

March 18, 1924.

1,487,434

F. W. BOLD

INTERMITTENTLY OPERATED ACTUATING MECHANISM

Filed Dec. 31, 1921

4 Sheets-Sheet 1

10) *Fig. 1.*

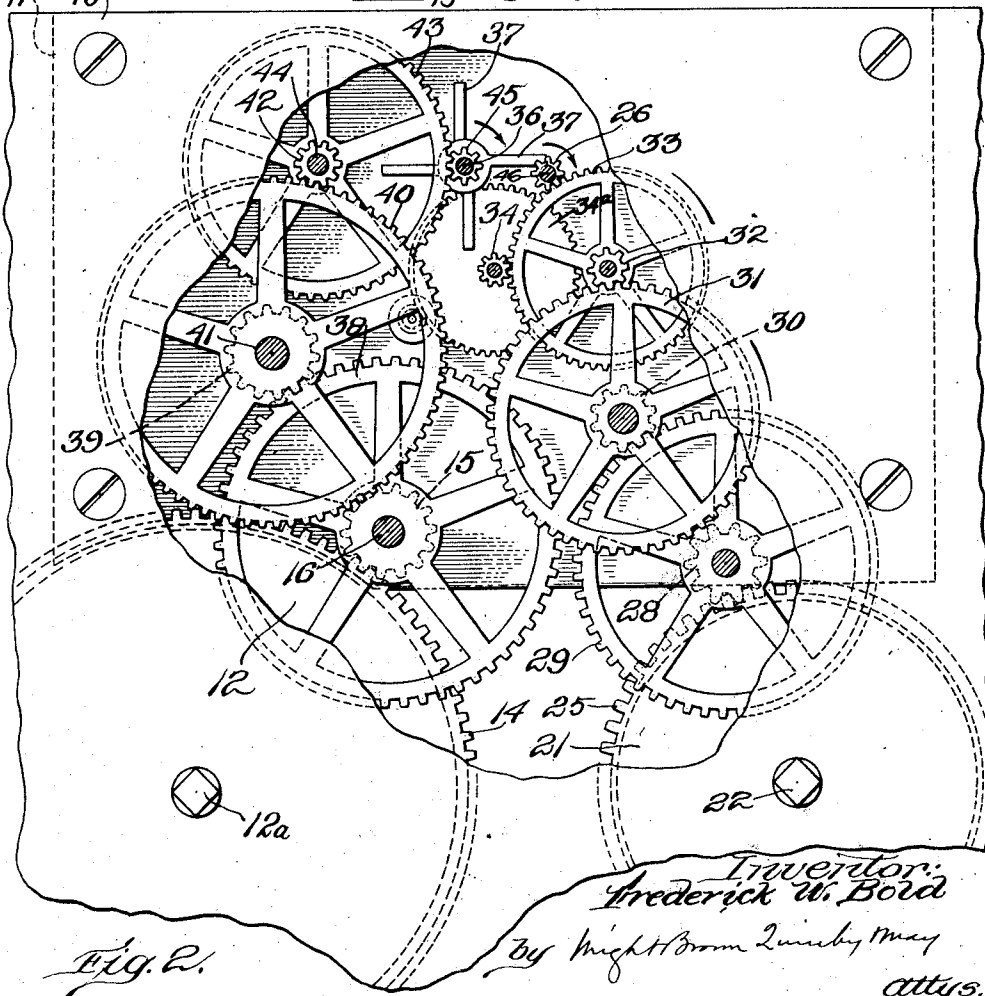
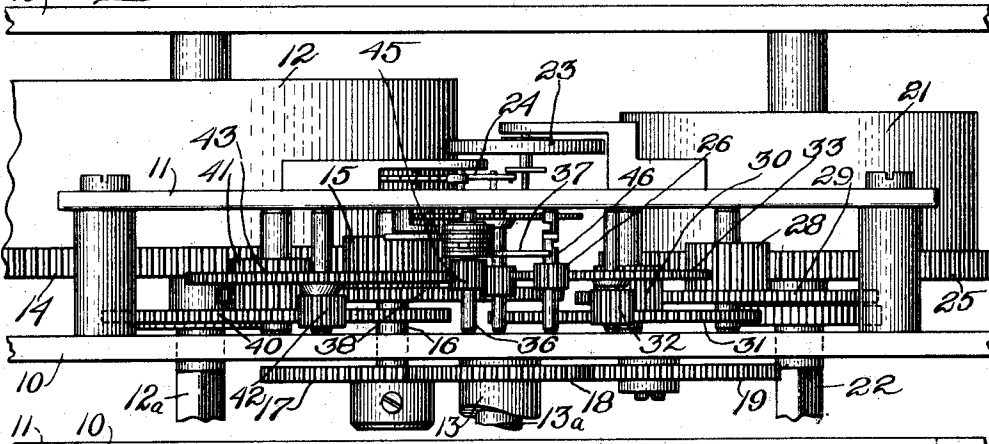


Fig. 2.

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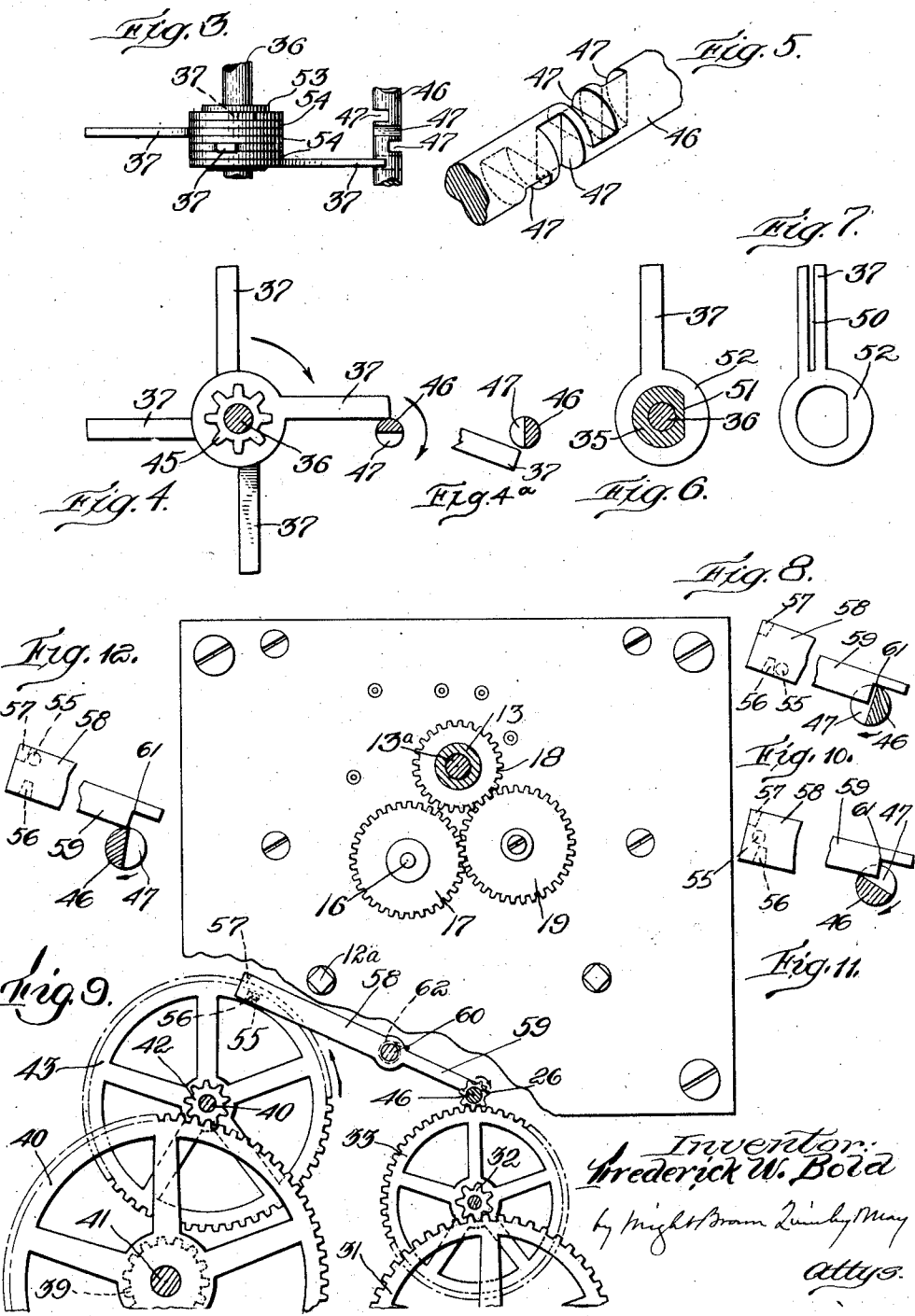
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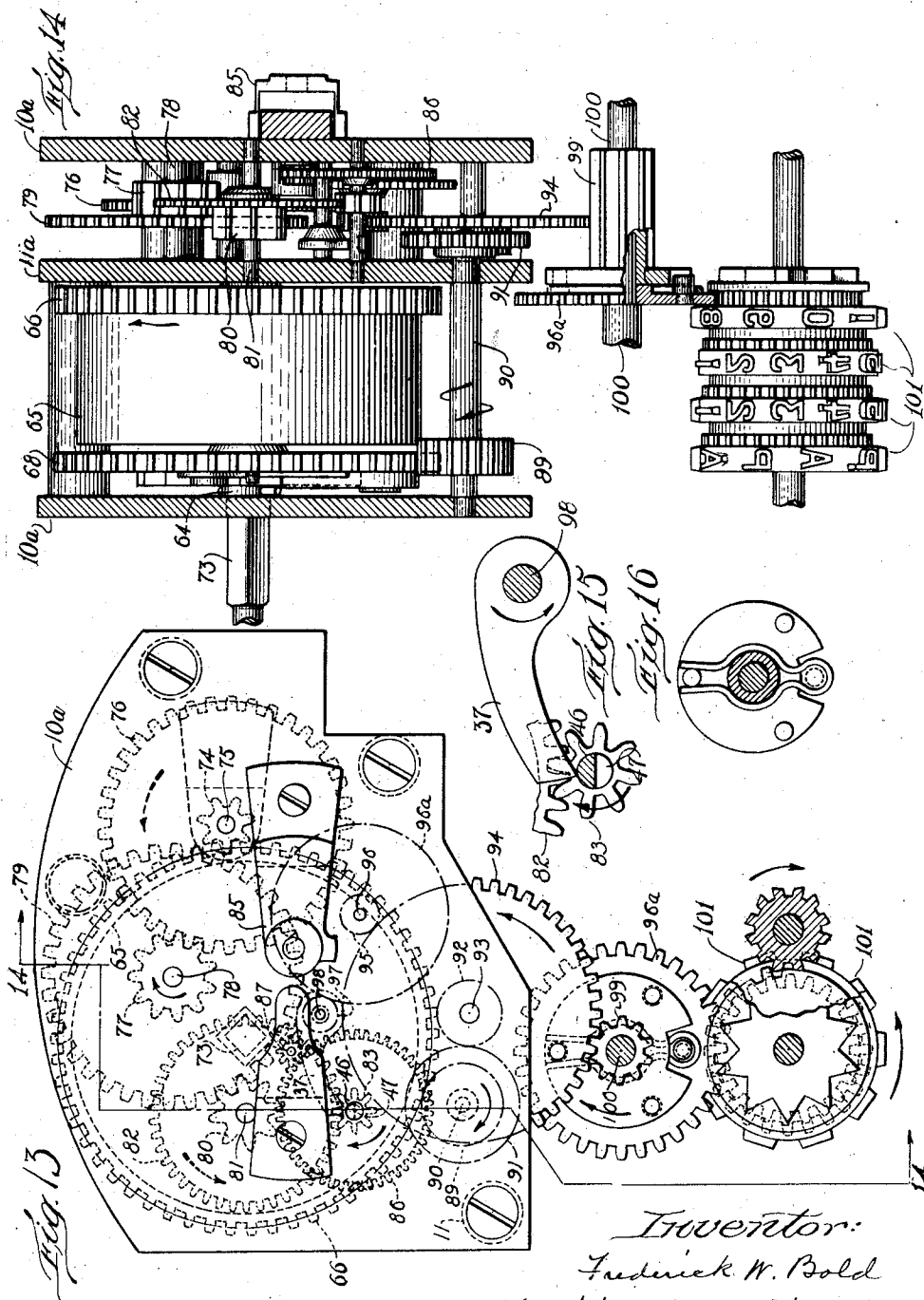
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4 Sheets-Sheet 3



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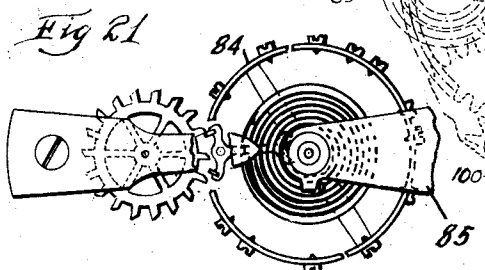
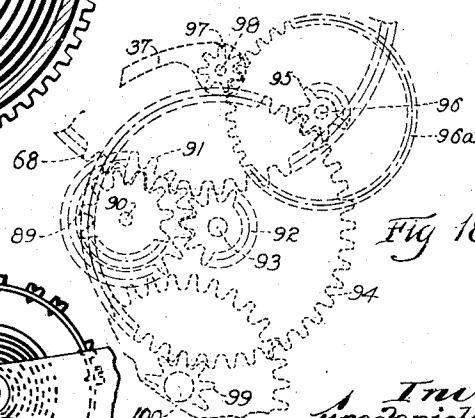
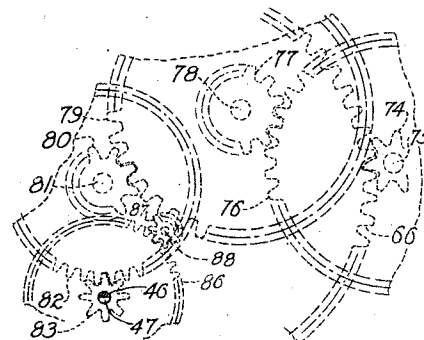
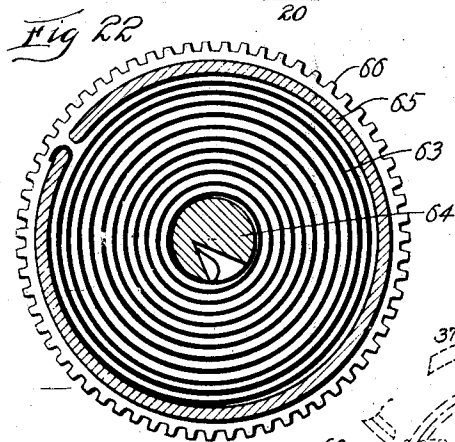
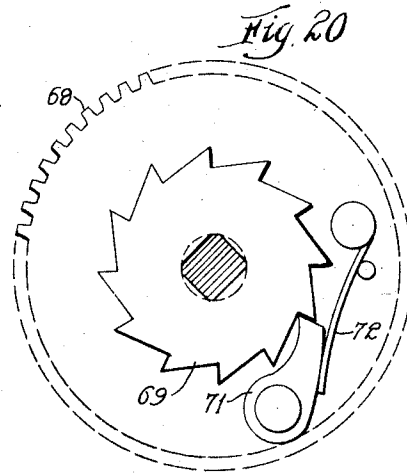
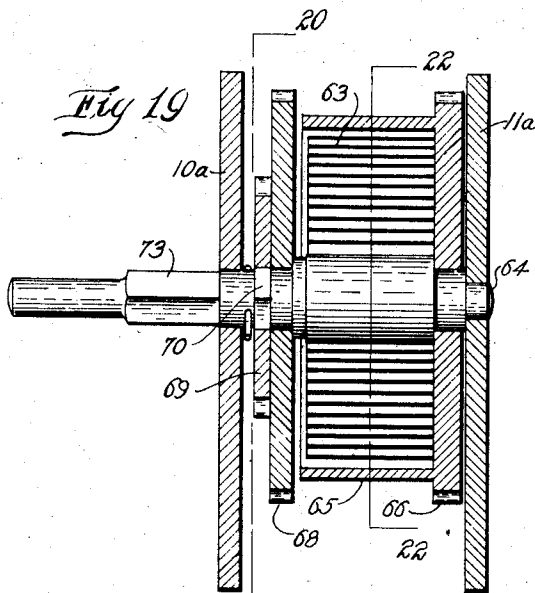
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INTERMITTENTLY OPERATED ACTUATING MECHANISM

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

FREDERICK W. BOLD, OF CHELSEA, MASSACHUSETTS, ASSIGNOR TO BOSTON CLOCK COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

INTERMITTENTLY-OPERATED ACTUATING MECHANISM.

Application filed December 31, 1921. Serial No. 526,438.

To all whom it may concern:

Be it known that I, FREDERICK W. BOLD, a citizen of the United States, residing at Chelsea, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Intermittently-Operated Actuating Mechanism, of which the following is a specification.

This invention relates particularly to actuating mechanism including a motor adapted to operate continuously for a protracted period, the motor being alternately allowed to operate and restrained from operation.

The invention is embodied in an actuating mechanism of this character, comprising a motor-driven power-transmitting train, a continuously operating time train movement whose only duty is to operate a power let-off adapted to alternately stop the power train, and permit it to start, said duty being so light that the operation of the time movement is not retarded or otherwise affected thereby, so that the periods of operation of the power train are accurately timed.

Of the accompanying drawings forming a part of this specification,—

Figure 1 is an edge view, showing a power train, a time movement, and a let-off embodying the invention, portions being broken away.

Figure 2 is a side view of the structure shown by Figure 1, portions being broken away, and various arbors of the power and time movement trains being shown in section.

Figure 3 is a fragmentary view, showing enlargements of parts shown by Figure 1.

Figure 4 is a view showing in side elevation the arms, and in section the slotted let-off member shown by Figure 3.

Figure 4^a is a fragmentary view, showing parts represented by Figure 4, in different relative positions.

Figure 5 is a perspective view showing a portion of the slotted let-off member.

Figure 6 is a side view of an arm constituting a let-off member, the arm-carrying hub being shown in section.

Figure 7 is a side view showing an arm of yielding construction.

Figure 8 is a side view showing one of the frame plates shown by Figures 1 and 2,

and parts of the mechanism supported thereby.

Figure 9 is a fragmentary view similar to portions of Figure 2, showing a modification of the let-off.

Figures 10, 11 and 12 are fragmentary views, illustrating the operation of the let-off shown by Figure 9.

Figure 13 is a side elevation of another embodiment of the invention.

Figure 14 is a section on line 14—14 of Figure 13, and an elevation of parts at the right of said line.

Figure 15 is a fragmentary view, showing in section and in elevation the let-off shown by Figures 13 and 14.

Figure 16 is a fragmentary view, showing details of the time stamp mechanism shown by Figures 13 and 14.

Figure 17 is a fragmentary view, showing the let-off member operated by the time movement, and parts of the time movement train.

Figure 18 is a fragmentary view, showing the let-off member operated by the power train, and parts of said train.

Figure 19 is a view showing the winding-post in elevation, and the spring, the barrel, and other parts in section.

Figure 20 is a section on line 20—20 of Figure 19, and an elevation of parts at the right of said line.

Figure 21 is a fragmentary view, showing parts of the timing escapement pertaining to the time movement.

Figure 22 is a section on line 22—22 of Figure 19.

The same reference characters indicate the same parts in all of the figures.

I will first describe the embodiments of the invention shown by Figures 1 to 12.

My improved intermittently operated mechanism, which may be employed for various purposes requiring relatively low power and limited periods of operation, alternating with periods of rest, includes a prime motor adapted to operate continuously for a protracted period, and preferably embodied in a spring or a weight. 12 represents a barrel, and 12^a a winding-post, these parts being associated as usual with a spiral driving spring, engaged at one end

with the barrel, and at the opposite end with the post. 10, 10 and 11 designate members of a supporting frame of any suitable construction, supporting the arbors of the 5 gears hereinafter described. Power may be transmitted from the barrel 12 to an operating shaft 13, connected with any suitable mechanism to be driven, through a suitable gear train which, as here shown, includes 10 a gear 14 fixed to the barrel, a pinion 15 meshing with the gear 14, a shaft 16 fixed to the pinion 15, a gear 17 fixed to the shaft 16, a gear 18 fixed to the operating shaft 13, and an intermediate gear 19 (Figure 8) 15 meshing with the gears 17 and 18. The operating shaft may be journaled on a fixed stud 13^a (Figure 1) on one of the plates 10 of the supporting frame.

My improved mechanism also includes 20 a continuously operated time movement driven by any suitable means, and including any suitable timing escapement. The time movement may be of any suitable type, and preferably includes a spring engaged with 25 a barrel 21, and with a winding-post 22, in the usual manner. The usual balance and escapement of the time movement are indicated respectively at 23 and 24 (Figure 1), these being associated as usual with a 30 time train, the terminal members of which are a gear 25 fixed to the barrel 21, and a pinion 26 fixed to the member 46 of the power-let-off hereinafter described. Torque is transmitted from the gear 25 to the pinion 26, through suitable reducing gears, 28, 29, 30, 31, 32 and 33. 34 and 34^a designates one of the usual gears connected with the escapement of the time movement.

The terminal member or pinion 26 of the 40 time movement is fixed to a power let-off member 46, which is an arbor driven by the time movement, the other member of said let-off being driven by the power train. Said members are formed and arranged to 45 cooperate in alternately stopping and permitting the operation of the power train. The let-off member driven by the power train, as here shown, includes a hub 35 (Figure 6), fixed on a shaft 36, and a plurality 50 of arms 37 fixed to and radiating from the hub, and arranged in different planes, as shown by Figure 3, said arms being revolvable in predetermined paths by the rotation of the shaft 36.

55 The shaft 36 is driven through suitable reducing gears, constituting members of the power train, and including a gear 38, on the shaft 16, a pinion 39, a gear 40, on a shaft 41, a pinion 42, a gear 43, on a shaft 44, 60 and a pinion 45 on the shaft 36.

In Figures 1, 2, 3 and 4 I have shown a multiple motor-driven let-off member, comprising four arms 37, these being arranged in different angular positions on the hub 35.

65 The let-off member 46 driven by the time

movement, is continuously rotated, and is an arbor provided with a plurality of slots 47, arranged in different angular positions, as shown by Figure 5, each slot being in the 70 plane and path of revolution of one of the arms 37, as indicated by Figure 3. Each portion of the let-off member 46 which backs a slot 47, is an arresting or stop portion arranged to obstruct the path of an arm 37, 75 as shown by Figure 4, and the corresponding slot is arranged to clear said path and leave it unobstructed, when the slot is moved by the rotation of the let-off member 46, to the position shown by Figure 4^a, the outer end 80 of the arm passing through the slot. The motor is thus permitted to operate until the next arm abuts against another arresting portion of the let-off member 46.

It will now be seen that the periods of action and inaction of the motor depend on 85 the rate of rotation of the let-off member 46, and on the number of arms 37 and slots 47. It will also be seen that by employing only one arm 37, each release of the arm will permit a more protracted operation of the 90 power train than when more arms are provided, the power train operating while the arm makes practically an entire revolution. When only one arm is employed, it is preferably rendered somewhat yielding, to 95 cushion its impact on the let-off member 46. This may be accomplished by providing the arm with a longitudinal slot 50, as shown by Figure 7. The frictional resistance, or 100 drag on the time movement, caused by contact of a let-off-member arm 37 with the let-off member 46, is not sufficient to retard, or otherwise appreciably affect the time-keeping of said movement, so that the mechanism of my invention is adapted to operate 105 accurately and at the desired predetermined periods.

The hub 35 is preferably flattened at one side, as shown at 51 (Figure 6), each arm 37 being provided with an enlarged inner 110 end 52, formed to accurately fit the hub. The arms when assembled on the hub, are spaced apart by washers 54.

Means including a time movement, and organized to alternately stop and start a 115 power train, without affecting the running time of the time movement, is of the essence of the invention, said means permitting a driven power-transmitting train capable of developing power to perform any work that 120 may be required, to be accurately stopped and started at predetermined times.

I am not limited to the above-described embodiment of said means, and may variously 125 modify the same without departing from the spirit of the invention.

The above-described let-off includes a progressive member formed by the arm or arms 37, and called progressive because it 130 progresses or moves unidirectionally in a

predetermined path, when the power train acts. The let-off also includes an alternating member formed by the shaft 46 and its slot or slots 47, and called alternating because it is alternately in position to stop the progressive member, and to release the same and the power train, connections such as the train members 26 and 33 being provided between the alternating member and the time movement, whereby the alternating member is moved alternately into and out of the path of the progressive member, to alternately stop and permit the action of the power train.

A modification is shown by Figures 9, 10, 11 and 12, in which said progressive and alternating escapement members and connections are otherwise embodied. In said modification, the progressive let-off member corresponding in function to the arm or arms 37, is a stud 55, fixed to and projecting laterally from the gear 43 forming an element of the above-described power train, said stud being caused to progress in a circular path when the gear 43 rotates. The alternating let-off member, and the connections between the same and the time movement, are embodied in two spaced apart pallets 56 and 57, a lever composed of arms 58 and 59 fulcrumed at 60, the pallets being fixed to the arm 58, and an arbor 46 having a slot 47, as in the embodiment of the escapement first described, said arbor being rotated by the time movement. The lever arm 59 is provided with a recess 61, and the arrangement is such that the rotation of the shaft produces the following results: When the shaft 46 is in the position shown by Figure 10, the recess 61 permits the depression of the arm 59 and the elevation of the arm 58, so that the pallet 56 stands in the path of the progressive member 55, and is adapted to arrest the latter. When the shaft 46 is in the position shown by Figure 11, the bottom of the slot 47 acts to raise the arm 59 and depress the arm 58, so that the pallet 56 releases the progressive member 55, which is permitted to pass between the pallets 56 and 57. When the shaft 46 is in the position shown by Figure 12, the arm 59 is further raised, and the arm 58 further depressed, so that the pallet 57 is moved into the path of the progressive member 55 and arrests the latter. A spring 62 may be provided to ensure contact of the arm 59 with the shaft 46.

It will be understood that the operating shaft 13 may be connected in any suitable manner with a machine or device to be driven by the mechanism of my invention.

I will now describe the structure shown by Figures 13 to 22, which show an embodiment of the invention suitable for use as a motor for a machine or device, such as a time stamp. 10^a, 10^b, 11^a represent mem-

bers of the supporting frame, by which the various arbors hereinafter mentioned are supported. This embodiment of the invention includes the controlling alternating let-off member 46, driven by a time movement, and the controlled progressive let-off member 37, driven by a power train, as in the embodiment first described. The member 46 preferably has a single slot 47, and the member 37 preferably includes a single arm (see Figure 15).

The time movement train and the power train hereinafter described, are each preferably driven by a double-acting spiral spring 63 (Figures 19 and 22). The inner end of said spring is engaged with a notch in a main shaft or arbor 64, journaled in bearings in frame plates 10^a. The outer end of the spring is engaged with a slot in a spring barrel 65, which is loose on the shaft 64. A gear 66 is fixed to the barrel and constitutes the inner member of the time movement train. A gear 68, which is loose on the shaft 64, constitutes the inner member of the power train. A ratchet 69 is fixed to the shaft 64, as by the engagement of a squared portion 70 of said shaft with a square hole in the ratchet. A pawl 71 pivoted to the gear 68, is pressed by a spring 72, carried by said gear, against the ratchet. The shaft 64 has a squared extension 73, constituting a winding-post. When the spring 63 is moved, it exerts torque in one direction through the barrel, on the gear 66 of the time movement, and in the opposite direction through the ratchet and pawl, on the gear 68 of the power train.

The time movement (see Figure 17), as here shown, includes, in addition to the gear 66, a pinion 74, fast on an arbor 75, and meshing with the gear 66, a gear 76, fast on the arbor 75, a pinion 77, meshing with the gear 76, and fast on an arbor 78, a gear 79, fast on the arbor 78, a pinion 80 meshing with the gear 79, and fast on an arbor 81, a gear 82, fast on the arbor 81, and a pinion 83, fast on the arbor 46, forming the controlling let-off member, the pinion 83 meshing with the gear 82.

The time-controlling escapement may be of any suitable character, and includes a balance wheel 84 (Figure 21), the staff of which is journaled in a bridge 85 on one of the frame plates. The escapement cooperates with a gear 86 and a pinion 87, included in the time-movement train, the gear 86 being fast on the controlling let-off member 46, and meshing with the pinion 87, which is fast on an arbor 88.

The power train (see Figure 18) as here shown, includes, in addition to the gear 68, a pinion 89, meshing with said gear, and fast on an arbor 90, a gear 91, fast on the arbor 90, a pinion 92, fast on an arbor 93, and meshing with the gear 91, a gear 94, fast

on the arbor 93, a pinion 95, fast on an arbor 96, and meshing with the gear 94, a gear 96^a, fast on the arbor 96, and a pinion 97 meshing with the gear 96^a, and fast on an arbor 98, to which the controlled let-off member or arm 37 is fixed.

I utilize the gear 94 as the outer or power-delivering member of the power train. As shown by Figures 13 and 14, the gear 94 meshes with a pinion 99, fast on a shaft 100, which constitutes an element of mechanism for driving a series of printing wheels 101, pertaining to a time stamp of well known construction. The last-mentioned mechanism forms no part of my invention, and although elements of said mechanism are shown in detail by Figures 13, 14 and 16, a description of the construction and operation thereof is not deemed essential to an understanding of my invention.

Since the progressive let-off member 37 is controlled by the alternating member 46, I call the latter a controlling member, and the former a controlled member.

It will be seen that in each of the described embodiments of the invention, there is provided a power let-off including a continuously driven smooth surfaced arbor 46, constituting a member of the time movement, and a member such as the arm or arms 37, movable by the power train in a plane substantially at right angles with the axis of the arbor, and pressed against the periphery of the latter. The arbor and said member are formed to have a limited, practically antifrictional contact with each other, so that the pressure of the member against the arbor does not appreciably retard the time movement.

I have filed on or about the 10th day of November, 1923, with the Serial No. 673,961, a further application relating to the same generic subject matter as that disclosed herein. All novel subject matter common to the disclosures is claimed in said later filed application and not in the present specification.

I claim:

1. An intermittently operated actuating mechanism comprising a time movement; a power train having power-transmitting means independent of the time movement; and a power let-off including a continuously driven smooth surfaced arbor, constituting a member of the time movement, and a member movable by the power train in a plane substantially at right angles with the axis of said arbor, and pressed against the perimeter of the latter, the said arbor and member being formed to have a limited, practically antifrictional contact with each other, so that the pressure of the said member against the arbor does not appreciably retard the time movement, said arbor being formed to alternately arrest and release said member.

2. An intermittently operated actuating

mechanism comprising a time movement; a power train having power-transmitting means independent of the time movement; and a power let-off including a continuously driven smooth surfaced arbor, constituting a member of the time movement, and an arm revoluble by the power train in a plane substantially at right angles with the axis of said arbor, the arbor and the arm being formed to have a limited, practically antifrictional contact with each other, and the arbor being formed to alternately arrest and release the arm.

3. An intermittently operated actuating mechanism comprising a time movement; a power train having power-transmitting means independent of the time movement; and a power let-off including a continuously driven smooth surfaced arbor, constituting a member of the time movement, and a plurality of arms revoluble in unison by the power train in parallel planes, substantially at right angles with the axis of said arbor, and pressed against the perimeter of the arbor, the said arbor and arms being formed to have a limited, practically antifrictional contact with each other, and the arbor being formed to alternately arrest and release the arms.

4. An intermittently operated actuating mechanism comprising a time movement; a power train having power-transmitting means independent of the time movement; and a power let-off including a continuously driven smooth surfaced arbor, constituting a member of the time movement, and an arm revoluble by the power train in a plane substantially at right angles with the axis of said arbor, the arbor and the arm being formed to have a limited, practically antifrictional contact with each other, and the arbor being provided with a slot arranged to periodically release said arm.

5. An intermittently operated actuating mechanism comprising a time movement; a power train having a power-transmitting means independent of the time movement; and a power let-off including a continuously driven smooth surfaced arbor, constituting a member of the time movement, and a plurality of arms revoluble in unison by the power train in parallel planes, substantially at right angles with the axis of said arbor, and pressed against the perimeter of the arbor, the said arbor and arms being formed to have a limited, practically antifrictional contact with each other, and the arbor being provided with a plurality of slots arranged to periodically release said arms.

6. An intermittently operated actuating mechanism comprising a time movement; a power train having power-transmitting means independent of the time movement; and a power let-off including a continuously driven smooth surfaced arbor, constituting

a member of the time movement, and an arm revoluble by the power train in a plane substantially at right angles with the axis of said arbor, the arbor and the arm being
5 formed to have a limited, practically anti-frictional contact with each other, and the arbor being formed to alternately arrest and release the arm, said arm being resilient, and adapted to yield to cushion its impact on the arbor. 10

In testimony whereof I have affixed my signature.

FREDERICK W. BOLD.