

(No Model.)

E. WRIGHT.

Winding Mechanism for Going Barrels.

No. 232,663.

Patented Sept. 28, 1880.

FIG. 1.

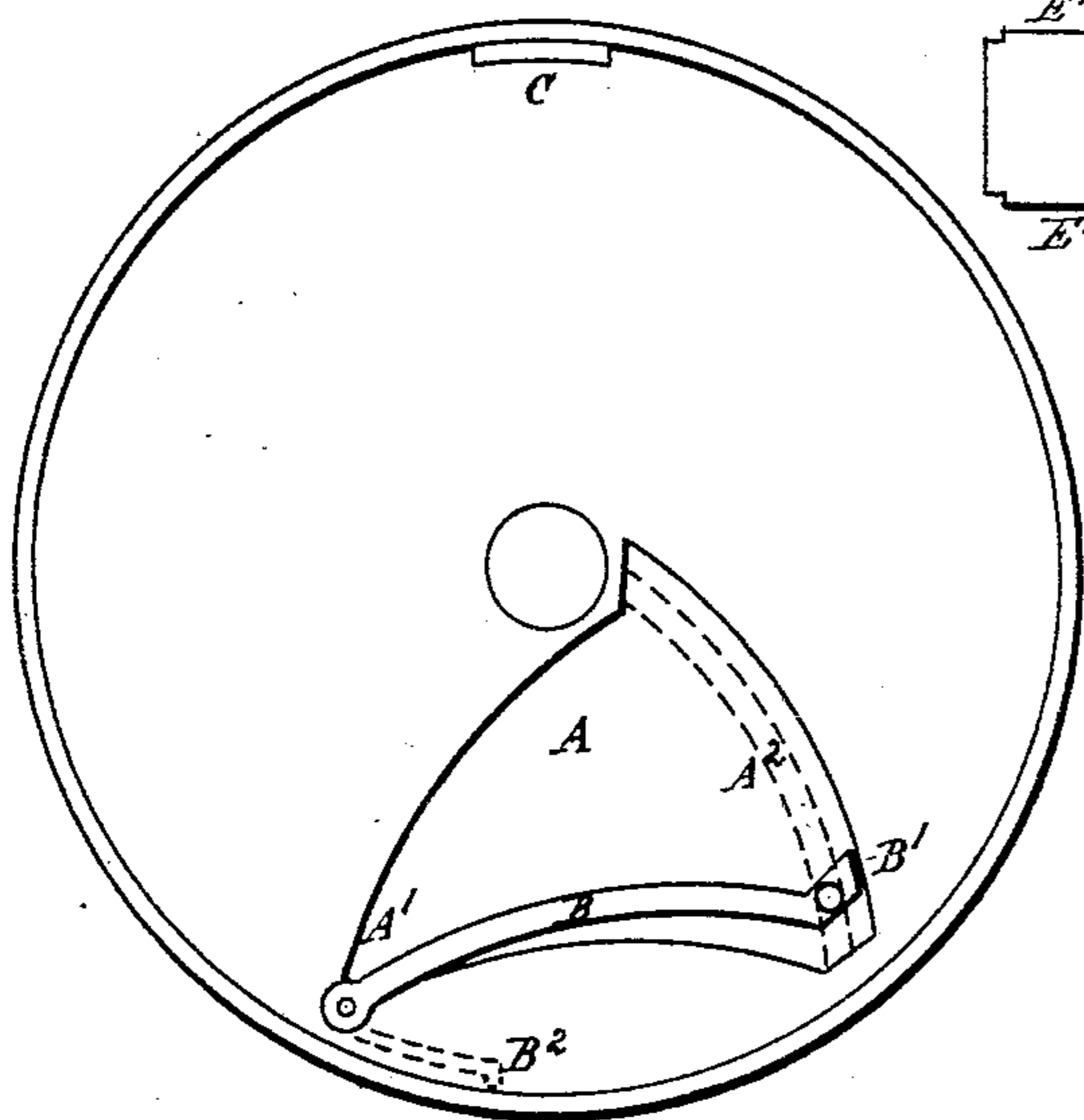


FIG. 2.

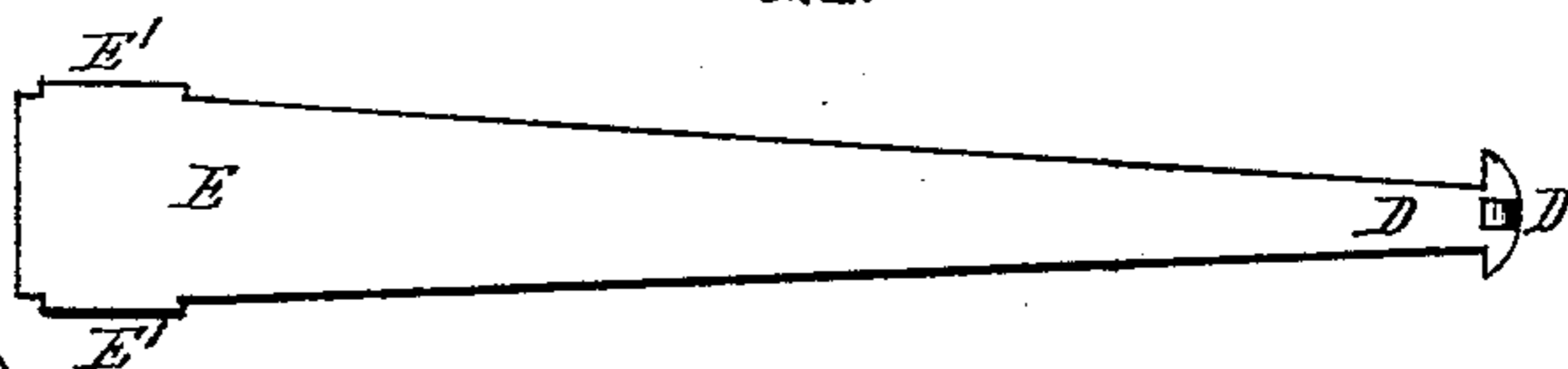


FIG. 3.

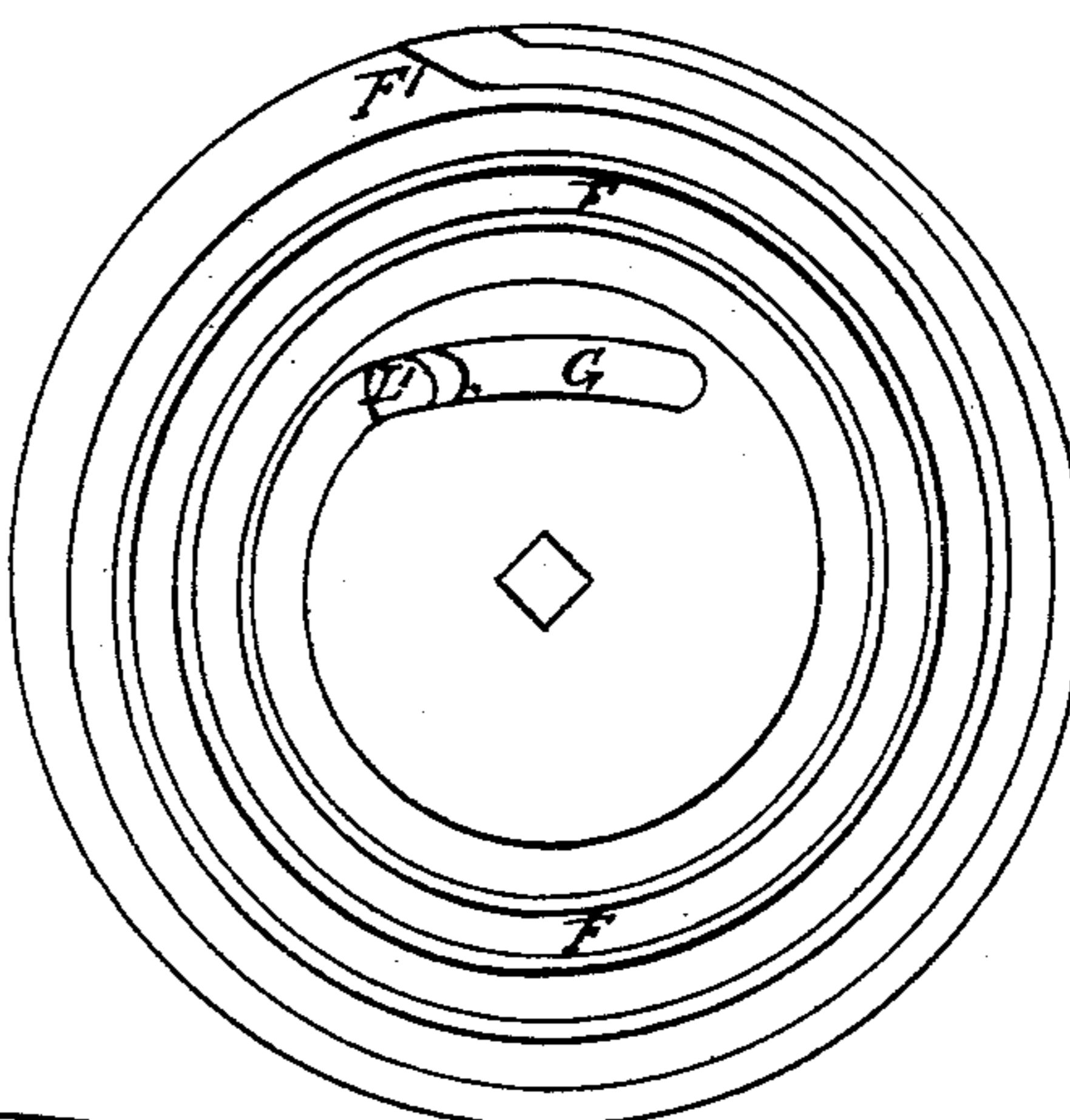


FIG. 4.

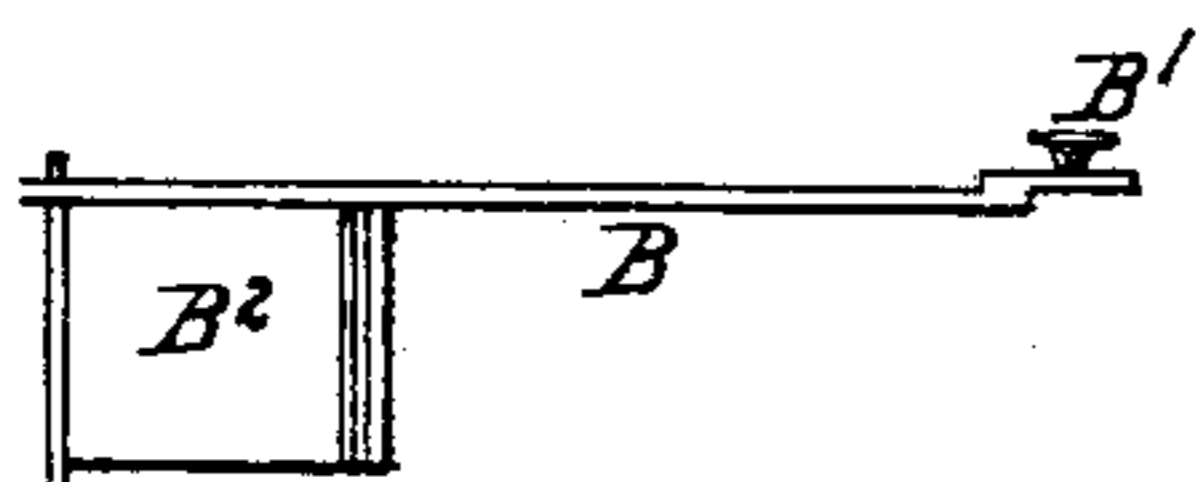
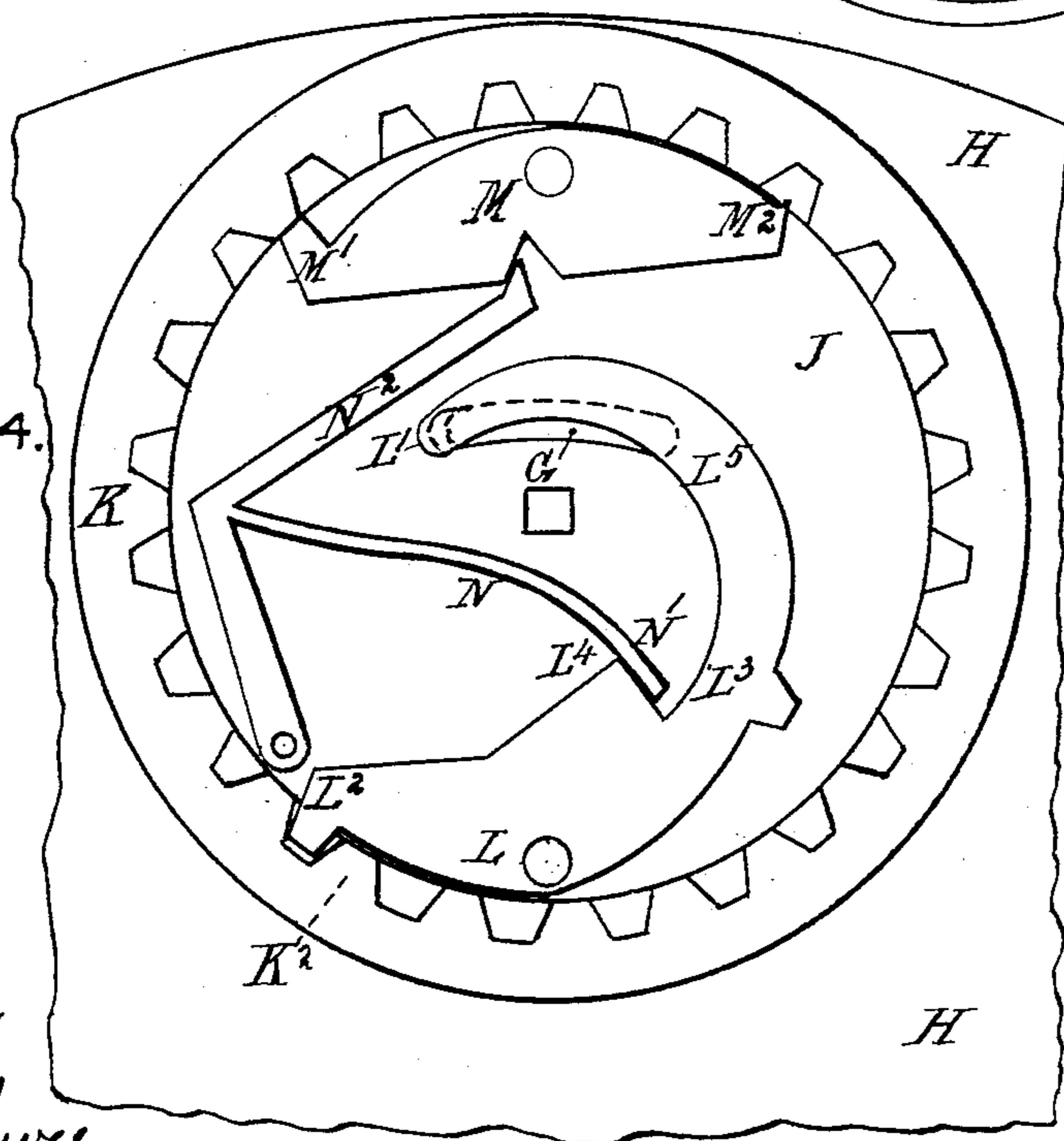


FIG. 4.



Witnesses

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WINDING MECHANISM FOR GOING-BARRELS.

SPECIFICATION forming part of Letters Patent No. 232,663, dated September 28, 1880.

Application filed June 25, 1880. (No model.) Patented in England February 28, 1880.

To all whom it may concern:

Be it known that I, EDWIN WRIGHT, of Northampton, in the county of Northampton, England, have invented a new and useful Improvement in Winding Mechanism for Going-Barrels, of which the following is a specification.

My invention relates to an improvement in the winding mechanism of watches, clocks, or other apparatus, in which are employed what are technically called "going-barrels"—that is to say, barrels in which the spring is so applied that the apparatus is kept going during the process of winding up; and by the use of my invention the spring is so wound up that the force it exerts upon the train of wheels is made less unequal than is usual, and the train of wheels is also kept entirely, or almost entirely, free from the severe and injurious strains which usually arise from accident or carelessness in terminating the winding, and moreover the train of wheels and also some other parts of the apparatus are rendered less liable to the injuries usually arising from the failure or breakage of the parts engaged in winding.

I obtain my object by the following means, illustrated by the accompanying drawings, in which—

Figure 1 is a view of the end or cover of the going-barrel. A recess, A, extending about half through the thickness of the metal, is formed upon the outside of the cover or end, and an arm, B, of tempered steel, is pivoted in the recess at A'. The thickness of the arm is equal to the depth of the recess, and at the end B' a stud or projection rises a convenient distance above the level of the arm. The end B' is bent at a convenient angle to the rest of the arm, so that it may clear the edge of the cover, as shown. The arm B is thus free to move to and fro in the recess A, and the stud B' is the only part of the arm that rises above the level of the barrel end.

A small portion of the edge of the barrel-cover is cut away at C, and a slot to correspond is cut directly under it in the opposite end or bottom of the barrel.

Fig. 2, D E, is a steel spring, provided at the end D with a hook, D', and at the end E with projections E' E', which are made to fit the slots C, Fig. 1. The spring, Fig. 2, at the

end E, is preferably about equal in width and strength to the mainspring, but is tapered or thinned down either edgewise or sidewise to a fourth or thereabout of that width, thickness, or strength, toward the end D, where a suitable head is left for carrying the hook D'. The spring, Fig. 2, is sprung into the barrel, (the inner edge of which may, if preferred, be recessed to receive it) and is held in place by the parts E' E' going into the slots C, Fig. 1. The length of the spring, Fig. 2, between the head at D and the projections at E, is preferably about equal to half the circumference of the barrel, and the outer end of the mainspring is attached to the hook D', the inner end being attached to the barrel-arbor as usual.

Fig. 3 is a disk, preferably of steel, of any convenient thickness, and upon its under side a spiral groove, F, is formed. The groove extends from the periphery of the disk to near the center, and the number of its turns is equal to the number of revolutions that the barrel-arbor is required to make in winding up the spring. The diameter of the disk is rather less than that of the barrel, and its edge is preferably thinned down upon the upper or plain side, so as to leave a boss of any convenient size in the center.

The inner end of the spiral groove terminates in a slot, G, which is cut through the disk and boss. The outer end of the spiral groove is left open at the periphery of the disk, the ridge or thick part of the disk slanting off to this opening and so terminating the groove, as shown at F'. The spirally-grooved disk, with its boss, is attached to the barrel-arbor by a square or other convenient device, so as to turn with it. The spirally-grooved side of the disk lies over the recessed barrel end, Fig. 1, but is held just free of it, and the stud B' of the arm B, Fig. 1, takes into and is held by the turns of the spiral.

Fig. 4 is an enlarged view of the upper side of the disk or boss and of the mechanism in connection therewith.

Part of the frame-plate H, or other suitable portion of the watch or apparatus, is cut away to receive the boss J, and the opening is surrounded by a ratchet, K. The ratchet may either be made as a separate part and fitted to the apparatus, or the spaces between the teeth

may be formed either wholly or partially, in or through the solid frame-plate or other convenient portion of the watch or apparatus.

L and M are clicks, and N is the click-spring, all working upon suitable pivots or studs in or on the boss or disk, and the click L is provided, at L', with a stud, which goes down through the slot G, Figs. 3 and 4, into the spiral upon the under side of the disk. The stud L' is hollowed out on the side nearest to the junction of the spiral groove and the slot, so as to furnish a secure hold for the stud B' of the arm B, Fig. 1. The end of the stud L' is shown in the slot G, Fig. 3.

The operation of the mechanism is as follows: The barrel and its accessories being put together, the barrel-arbor is turned round as far as is required to set up the spring, and the spirally-grooved disk is then brought down so that the stud B' of the arm B, Fig. 1, goes into the spiral groove at its outer end, and resting against the part F', Fig. 3, prevents the barrel-arbor turning back. When the frame is put together the boss J comes up through the opening inside the ratchet K, until the upper side of the edge of the disk comes into contact with the under side of the frame-plate H, and the barrel-arbor is so proportioned that when the frame is fixed together the disk is held flat up against the plate H, and the boss J being accurately fitted to the opening, the disk and boss are free to turn with the barrel-arbor and form for it a firm and solid bearing, no pivot being necessary. The clicks L and M and the click-spring N are then placed in their respective positions upon the boss, and the watch may be wound up. When the barrel-arbor is turned by means of the key it turns with it the disk and boss, and the ends L³ and M' of the clicks L and M, having an outward tendency imparted to them by the click-spring N, rise and fall over the ratchet-teeth and prevent the barrel-arbor running back. As the winding proceeds the gradually-increasing force of the mainspring draws the spring D E, Fig. 2, over in the form of a curve, the head and the hook D' leaving the rim of the barrel and moving nearer to the barrel-arbor, and the effect of this is that the mainspring is wound more centrally round the barrel-arbor, and also that the force it exerts upon the train of wheels in unwinding is made much less unequal than is the case when the mainspring is attached direct to the barrel in the usual manner. In the meantime the stud B' of the arm B, Fig. 1, is carried along the spiral groove F, Fig. 3, until it comes into contact with the stud L' of the click L, which stud, as before explained, passes down through the slot G, Figs. 3 and 4, to the spiral groove at the under side of the disk, and as the barrel-arbor, with the disk and boss, still continues to turn, the stud L' is pushed by the stud B' along the slot G, and so moves the click L over until the point L⁴ of click L passes the end N' of the click-

spring N, and the click L then immediately shoots over, and its end L², going into one of the spaces between the ratchet-teeth, prevents the winding being carried any farther. By this means the strain caused by the sudden check at the end of the winding is borne by the frame-plate H or other substantial portion of the watch or apparatus, instead of being conveyed to the train of wheels, as is the case where winding mechanism of the usual kind is employed; and here some of the great advantages of this invention become apparent, for it is evident that the entire arrangement can be made so strong that, short of wrenching the winding-square bodily off, no injury can occur to the mechanism, however much or in whichever direction force is applied to turn the key or winder.

Fig. 4 shows the position of the mechanism when the winding is brought to an end in the manner just described, and it now remains to release the end L² of the click L from the ratchet K, and to bring its end L³ down to the ratchet again, in readiness for the next winding, and this I do without offering any impediment to the ordinary running down of the watch or apparatus. When the pressure of the key is removed the pull of the mainspring draws the barrel-arbor backward, the end L² of click L rises to the top of the tooth K², the end M' of click M falls into the space K', and at the same time the end N' of the click-spring N comes backward over the point L⁴ of the click L, and, sliding down the longer of the two inclined surfaces of click L, moves the said click over into its original position as soon as the stud B' recedes from the slot G.

The click-spring N derives its peculiar motion from the manner in which it is attached to the boss and connected with the click M, and I prefer to leave the part N² soft, so that by bending it slightly in either direction, as required, the end N' may be adjusted to pass and repass the point L⁴ of click L at the proper times.

To find the proper adjustment of the click-spring N, wind the mainspring partly up, so as to leave the barrel-arbor supported—i. e., kept from running back—by the click M, and move the click L over until its end L² comes into contact with the top of one of the ratchet-teeth. Then adjust the click-spring so that its end N' has just a safe bearing on the longer of the two inclined surfaces of click L.

When the watch is going the arm B is carried round with the barrel, and the stud B' travels backward along the spiral groove until it comes into contact with the part F', Fig. 3, and the watch is then run down.

Referring again to Fig. 1, it will be seen that the arm B, when lying near the periphery of the barrel, comes into contact with the edge of the recess A at a point near to the pivot A', and that the stud B' stands a short distance from the edge of the recess. When in this position, which is shown in Fig. 1, the edge of

the stud B' is just level with the outer end of the spiral groove, and if the stud B' is moved nearer to the outer edge of the recess the elasticity or springiness of the arm B is called into action. When, therefore, the stud B' comes into contact with the part F', Fig. 3, in the natural running down of the watch, it meets with sufficient resistance to stop the watch altogether; but should the barrel-arbor suddenly recoil, through breakage of the click or other similar cause, the stud B' springs over the part F' and is conducted to the outside of the spiral disk, while the force is harmlessly expended.

Should the click-spring M, Fig. 4, break, the barrel-arbor cannot recoil, nor can it be turned in either direction, for the click M is so adjusted that when either end rises to the top of a ratchet-tooth the opposite end slightly dips into a space between two other teeth, (see M², Fig. 4,) and unless some force such as that of the click-spring is present to lift it out again it catches the first tooth it comes to and arrests the motion of the barrel-arbor.

If the click L is adjusted in a similar manner the click M may, if preferred, be dispensed with altogether, and in that case it will be found sufficient to cause the stud B' of arm B, Fig. 1, to lift the click-spring off from the click L, and the winding will be immediately arrested; but as the action under these conditions is less prompt than under those I have previously described, I prefer to use the click M, the more so as the use of the two clicks imparts additional strength to the mechanism.

If it is desired that only one click should act during the winding up I prefer to shorten the slot G, so that the end L³ of click L is held free of the ratchet. The click L will then remain stationary upon the boss until acted on by the stud B'. The part L⁵ of click L may be left soft, so as to afford a means of adjustment by bending.

It may be as well to mention here that the thin or elastic portion of the click-spring N branches off to the click L from a point intermediate between the pivot of the click-spring and its point of contact with the click M, and also that the click L is so adjusted that after either end leaves the ratchet the click has to move on a little distance before the opposite end reaches the ratchet. The effect of the motion of the click-spring is that there are two points from which the click L shoots. In moving toward the ratchet L² shoots before it reaches it, and in leaving the ratchet L² shoots before it reaches the top of the tooth or before it gets clear of the ratchet.

For keyless watches the ratchet K is attached to or cut in the barrel-wheel of the usual toothed gearing, and is turned by means of the milled button at the pendant in the ordinary manner. The end L³ of click L being engaged in the ratchet, the barrel-arbor and the disk and boss are carried round with it.

The barrel-arbor is supported upon the plate

by the click M, or by the ordinary ratchet-work, and when the stud B' of arm B, Fig. 1, comes into contact with the stud L' of click L, through the slot G, Figs. 3 and 4, at the end of the spiral groove, as before described, the click L is moved over, and its end L³, being withdrawn from the ratchet-teeth, the winding is brought to an end without strain upon the mechanism; and should the wearer of the watch still continue to turn the pendant button, the barrel-wheel turns harmlessly round upon the boss J, the easy motion of the button, of course, indicating that the watch is sufficiently wound.

The end L³ of click L, and also the slot G, are cut concentrically with the pivot of the click L; but I prefer to cut the ends L², M', and M² of the clicks L and M so that their tendency is to draw into the ratchet when subjected to pressure.

I prefer to set up the spring just sufficiently to free all its coils in the barrel, and, for convenience as regards the setting up, I have arranged the direction of the spiral so that the stud B' of the arm B, Fig. 1, works out toward the periphery of the barrel as the watch runs down; but the direction of the spiral may be reversed, if desired, and the other parts of the mechanism rearranged to suit the altered direction. In this, as in other matters, I have set forth what I consider to be the best arrangement of the mechanism for general purposes; but the various parts may, of course, be rearranged, distributed, modified, or duplicated, as may best suit the requirements of the apparatus to which my invention is to be applied.

The disk and boss may be formed in a solid piece with the barrel-arbor, and the whole will then afford a support for a hanging barrel.

I prefer to recess out the upper side of the boss or disk to receive the clicks and the click-spring, and to spring or otherwise secure a cover on, so as to exclude dirt and prevent the clicks and the click-spring working off from their pivots. The disk and boss may be fitted at either end of the barrel. If it is desired to place them at the same end as the center wheel a groove should be cut partly through the under side of the boss for the edge of the center wheel to run in. Another convenient plan for securing the clicks and the click-spring is to cut or stamp the ratchet K in both the frame-plate and the name-plate or in the barrel-bar, so that when the latter is screwed down it forms the cover for the boss and imparts additional strength to the ratchet-work.

The arm B is curved so as to allow sufficient strength in the edge of the recessed barrel end, and I prefer that the length of the arm B should not exceed the radius of the barrel.

If desired, the arm B may be fitted inside the barrel and the stud B' brought up through a suitable slot, the end of the arm being also brought slightly up and supported in a narrow recess carried beyond the slot on the upper

side of the barrel end. This arrangement is shown by the dotted lines A², Fig. 1.

A portion of the arm B² (shown by dotted lines and also in the separate drawing of the arm in Fig. 1^a) may be continued down through the barrel and pivoted at its under side. Then, as the arm B is moved by the spiral, the inner edge of B² will be carried nearer to or farther from the center of the barrel, and if the outer end of the mainspring be hooked round the inner edge of B² (the spring pulling across the pivots of the arm) a means of partial adjustment will be afforded; but although this plan may be found sufficient for very long and slender springs, I do not consider it equal to the one I have previously described. The extension B² may, however, be used in connection with the spring D E, Fig. 2, and it has this advantage, that if the mainspring should break during or after the process of winding the shock will be materially diminished, because the part B² follows the mainspring up as it is wound into the middle of the barrel, and the arm B, (of which B² is a part,) being held by the spiral, cannot fly back, and the broken spring is therefore prevented from so suddenly expanding, thus tending to preserve both the barrel itself and the center pinion from injury.

Having now described my invention, I wish it to be understood that what I claim, and desire to protect by Letters Patent, is—

1. As an improvement in clocks or watches, the combination, with the spring-barrel provided with an interior peripheral recess and the mainspring of an auxiliary detachable spring rigidly attached to said barrel at one end, the free end serving as an attachment for the outer end of the mainspring, all arranged and operating substantially as and for the purposes specified.

2. As an improvement in clocks or watches, the combination, with the spring-barrel provided with an interior peripheral recess and the mainspring, of a horizontally and vertically tapering auxiliary detachable spring having its wide and thick end rigidly attached to said barrel, its narrow thin end serving as an attachment for the outer end of the mainspring, all arranged and operating substantially as and for the purposes specified.

3. As an improvement in clocks and watches, the combination, with a spring-barrel provided with slots in its opposite ends at the periphery and an interior peripheral recess, and the mainspring, of an auxiliary detachable spring having projecting shoulders to fit the slots in the barrel for rigidly attaching one end of the spring thereto, the other or free end being provided with means to secure the outer end of the mainspring, all arranged and operating substantially as and for the purpose specified.

4. As an improvement in clocks or watches, an attachment to the mainspring, which consists of a horizontally and vertically tapering auxiliary and detachable spring provided at

the wide and thick end E with projecting shoulders E', for rigidly attaching it to the barrel, and at the narrow thin end D with an enlargement or head, D', or its equivalent, for the attachment of the mainspring, said auxiliary spring being of a length equal to about one-half the circumference of the spring-barrel, substantially as described, and for the purposes specified.

5. The disk or plate F, boss J, and barrel-arbor, in one solid piece, as a support for a hanging barrel when said disk and boss are in a suitable manner supported or retained in position by the frame-plate or other convenient part of the watch or apparatus to which they are applied.

6. In going-barrels for time-pieces, the combination, with the barrel, its arbor, the mainspring, and locking devices for said mainspring, of a pawl or lever actuated by and made to follow the convolution or winding path of the mainspring, and actuating the locking devices when said mainspring is fully wound up independently of the barrel, to stop the further winding and transfer the strain of said mainspring to the locking devices, as set forth.

7. In going-barrels for time-pieces, the combination, with the barrel, its arbor, the mainspring, and a pawl or lever actuated by and made to follow the evolution or unwinding path of said mainspring, of a stop or abutment for said pawl, to stop the further unwinding or the arbor from turning back independently of said barrel, substantially as set forth.

8. In going-barrels for time-pieces, the combination of the mainspring, the arbor, and the barrel, provided with a recess, A, the lever or arm B, operating within said recess, a spirally-grooved and slotted disk mounted on and rotating with the arbor, and carrying a spring pawl or pawls, with a stationary ratchet, all arranged and operating as set forth.

9. In going-barrels for clocks or watches, the combination, with the barrel, its arbor, the mainspring, and a disk provided with a spiral groove terminating in a peripheral recess, F', of a vibrating arm projecting within the groove of the disk to lock the arbor and prevent it from turning back when said arm has reached the recess F', substantially as described.

10. In going-barrels for time-pieces, the combination, with the barrel, its arbor, the mainspring, and the vibrating arm B, of the disk J, provided on its under side with a spiral groove terminating in a slot, G, and carrying the pivoted pawls L M, and a pivoted spring-arm N N², and the ratchet K, all arranged and operating substantially as described, and for the purpose specified.

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Witnesses:

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