L. C. COLLINS.

POSITIVE DRIVING MECHANISM FOR THE HANDS OF TIMEPIECES.

APPLICATION FILED JUNE 19, 1912.

1,136,866.

Patented Apr. 20, 1915.

2 SHEETS—SHEET 1.

Fig. 1

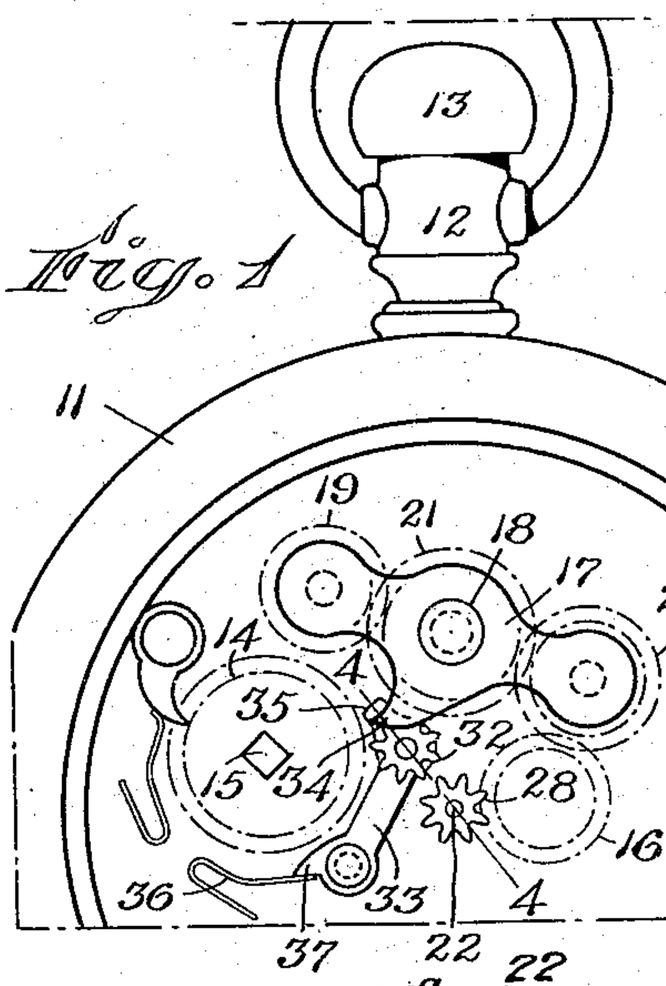


Fig. 3

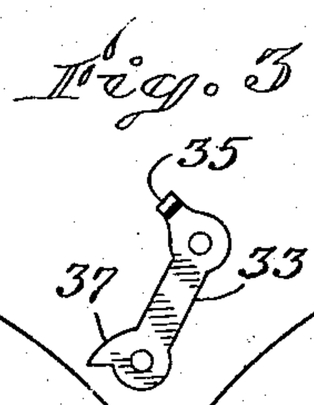


Fig. 2

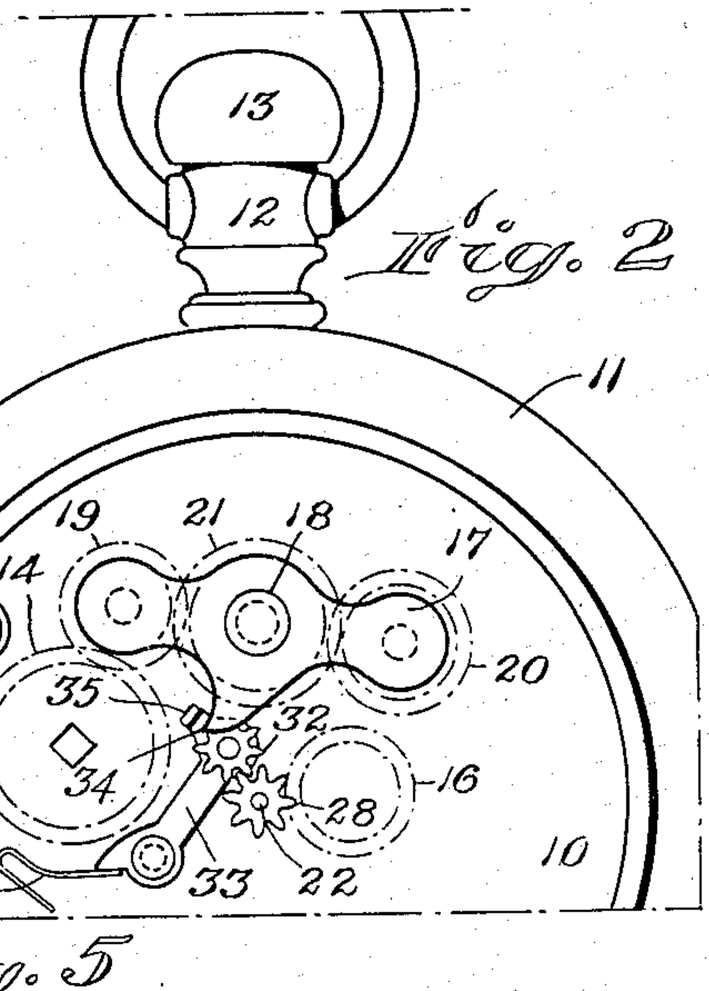


Fig. 4

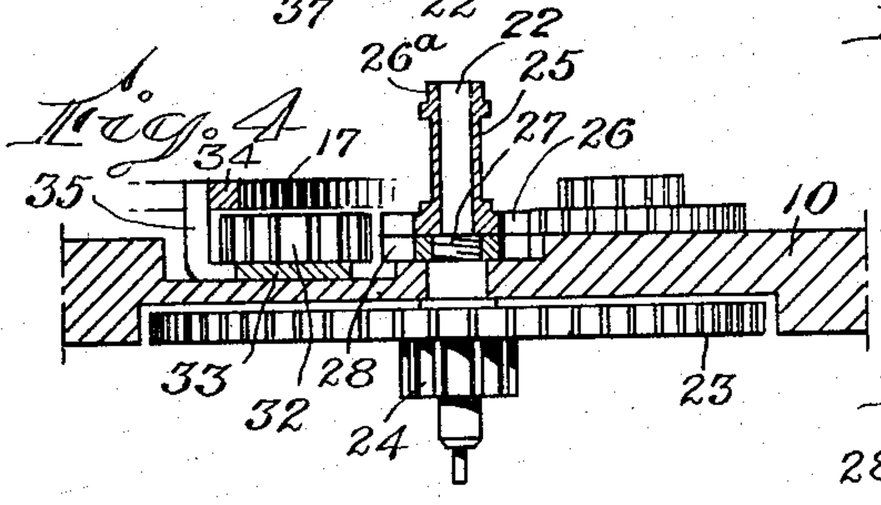


Fig. 5

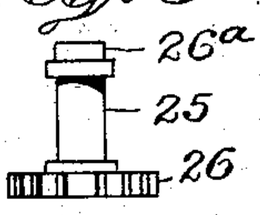


Fig. 7

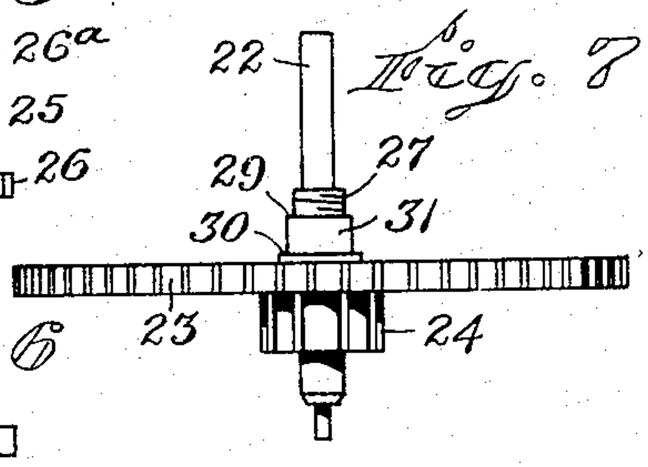


Fig. 6

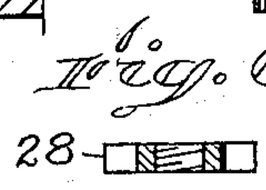


Fig. 6a

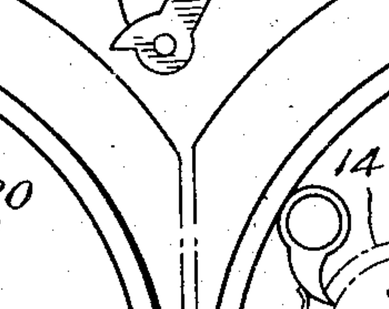


Fig. 8

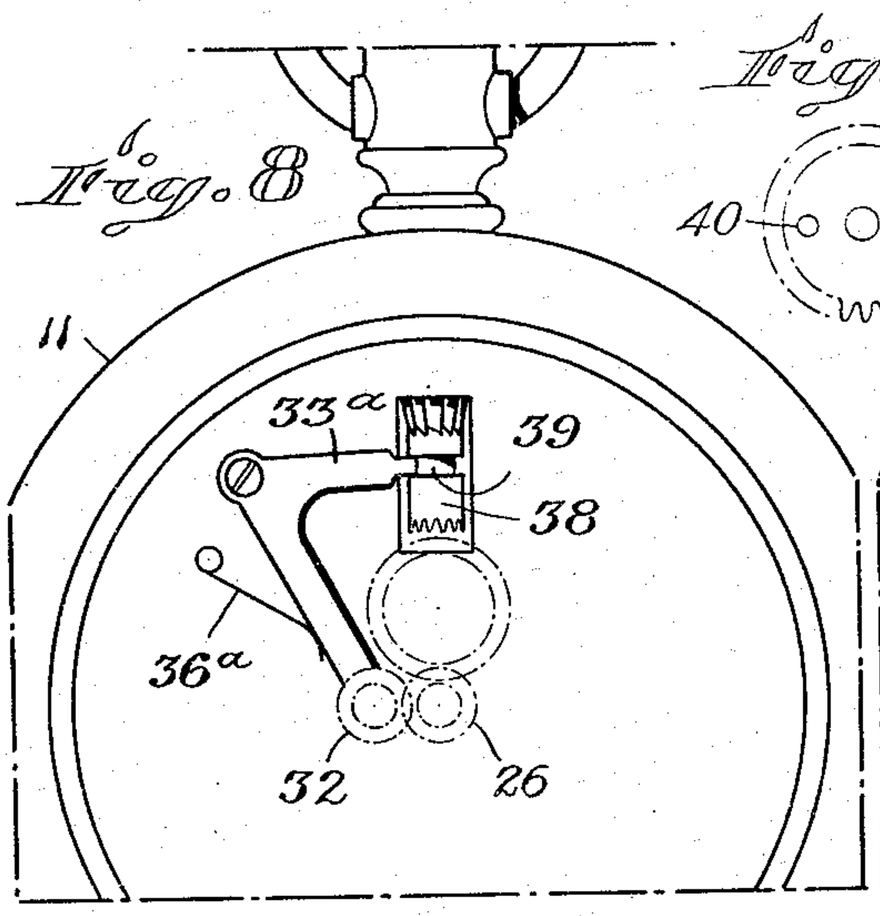
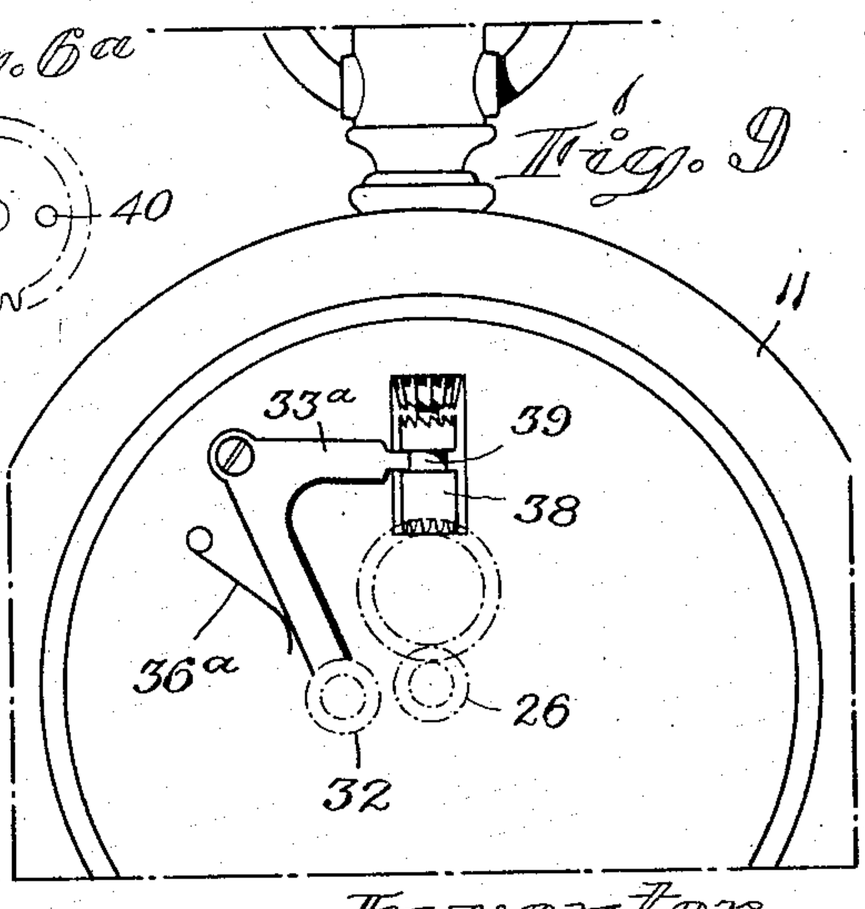


Fig. 9



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2 SHEETS—SHEET 2.

Fig. 10.

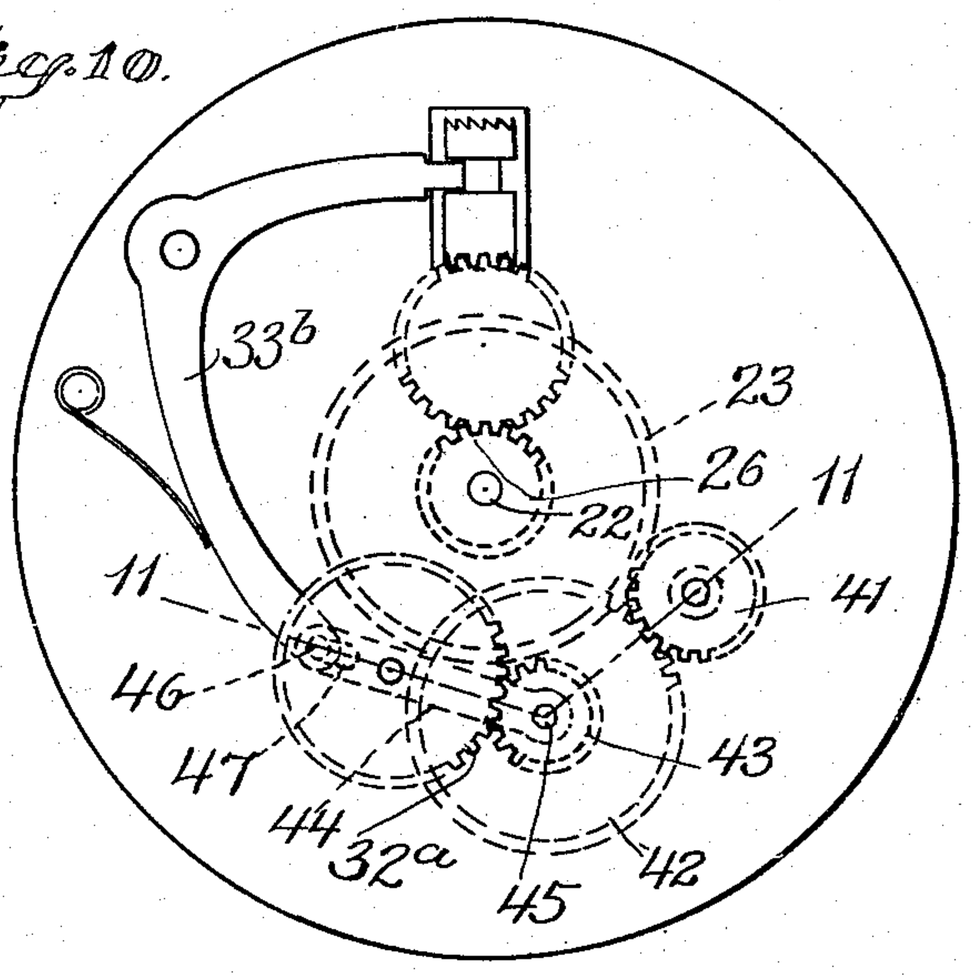


Fig. 11.

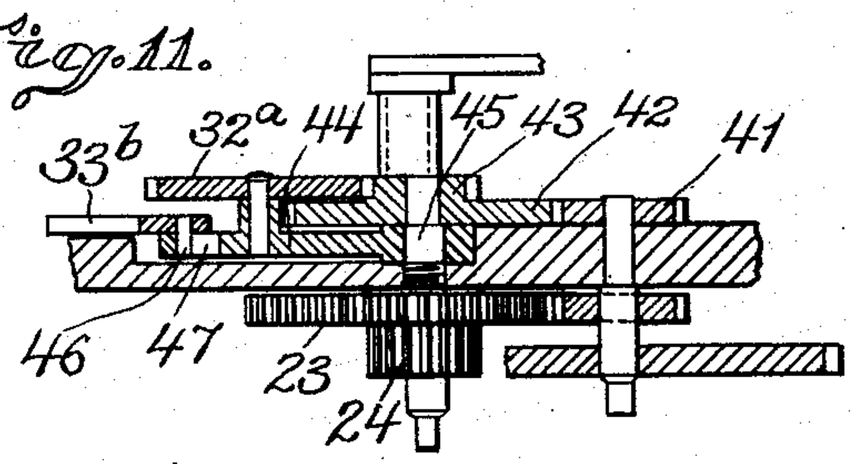


Fig. 13.

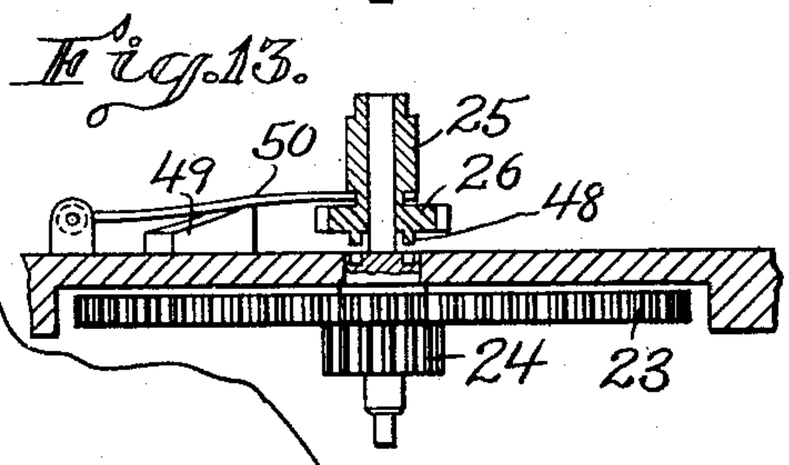


Fig. 12.

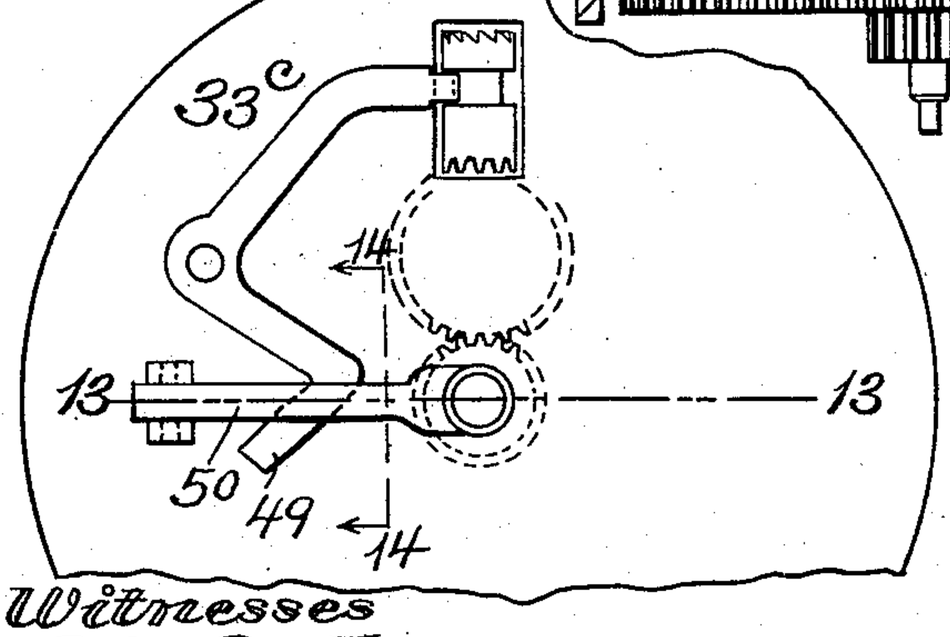
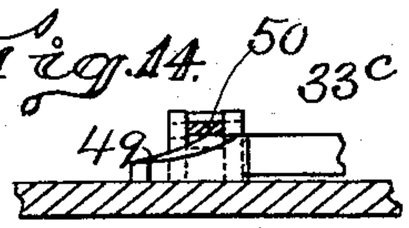


Fig. 14.



Witnesses

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UNITED STATES PATENT OFFICE.

LEON C. COLLINS, OF ROXBURY, MASSACHUSETTS, ASSIGNOR OF ONE-THIRD TO CHARLES WAGNER, OF SUFFOLK COUNTY, MASSACHUSETTS.

POSITIVE-DRIVING MECHANISM FOR THE HANDS OF TIMEPIECES.

1,136,866. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed June 19, 1912. Serial No. 704,653.

To all whom it may concern:

Be it known that I, LEON C. COLLINS, a resident of Roxbury, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Positive-Driving Mechanism for the Hands of Timepieces, of which the following is a specification.

The object of the present invention is to provide a means by which the hands of a watch or clock may be positively connected with the movement with consequent elimination of the necessity of a frictional connection, which has hitherto been the mode of connection universally employed in watch construction. The frictional engagement between the hands and the center staff of the watch or clock movement, which has hitherto been considered necessary in order to permit setting of the hands, is a cause of inaccuracy because it is frequently insufficiently secure and the hands are therefore liable to fail to move in exact synchronism with the mechanism, resulting in loss of accuracy.

My invention is designed to overcome this defect by making it impossible for the hands to slip or stick fast while the movement continues to run, and it also permits setting of the hands independently of the movement by the manner of arranging the positive connection, which permits it to be disconnected at the time of setting.

A construction embodying the principles of my invention is described in detail in the following specification and illustrated in the accompanying drawings, this embodiment being only one of many possible constructions which may be made without departing from the principles of the invention.

In the drawings the timepiece is represented as a pocket watch, and in the following specification it is described as such, this representation and description being intended for the purpose of illustration only and not as limiting me in any way as to the character of timepiece to which the invention may be applied.

In the drawings: Figure 1 is a front elevation of the watch with the hands and dial removed, showing the mechanism embodying my invention in the position for setting; Fig. 2 is a similar view showing the mechanism in position for winding and running, which is the normal position; Fig. 3 is a detail; Fig. 4 is an enlarged detail section on line 4—4 of Fig. 1; Fig. 5 is an elevation of a pinion and sleeve connected thereto adapted to carry the minute hand of the watch, the same being commonly known as a cannon pinion; Fig. 6 is a sectional view of a pinion forming one of the parts of the present invention; Fig. 6ª is a partial plan view of a modification of such pinion; Fig. 7 is an elevation of the center staff wheel and pinion; Figs. 8 and 9 are views similar to Figs. 2 and 1 respectively, showing the invention applied to a watch having a different type of winding and setting mechanism. Fig. 10 is a front view of a watch with the dial removed, showing a modification of the driving connection for the hand carrier. Fig. 11 is a sectional view taken on line 11—11 of Fig. 10. Fig. 12 is a front view showing another modification of the invention. Fig. 13 is a sectional view on line 13—13 of Fig. 12. Fig. 14 is a sectional view on line 14—14 of Fig. 12.

Referring to the drawings, 10 represents the pillar plate of a watch movement, 11 the case in which the movement is mounted, 12 the pendant of the case, and 13 the winding and setting crown.

14 represents the winding wheel connected to the mainspring arbor 15.

16 is a setting wheel and 17 is a bridge oscillating upon the center 18 and carrying idle pinions 19 and 20 meshing with a wheel 21 which is driven by the crown 13, by mechanism which is old and common and is therefore not here shown, for either winding the mainspring or setting the hands of the watch.

Referring now to Fig. 4, 22 represents the center staff of the watch movement, on which are fixed the center wheel 23 and pinion 24, the same being held in the pillar plate 10. Surrounding the center staff is a sleeve 25 having at one end a bearing face 26ª on which is fastened the minute hand, and connected at the opposite end to a pinion 26, said sleeve and pinion together constituting what is known as the cannon pinion. Said cannon pinion also serves as a bearing for the sleeve carrying the hour hand, which is driven by the usual gearing, neither the hour hand or such gearing being here shown because they may be of any

well-known type. Rigidly secured to a threaded portion 27 of the center staff is a pinion 28, which abuts against a shoulder 29 on the staff. The thread is left-handed in order to avoid danger of loosening the pinion when the staff rotates. There is a slightly greater distance between the shoulder 29 and another shoulder 30 on the center staff, which underlies the pillar plate, than the thickness of that part of the plate in which the journaled 31 of the staff is contained, to provide sufficient end shake of the staff to allow it to turn freely in its bearing.

The pinions 26 and 28 have the same number of teeth, and lying beside and meshing with them is a pinion 32 having a sufficient width of face and being so placed that its teeth may engage simultaneously with the teeth of both pinions 26 and 28. Said pinion 32 is mounted on an oscillating arm 33 so that it may be brought into and out of mesh with the other pinions. It will be seen that when the pinion 32 is thus in mesh it furnishes a positive connection between the pinions 26 and 28, making the cannon pinion in effect an integral part of the center staff so that the latter are inevitably compelled to rotate in unison and any relative movement between the hands and watch mechanism is prevented. However, when the hands are to be set it is only necessary to displace the pinion 32 far enough to clear the pinions 26 and 28, whereupon the cannon pinion is released and the hands may be freely turned. The movement of pinion 32 for this purpose is accomplished by the same act which places the winding and setting mechanism in the position for setting. For this purpose the pivoted bridge 17 has a hook or shoulder 34 which engages a lug or other projection 35 on the arm 33, which lug is held against the projection by a spring 36 fastened to the pillar plate and bearing against the shoulder 37 on the arm. When the bridge 17 is in the position shown in Fig. 1, which is that for setting, connection is made between the wheel 21 and the setting pinion 16, the other or winding pinion 19 being disengaged from the winding wheel 14. At the same time the connecting pinion 32 is held clear of the pinions 26 and 28. On the other hand, when the bridge 17 is in the position for winding, which is also the normal position for running, the connection with the setting pinion is broken and the connecting pinion 32 is in operative position, all as shown in Fig. 2. The bridge may be moved into these two positions by any of the means hitherto used, as by endwise movement of the stem or by a lever exposed at the side of the case, or otherwise.

In Figs. 8 and 9 is shown the application of my invention to a type of watch movement in which the winding and setting mechanisms are connected with the stem by an endwise movable clutch 38 having two sets of teeth on its opposite ends respectively. The clutch has a groove 39 which receives the part of a lever 33^a carrying the pinion 32 in the same arrangement relatively to the pinions 26 and 28 as that already described. The location of lever 33^a is such that when the clutch is in the position for winding and running, as shown in Fig. 8, the connection between the cannon pinion and center staff to the connector pinion 32 is made, and when the clutch is in the position for setting, as shown in Fig. 9, this connection is broken. Any of the mechanisms now in common use for moving clutches of the nature of the clutch 38 now in common use may be employed, and as my invention does not reside in any such mechanism, but only in the application of my hand connector thereto, such mechanism is not shown.

Preferably the teeth of the pinions 26, 28 and 32 are pointed in order that after setting of the hands the pinion 32 may come into proper mesh even though the cannon pinion should not have been left in alinement with the pinion 28. Preferably the pinions 26 and 28 will have a comparatively large number of teeth, greater than that shown in Figs. 1 and 2, and the pinions may also be made of relatively larger diameter. This is in order that there may not be any appreciable displacement of the hand when the connector pinion is brought into operation after setting. For the same object the connection between the hand and center staff, instead of being made directly between pinions concentric with the hand and center staff, may be made through other pinions in mesh therewith at a distance therefrom, and having a step-down gear ratio, as shown in Figs. 10 and 11, where 41 represents a pinion on another arbor of the watch movement, which is driven by the center wheel at a higher speed, the double pinion 42, 43, represents the step down gearing, and 32^a the connector pinion operated by a lever 33^b to mesh with the cannon pinion for setting and to be disconnected therefrom for winding and running, in essentially the same way as described in connection with Figs. 8 and 9. It is not material to this embodiment of the invention how the connector pinion is here mounted, but it may conveniently be carried by an arm 44 swiveled on the pivot 45 of the double pinion and engaged with the operating lever by a pin and slot connection, a pin 46 on said lever entering a slot 47 in the arm. Indeed, many modifications may be made in the construction and location of the connecting elements without departing from the spirit of my invention, and

I consider that any construction in a time-piece having manually operable winding and setting mechanism, embodying a holder for the minute hand, such as a cannon pinion, capable of moving independently of the movement, in combination with a positive connector shiftable to make positive driving connection between the holder and movement for winding and running, and to break the connection for setting, is within the scope of my invention and is covered by the more generic of my appended claims.

The pinion 28 may be provided with sockets 40 for reception of a tool to be used in screwing it on and unscrewing it from the center staff, as shown in Fig. 6ª, in order to avoid danger of injuring the teeth of the pinion, particularly in case such teeth should be fine and delicate.

It will be observed that the pinions 26 and 28 constitute in effect parts of a clutching device for securing the loosely arranged hand upon a rotating staff, and that the pinion 32 is a connector complemental to these clutching members for making the connection between them. Such pinions may be considered as typical of any sort of clutch and connector operated for the purpose, and therefore I declare that I do not limit my invention to these specific elements, but include within its scope any form of clutch or connector suitable for accomplishing the desired end, wherever the same may be situated. One such form comprises the provision of a face clutch or the like on the under side of the cannon pinion, engaging a complemental clutch provided on the center staff in place of the threaded portion 27, such as the pins 48 and complemental sockets shown in Fig. 13, and a cam element 49 connected with the setting mechanism through the lever 33ᶜ and engaging an arm which is engaged with the cannon pinion, the arrangement being such that when the setting mechanism is arranged for setting, the cannon pinion is lifted clear of the complemental clutch, whereby it may rotate independently of the center staff.

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

1. In a time-piece the combination with a hand setting wheel, of a center staff, a cannon pinion mounted thereon and meshing with said hand setting wheel, means for positively connecting said center staff and said cannon pinion to rotate in unison at the same speed, and means for controlling said hand setting wheel, said controlling means being provided with means for acting on the connecting means to disconnect said center staff and cannon pinion.

2. In a time piece the combination with a hand setting wheel, of a center staff, a cannon pinion mounted thereon and meshing with said hand setting wheel, a pivoted lever, means carried by said lever for connecting said center staff and said cannon pinion to rotate in unison at the same speed, and controlling means connected with said hand setting wheel for shifting said lever.

3. In a time piece the combination with a hand setting wheel, of a center staff, a cannon pinion mounted thereon and meshing with said hand setting wheel, a member rigidly connected to said center staff, a movable member for connecting said cannon pinion with the rigid member of said center staff, and means for controlling said hand setting wheel, said controlling means being provided with means for shifting said connecting member.

4. In a time piece the combination with a hand-setting wheel, of a center staff, a cannon pinion mounted thereon and meshing with said hand setting wheel, a pinion rigidly connected to said center staff and corresponding with said cannon pinion, a pivoted lever, a pinion carried thereby and arranged to mesh with said cannon pinion and the pinion on said center staff, and means connected with the setting wheel for shifting said lever.

5. In a time piece the combination with a hand setting wheel, of a center staff, a cannon pinion mounted thereon and meshing with said hand setting wheel, a pivoted lever provided with an offset portion, and means connected with said lever for connecting said cannon pinion and center staff, and a movable member connected with said setting wheel to engage the offset portion of said lever.

In testimony whereof I have affixed my signature, in presence of two witnesses.

LEON C. COLLINS.

Witnesses:
ARTHUR H. BROWN,
J. MURPHY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."