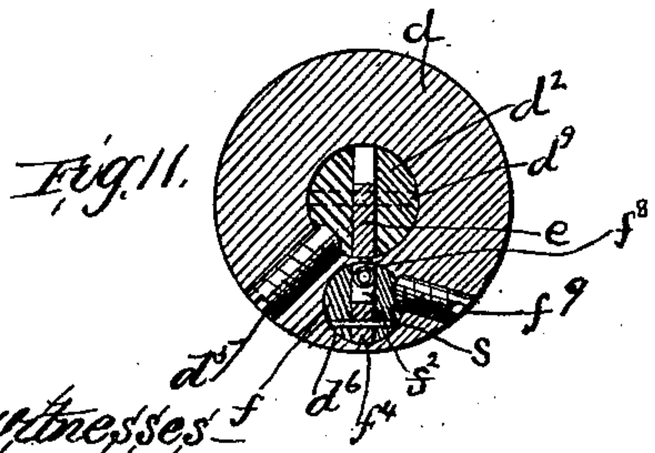
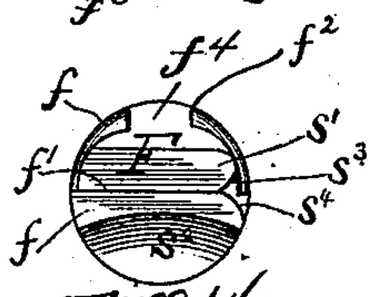


Fig. 14.



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UNITED STATES PATENT OFFICE.

ALBERT MORLEY, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE LASKEY COMPANY, OF SAME PLACE.

BOBBIN-WINDER FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 497,476, dated May 16, 1893.

Application filed April 5, 1890. Serial No. 346,672. (No model.)

To all whom it may concern:

Be it known that I, ALBERT MORLEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Bobbin-Winders for Sewing-Machines, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of a bobbin winder embodying my invention; Fig. 2, a plan view of the same; Fig. 3, a vertical section of the same, taken on the line 3, 3, of Fig. 2 looking in the direction of the arrows thereon; Fig. 4, a detail section, taken on the line 4, 4, of Fig. 1; Fig. 5, a detail section, taken on the line 5, 5, of Fig. 1; Fig. 6, a detail plan section, taken on the line 6, 6, of Fig. 1; Fig. 7, a detail section, taken on the line 7, 7, of Fig. 6; Fig. 8, a detail section, taken on the broken line 8, 8, of Fig. 2, showing the parts in position for cutting the thread; Fig. 9, a similar section, showing a part of Fig. 8 with the devices just after the thread is severed; Fig. 10, a detail section, taken on the line 10, 10, of Fig. 2; Fig. 11, a detail section, taken on the line 11, 11, of Fig. 10; Fig. 12, a detail section, taken on the line 12, 12, of Fig. 10; Fig. 13, a plan view of the thread-cutter, detached; and Fig. 14, an end elevation of the same. Figs. 1, 2 and 3 are upon one scale. Figs. 4, 5, 6, 8, 9, 10, 11 and 12 are upon one scale, but enlarged from that just mentioned; and Figs. 7, 13 and 14 are upon one scale, but still further enlarged.

My invention relates to machines for winding bobbins for sewing machines; and is intended to provide a machine which may be attached to the table of the sewing machine, or some other convenient support, where it may be driven either from the driving shaft of the sewing machine, or any other device adapted to communicate the required motion to the winder.

I will proceed to describe in detail the construction and operation of a machine in which I have embodied my invention in practical operative form; and will then point out more definitely in claims the improvements which I believe to be new and wish to protect by Letters Patent.

In the drawings, A represents a supporting base which is adapted to be fastened to the table, or any other suitable support for the machine. From this base at one side rises a post or standard, *a*, which carries at its top a band-wheel, B, the shaft, *b*, of which is mounted in a suitable bearing on the post and has at its other end a small band-pulley, *b'*. This wheel B is the drive-wheel of the winder; and motion is communicated to it from any suitable power shaft, by means of a band, B'. On the opposite side of the base there is also a post or standard, *a'*, which is considerably shorter than the standard *a* and curves inward somewhat so as to bring its upper end nearly over the center of the base. This second post carries at its upper end the bobbin disk or holder, C, which is fixed on a shaft, *c*, mounted in a suitable bearing on the top of said post. This bobbin holder is fixed on one end of its shaft, and at one side of the base in a plane just outside of the plane of the driving wheel; and its shaft has a long bearing a^5 through which it extends to the other side of the machine, where it projects considerably beyond its bearing. The bobbins are mounted on this disk by the following devices:—The disk is perforated at suitable intervals, according to the number of bobbins which it is to accommodate.

In the drawings the machine is shown with a disk of a size to hold three bobbins. These perforations, *c'*, through the disk must be located in the same circle, which is somewhat within the circumference of the disk; so that each bobbin in turn will be brought into the same required position, as the disk is rotated. A sleeve, c^2, is inserted in each one of these holes through the disk, being passed through from the back side of the latter and provided with a flange, c^3, on that side of the disk, which sets against the latter and fixes the position of the sleeve. The sleeves extend somewhat beyond the front face of the disk, as seen in Fig. 10 of the drawings; and are fastened in position by binding-screws, c^4, set in from the circumference of the disk against the sleeve, as seen in Fig. 12. In each of these sleeves is mounted a short hollow shaft, D, being inserted at the front end of the sleeve, where it is provided with a flange, *d*, which

abuts against the front end of the bearing sleeve. This shaft projects a little beyond the sleeve on the back side of the disk, and has fixed on the said projecting end a small band-pulley, D′, which is fastened to the shaft by means of a small binding-screw, d', as seen in Fig. 10. These small pulleys on the rear ends of the bobbin shafts are arranged in the same plane as the driving wheel B; and the relation of the parts is such that when one of the pulleys is farthest toward this wheel it will stand a little under the latter, as seen in Fig. 3, so that the driving band, passing down at the back of the wheel B, will pass over the pulley standing in this position, as seen in said Fig. 3 and, therefore, when the band is driven, this pulley will be rotated and thereby revolve the bobbin shaft to which it is attached.

In the front end of the hollow spindle shaft is set a short plug, d^2, from the front end of which projects a still smaller stud or spindle, d^3, which constitutes the journal or pin on which the bobbin, E, is mounted. The bobbin is held on its spindle by means of a spring-lever, e, which is arranged within the hollow bobbin shaft, and is pivoted to the plug d^2 which is slotted at its rear or inner end to receive the lever for this purpose. The slot in the plug also extends out through the bobbin spindle, opening on one side thereof, so as to provide a groove, d^4, within which the outer end of the lever extends. The outer edge of the lever e in this recess d^4 protrudes a little from the slot, when free to move under the action of its spring; and it is preferably inclined or beveled slightly in each direction, so as to make a small bearing point or edge, e'. At the rear end of the tubular shaft D, a spring, e^2, is set under the tail of this lever, as seen in Fig. 10 of the drawings; and arranged so that it will operate to vibrate the lever in a direction to cause the front edge to protrude from the slot in the spindle, just described. When the bobbin E is slipped upon its spindle, as seen in Fig. 10, the lever will yield on account of the spring, so that the bobbin can easily be mounted on its spindle, but the forcing outward of the lever by the action of the spring, just described, will operate to hold the bobbin in place. This device enables me to use bobbins of different sizes; for, even though the bobbin is a little larger than the spindle, the lever will retain it in its proper position. The plug d^2 is held in its position in the shaft by means of a binding-screw, d^5, inserted through the end of the shaft, as seen in Fig. 11.

In the head of the tubular shaft D and just below or outside of the plug d^2, a circular recess, d^6, is sunk. This recess is for the reception of a small plug, f, which is set in the recess to which it is fitted. This plug f is for a cutter and clamp which severs the thread at the proper time and catches and retains the spool end ready for the next bobbin. The body of the plug is cut away on one side at its front end to provide a flat seat, f'; and at its rear end a slot or recess, f^2, is cut in some distance toward the front end of the plug.

The knife or cutter, f^3, is provided with a shank, f^4, which fits the slot in the rear end of the plug and is pivoted thereto, as seen in Fig. 13 of the drawings. The front end of the cutter is a kind of broad foot, f^5, which is adapted to rest upon the seat f'. This foot has a notch, f^6, cut in its forward end, the sides of which are beveled and slightly flaring; so that at the rear end of the notch, the lower edge becomes a sharp cutting edge, as shown at f^7 in Fig. 13. The outer prong of this foot is beveled slightly on the lower side of its front end; and the said seat immediately below is correspondingly beveled, so as to make a slight opening or notch, as seen in Fig. 14 of the drawings, for facilitating the entrance of the thread between these two parts. A small coiled spring, f^8, is set in the recess in the rear end of the plug between the body of the latter and the tail of the cutter, as seen in Fig. 10 of the drawings; and operates to hold the foot of the cutter down upon its seat, but providing for a slight yielding of the latter upon its pivot to permit the thread to enter between the cutter-foot and the seat when required. This cutter plug f is set into its recess with the cutter end outward, as seen in Figs. 10 and 11 of the drawings; and is fastened therein by a binding screw, f^9.

While one of the bobbins is being wound or filled, it is necessary, of course, that the disk C be stationary. For the purpose of thus securing the disk in its required positions, notches, e^5, are cut in its periphery, one opposite each bobbin and each having its front wall slightly beveled for facilitating the entrance of a stop, presently to be described while the other is perpendicular, the rotary movement of the disk being in the direction indicated by arrows in the drawings.

On the base A, just behind the disk C, is a short stud or standard, a^2, which is slightly inclined forward toward the disk. A recess, a^3, is cut down into this standard at an inclination corresponding to the radius of the disk, in the plane of which it is situated. A short bolt or stop, G, is fitted into this recess, having a spring, g, placed back of it; which, of course, operates to throw the stop outward. The outer end, which projects beyond the standard under the normal effect of the spring, is cut down to form a short lug, g', adapted to fit the notches in the periphery of the disk, with which it is caused successively to engage under the action of the spring. Obviously, when this bolt thus engages with one of the notches in the disk, it will securely fasten the latter in the position to which it has been turned, and will hold it in such position until disengaged from the notch. To provide for such disengagement, a pin, g^2, is secured to the front side of the bolt and passes out through a slot, a^4, in the front portion of the

standard, a^2 as seen in Fig. 3 of the drawings. Evidently, whenever this pin is depressed, the bolt will be withdrawn from engagement with the disk; thereby unlocking the latter. This unlocking of the bobbin disk or holder is effected automatically upon the filling of the bobbin, in the following way. In Figs. 1 and 8 of the drawings, the disk is represented in position just as it has been stopped after its intermittent movement to carry one bobbin out of position and bring another into position for winding. The bobbin marked E′ has just been filled, while the one marked E^2 has just been brought into position for filling. In the base A is mounted a short rock shaft, H, directly underneath the bobbin disk and near its inner end there is fastened upon this shaft an arm, h, which extends backward underneath the disk until it rests upon the pin g^2, as seen in Figs. 1 and 7 of the drawings. A spring, h', is coiled around this shaft between the hub of the arm h and the side of the base, being attached at one end to the former and at the other to the latter; and so arranged as, normally, to throw the arm h up. Now it is evident that if this shaft H is rocked in a direction to turn this arm h downward, it will depress the bolt G and thereby unlock the bobbin disk; and that such a movement of the shaft must be against the action of its spring. A collar, I, is fastened upon the outer end of this rock shaft and has a projection, i, at its rear, in which is mounted a cam pin, i', that extends through the projection and somewhat beyond the latter on the inside thereof. The inner end of this pin, beyond its bearing in the collar, I is enlarged and cut away upon its upper side to present a flat face, i^2, as seen in Fig. 7 of the drawings. A short arm, i^3, is fastened to the outer end of the cam pin, by which it may be oscillated. This arm is elastic and carries upon its outer end a pin, i^4, the inner end of which is adapted to enter one of two or more holes, i^5, provided in the outer face of the collar I, whereby the cam may be set in the position to which it may be adjusted. Inside of the collar I, a lever, J, is mounted loosely on the rock shaft H and extends upward even with the bobbin when in the position of winding; as shown by the bobbin marked E^2 in Figs. 1 and 8. This lever is provided at its foot with a toe, j, extending rearward, over the inner end of the cam pin i' just described; hence it is evident that any backward vibration of the lever will depress this toe, which acting on the said pin will rock the shaft H in a direction to depress the arm h on its inner end. The upper end of the lever J is provided with a cam projection, j', which is set inward so as to be brought into the same plane with the bobbin, and then projects forward between the flanges or sides of the bobbin against its central body or barrel, as seen in Fig. 8 of the drawings, being held up in this position by the rock shaft H on which it is mounted. In order to prevent this lever being thrown forward too far, it is provided at its lower end with a shoulder, j^2, opposite to the toe j, immediately below which is a lug or stop, a^{22}, on the base, against which the shoulder on the lever will strike and thereby arrest the forward movement of the latter. Now the bobbin is wound under the slight pressure of the cam j' at the upper end of the lever J, resting constantly against the thread, so that, as the bobbin is gradually filled, the cam will be gradually pushed back by the wound thread, thereby rocking the shaft, as already described, so as to depress the arm on the end of the shaft to unlock the bobbin disk, the parts being constructed and arranged to effect this result when the bobbin is full. The adjustable cam on which the toe of the lever J acts, provides for the use of this tripping device with bobbins of different sizes. From the description above, it will be seen that the shaft H is rocked to depress the locking bolt G by the downward pressure of the toe j at the foot of the lever upon the cam, i' which is practically a part of the shaft, being connected rigidly thereto. Now it is evident that if these devices can be adjusted so that the toe must be depressed farther to strike the cam than in a former position, the lever can move backward farther before the tripping is effected and so a larger quantity of thread may be wound upon the bobbin before the lever is pushed back far enough to unlock the disk. Precisely this result is obtained by adjusting the cam to different positions. If it is set in the position shown in Fig. 7 of the drawings, with its thicker portion thrown up under the toe, the lever will be thrown forward slightly, so that less movement will be required for tripping the lock and so it is adapted to small bobbins. Now, if the cam be turned so that its flat face will be uppermost, and the toe will rest directly upon this face, it is evident that the lever will have more backward movement to effect the trip and hence under this adjustment it is adapted to bobbins of larger size.

As soon as the bobbin disk is unlocked, it is rotated by a device which I will now describe. A large band wheel, K, is mounted loosely on the outer end of the shaft c opposite to the bobbin disk; being grooved for the accommodation of the band. The hub, k, of this wheel is considerably enlarged, and on its inner face has a recess, k', which is adapted to receive a friction wheel or hub, c^6, fixed on the shaft c just outside of its bearing a^5 as seen in Fig. 4 of the drawings. A spring, k^2, is coiled around the extreme outer end of the shaft c outside of the hub of the wheel K, being held on the shaft by means of a suitable collar, k^3, as seen in Fig. 2. This spring, of course, acts to hold the wheel K up to engagement with the friction hub, thereby making a kind of friction clutch between the two, which is sufficient to cause the movement of the bobbin disk with the rotation of the wheel K when the disk is unlocked, but, when the latter is locked, as already described, the force

of the spring is not so great but that the frictional surfaces move easily upon each other and permit the wheel K to rotate constantly. This wheel K is rotated by means of a band, L, which passes over the band pulley b' on the shaft b and around a small pulley, l, arranged immediately below the former and suitably mounted on the base. This lower wheel stands in a little under the wheel K so that the band L on its inside path will be applied to the periphery of the wheel K at that point and so rotate the latter by the motion which is communicated to the band through the drive wheel B. This rotation will, of course, be communicated to the disk C the moment the lock of the disk is tripped, and will continue until the next notch in the periphery is brought into engagement with the locking bolt,—that is, the movement of the disk is the distance from one notch to another. This movement brings the full bobbin E′ into position near the lock, as shown in Figs. 1 and 8 of the drawings; and at the same time brings a new empty bobbin E^2 into position for winding, as seen in the same figures; and then the disk is stopped again; but the thread is not yet cut, and is run out with the full bobbin, as indicated in the two figures just mentioned. It will be understood from the description already given that when the bobbin marked E^2 is brought into winding position, as just stated, its driving pulley D′ is also brought into contact with the band B′, as shown in Fig. 3; so that the rotation of the bobbin begins at once.

At the first movement of the bobbin E^2 the thread is cut; as will now be described. When the thread is carried down with the full bobbin in a straight line, it is not in position to be taken by the cutter, being outside of the plane of the latter. In order to bring the thread into such position that the cutter will surely take it as soon as the bobbin shaft begins to revolve, a thread placer, M, is employed. This placer is in the form of a bell-crank lever, pivoted to the base so as to vibrate at right angles to the plane of the bobbin disk, as seen in Fig. 5 of the drawings. The perpendicular arm m, of this lever extends up to the head of the bobbin shaft and is provided at its upper extremity with an enlarged flat hand, m', which has a slight rib or flange m^2, on its rear upper corner. The horizontal arm, m^3, of this lever extends inward under the disk C; and underneath its inner end is set a spring, M′, arranged in a suitable seat in the base. This spring operates normally to throw the lever outward beyond the plane of the bobbin. In this position, the hand at the upper end of the lever stands outside of and opposite the thread as it is carried down by the full bobbin; and it is evident, therefore, that if the lever is vibrated inward it will carry the thread inward with it. In order to effect this movement, cams, N, are fastened to the disk; being arranged one for each bobbin and a little behind the same, as seen in Fig. 1 of the drawings. These cams are of such size and shape that as they pass over the horizontal arm of the thread placer M, they will depress it against the spring, thereby vibrating the placer inward and so carrying the hand inward, thereby placing the thread in against the head of the bobbin-shaft, as seen in Figs. 4 and 5 of the drawings; this is also the position intended to be represented in Fig. 8. The relative arrangement of the parts is such that this movement of the placer is effected just before the bobbin disk stops and the thread is then carried in so far that it will certainly be taken by the notched cutter, already described. After this placing of the thread, it lies immediately in front of the cutter, as seen in Fig. 8, which is intended to represent the position of these parts just before the revolution of the bobbin commences. The construction of the horizontal arm m^3 and the cams N is such that the latter remains in contact with the arm when the disk stops, so that the placer is held in its inward position and retains the thread in its relation to the cutter, already described. Now, the parts being as shown in Fig. 8 of the drawings, the moment the shaft of bobbin E^2 begins to revolve, the notched cutter will take the thread, which will thereby be drawn inward between the cutter and its seat, thereby clamping the thread to the head of the shaft, and at the same time severing the thread as soon as the edge at the inner end of the notch is reached; which operation will be understood from examination of Fig. 9. The full bobbin can now be removed and an empty bobbin put in its place. The end of the main thread is, however, clamped to the head of the bobbin shaft and, of course, rotation of the latter fills the new bobbin. The placer remains in the position described, until the disk starts again, when the cam N immediately passes off from the horizontal arm m^3 and, under the action of its spring, the placer is vibrated outward at once. At the angle of this placing lever, there is provided a toe, m^4, which extends down a little way outside of the base, as seen in Fig. 5, and serves as a stop to limit the outward throw of the lever; and a projection or lug m^5, may be provided on the under side of the horizontal arm which limits the inward throw of the same lever by striking against the bottom of the base. For the purpose of properly guiding the thread to the bobbins, an inclined standard, O, is fastened to the base in front of the disk and extends up some distance above the lattor. At its upper end there is a pulley, o^2, and two guides, o', one each side of the pulley. The thread, P, runs from the main spool, wherever conveniently located, through these guides and over the pulley and thence down to the bobbin disk, as seen in Fig. 1 of the drawings.

The operation of this machine will be understood from the description above, as the

function and action of the devices has been specified, in connection with the description of their construction.

It is obvious that various modifications in the details of construction and arrangement of the parts, may be made without departing from the principle of my invention. Hence I do not wish to be understood as limiting myself strictly to the precise details of construction hereinbefore described and shown in the drawings.

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

1. In a bobbin winder, a revoluble disk or bobbin holder, in combination with a plurality of revolving shafts mounted in said disk and adapted to carry the bobbins, driving pulleys attached to said shafts, and a driven band with which said pulleys are successively brought into contact when the disk is rotated to bring the corresponding bobbin into position for filling, substantially as and for the purposes specified.

2. In a bobbin winder, a revoluble disk, or bobbin holder, in combination with a series of shafts mounted therein and adapted to receive the bobbins, driving pulleys attached to the said shafts, a driving band with which said pulleys are successively brought in contact at the point of filling, and a lock which arrests the rotation of the disk at the filling point and holds it in a stationary position while the bobbin is filled, substantially as and for the purposes specified.

3. In a bobbin winder, a revoluble disk, in combination with a series of revoluble bobbin shafts mounted therein, mechanism for revolving said shafts consecutively for filling the respective bobbins, a lock for holding the disk in filling position, for each bobbin and a lock trip operated by the accumulating thread on the bobbin to release the disk when the bobbin is full, substantially as and for the purposes specified.

4. In a bobbin winder, a revoluble disk, in combination with a driving wheel mounted loosely adjacent to the disk, said disk and wheel having intermediate frictional driving surfaces, a spring arranged to maintain the said surfaces in contact, revolving shafts mounted in the disk and adapted to carry the bobbins, a lock for arresting the disk and holding it stationary in filling positions, and an automatic trip operated by the thread accumulating on the bobbin to release the lock when the bobbin is full and thereby permit the disk to be moved forward, substantially as and for the purposes specified.

5. In a bobbin winder, the disk C, in combination with a plurality of shafts D, mounted in suitable bearings in said disk, and adapted to carry the bobbins, the band pulleys D′, on said shafts, and the band B′, substantially as described.

6. The revoluble disk C adapted to carry the bobbin shafts, in combination with sleeves c^2 set in said disk, a plurality of bobbin shafts D mounted in said sleeves, the driving pulleys D′ fastened to the said shafts, whereby the bobbins mounted on the opposite ends of the shafts are rotated by the rotation of the latter, substantially as and for the purposes specified.

7. The hollow bobbin shaft D, in combination with the slotted plug d^2, provided with spindle d^3, the lever e pivoted within the shaft and the spring e^2, substantially as and for the purposes specified.

8. The disk C, in combination with a plurality of bobbin shafts carried thereby, the shaft c on which said disk is fixed, the friction hub c^6, also fixed on the shaft, the driven wheel K mounted loosely on said shaft and adapted to engage with said friction hub, and the spring k^2, substantially as and for the purposes specified.

9. The disk C, fixed on the shaft c, in combination with the friction hub, c^6, also fixed on the same shaft, the driven wheel K mounted loosely on said shaft and adapted to engage with the friction hub, the spring k^2, the band L, and the band pulleys b' and l, substantially as and for the purposes specified.

10. The revoluble bobbin disk C, in combination with a lock whereby it is stopped and held in certain positions, a loose wheel K mounted on the shaft of the disk and connected thereto by a friction clutch, a spring k^2, the driving shaft b provided with the band pulley b', the band pulley l and the band L, whereby the disk may be stopped at certain positions, while the driving wheel K continues in motion and may be started at once upon being released from the lock, substantially as and for the purposes specified.

11. The revoluble bobbin disk C, in combination with a plurality of bobbin shafts mounted therein and provided with pulleys whereby they are rotated, and a clamping cutter mounted on each of said shafts adjacent to the respective bobbins and adapted to cut the thread running to the filled bobbin and to clamp the severed end of the main thread at the commencement of the revolution of the unfilled bobbin when brought into position for filling, substantially as and for the purposes specified.

12. The bobbin shaft, in combination with the plug f set in the head of said shaft and provided with a flat seat f', and the notched cutter f^3 and the spring f^8 both mounted on the plug; substantially as and for the purposes specified.

13. The disk C, adapted to carry the plurality of bobbin shafts, provided with peripheral notches e^5, in combination with the recessed standard a^2 on the base, the bolt G set in the recess in said standard, the spring g set back of the bolt, the pin g^2 fastened to the bolt and extending out from the standard, and a trip arranged to act upon said pin and

operate it by the filling of a bobbin to trip the bolt substantially as and for the purposes specified.

14. The bobbin disk C, provided with peripheral notches c^5, in combination with the spring bolt G, the rock shaft H provided with the fixed arm h, and a retracting spring adapted to turn said arm away from the bolt, and the lever J mounted on the rock shaft and at its other end resting upon the center of the bobbin as it is filled whereby, as the thread accumulates upon the bobbin, the lever will be vibrated to rock the shaft and finally release the bolt from the disk, substantially as and for the purposes specified.

15. The disk locking bolt G, in combination with the rock shaft H, provided with arm h, retracting spring h', collar I fastened to said rock shaft, adjustable cam pin i' mounted in said collar, and the actuating lever J mounted loosely on the rock shaft and provided with a toe j projecting over the cam pin, substantially as and for the purposes specified.

16. The lock tripping shaft H, in combination with the collar I fastened thereto and provided with a series of holes i^5, the cam pin i' mounted in the collar, the elastic arm i^3 fastened to the cam and provided with a pin to engage with one of said holes, and the lever J mounted loosely on the rock shaft and provided with a toe j' extending back over the cam, substantially as and for the purposes specified.

17. The bobbin disk C, in combination with a plurality of revoluble bobbin shafts mounted therein, the bobbins E carried by said shafts, a thread cutter also mounted on the said shafts, and a thread placer adapted to carry the thread inward to be taken by the cutter as it is moved with the shaft, substantially as and for the purposes specified.

18. The revoluble bobbin disk C, in combination with a plurality of bobbin shafts D, a cutter and clamp carried by each bobbin shaft, the thread placing lever M and cam projections on the disk adapted to vibrate said lever inward for the placing of the thread to the cutter at the proper moment, substantially as described.

19. The revoluble bobbin disk C, in combination with a plurality of revoluble bobbin shafts mounted therein, the cutter and clamp mounted on each bobbin shaft, the thread placing lever M, the spring M′ adapted to throw said lever outward, and the cam projections N on the disk and adapted to vibrate the placer inward at the required moment, substantially as and for the purposes specified.

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