

A. L. SOHM.
PAWL AND RATCHET MECHANISM.
APPLICATION FILED NOV. 17, 1913.

1,296,870.

Patented Mar. 11, 1919.

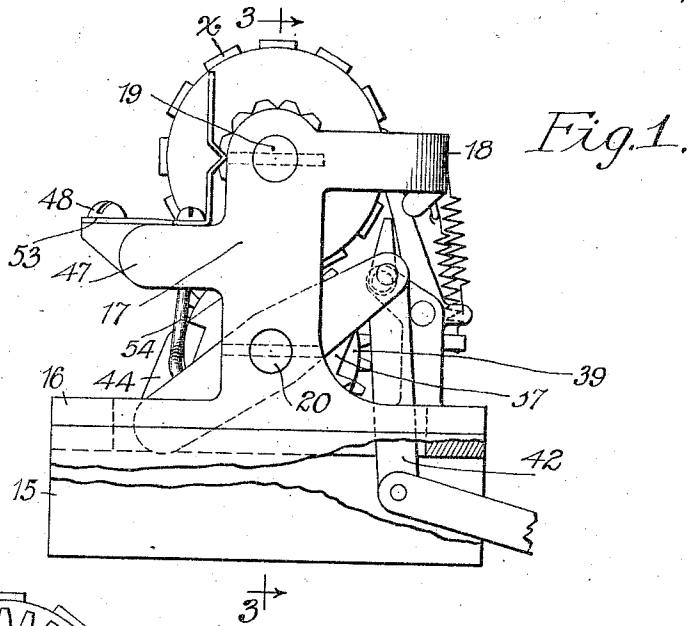
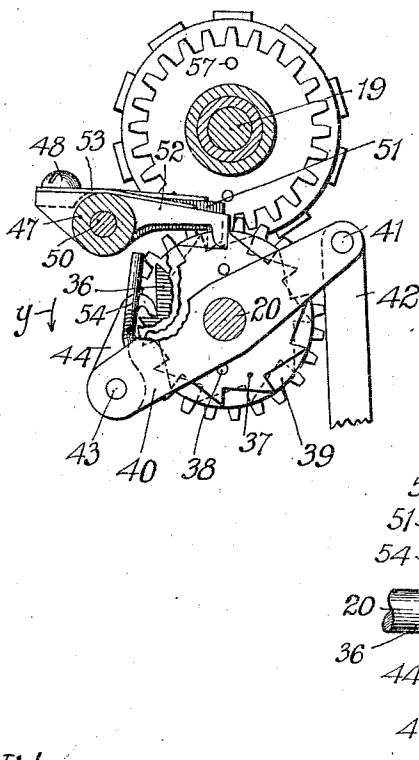
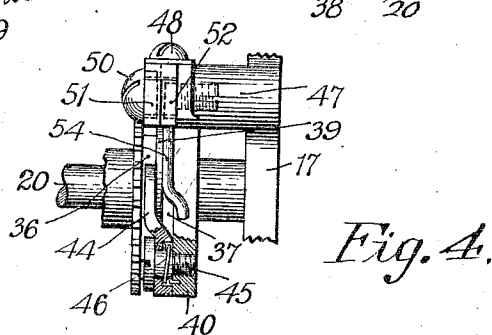
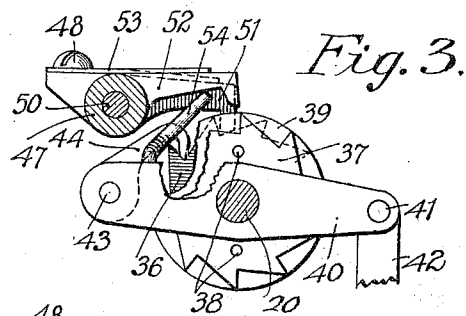


Fig. 2.



3-3



Witnesses:

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UNITED STATES PATENT OFFICE.

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PAWL-AND-RATCHET MECHANISM.

1,296,870.

Specification of Letters Patent. Patented Mar. 11, 1919.

Application filed November 17, 1913. Serial No. 801,370.

To all whom it may concern:

Be it known that I, ALFRED L. SOHM, 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 Pawl-and-Ratchet Mechanism, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to register mechanism in the nature of printing or indicating apparatus which may be operated to print or indicate successively different notations.

It will appear to those skilled in the art that my invention is adapted to wide and varied applications, but I contemplate particularly the use thereof in connection with time registers or recorders, such as time stamps, and printing and indicating recorders.

In time printing or indicating apparatus which is operated automatically so that the notation to be indicated or printed may correspond with a master clock, so-called "printing wheels" or "indicating wheels" are usually employed, and are operated by step-by-step mechanism which, in turn, is actuated by some sort of periodic impulses. Devices of this kind are most commonly operated by electromagnetic means which is energized and deenergized by means of contact mechanism controlled or operated by the master clock, proper mechanical connections between the armature of the electromagnetic means and the various printing or indicating wheels being provided.

One of the chief difficulties which are encountered in structures of this kind where in the printing or indicating wheels are periodically advanced by sudden impulses, is what is known as "overthrow," that is, an uncontrollable movement and an undesired movement of one or more of the time wheels in addition to the properly measured movement determined by the advancing mechanism. This overthrow is due to inertia and, as will be clear to those skilled in the art, and as has been found by experience, is productive of inaccurate results which, of course, is fatal to a registering apparatus which is to be relied upon.

It is the primary object of my invention to provide a structure in which the possibility of such overthrow is eliminated, in

which positive and reliable operation is secured, which is of simple structure, and in which the various actuating parts are operated from the source of power without the intervention of an excessive degree of mechanical ratio.

In carrying out the objects and purposes of my invention I provide means for mechanically locking all of the moving parts of the apparatus against movement during all normal conditions of the apparatus and to lock all of the parts except those positively actuated by the power devices under all conditions of the apparatus. And, proceeding with this theory of construction, I also lock the parts which are to be moved to the power mechanism in such a way that the period between their release from the other lock mechanism and the return into locking engagement therewith is guarded by their positive relation to the power mechanism. With mechanical relations such as these, there is no condition wherein the time wheels may be moved when they are not supposed to be moved and there is no condition without a safeguard against the undesirable overthrow which has been referred to.

These features are of particular importance in connection with time stamps where, as is well known, it is the practice to place a sheet of paper between the time wheels and the platen and to move the platen against the paper and time wheels so as to print the notation of the time wheels on the paper. In prior art devices, although in some instances some form of restraining means is provided, there are conditions wherein the time wheels are free to rotate, and if it should occur that this condition should exist at the time when the paper is withdrawn from the time stamp, it very frequently occurs that the time wheels are moved three or four, or even more, steps out of the proper position. In my device such undesired operation is impossible and the arrangement is such that any overthrow is likewise impossible, as hereinbefore pointed out.

In order to instruct those skilled in the art in the construction and use of my invention, I shall refer to the accompanying drawings which illustrate printing register wheels adapted to print the month, day, year, and time of day, and arranged to be operated automatically by regular periodic impulses,

such as that of an electromagnetic device controlled by a master clock, so that the printing notation may at all times correspond with the facts. For instance, means is provided to secure a mechanical impulse every minute. This impulse advances the time wheels successively so that the proper type may be brought into the printing line, and proper carry-over mechanism is provided to transmit the impulses to the proper post-meridian or ante-meridian notation wheels and to the day wheel.

In the drawings—

Figure 1 is a side elevational view of a mechanism embodying my invention, parts being removed for the sake of clearness.

Fig. 2 is a vertical sectional view of the operating mechanism.

Fig. 3 illustrates the operating mechanism in another position; and

Fig. 4 illustrates the locking mechanism in front elevation.

I have applied like reference characters to the same parts throughout the various figures.

Referring, first, to Figs. 1, 2, and 3, it will be seen that I provide a supporting base and that upon this base I mount a framework comprising base flanges 16, side uprights 17—17, and horizontal connecting pieces 18—18. A main shaft 19 is transversely journaled in the side uprights 17—17 near the top thereof and the auxiliary shaft 20 is journaled in these uprights near the bottom thereof in vertical alinement with the main shaft.

I mount for rotation upon the shaft 20 an operating unit comprising a forward ratchet 36 and a backward ratchet 37 secured together by means of pins 38—38 and spaced apart by means of a separating plate 39. An operating lever 40 is loosely mounted upon the shaft 20 proximate to this operating unit and has pivoted at one end, at 41, an operating link 42 which is connected in some suitable manner to the power mechanism—such as the armature of an electromagnetic operating device. At the other end of the lever 40, at 43, a pawl 44 is pivoted and this pawl coöperates with the forward ratchet 36. The pivot for this pawl is in the form of a screw 45 which screws into the lever 40 and which has an enlarged portion upon which the pawl 44 fits loosely. As will be seen from Fig. 4, the pawl 44 is provided with a pocket around the screw 45 and that a spring 46 is provided in this pocket and is connected to the pawl and to the lever to hold the pawl in constant engagement with the ratchet 36. The lever 40 is adapted to rock back and forth upon the shaft 20 by a reciprocating movement of the link 42 and the stroke of the lever 40, as illustrated by comparing Figs. 2 and 3, is sufficient to advance the

pawl 44 enough to catch the next succeeding tooth on the ratchet 36, and but one tooth.

The upright 17 on the side of the device toward which the operating unit is located is provided with an extension 47 in which a screw stud 50 is mounted and two pawls 51 and 52 are mounted to rock on this screw stud. The pawl 51 is adapted and arranged to coöperate with the forward ratchet 36 and the pawl 52 is adapted to coöperate with the backward ratchet 37, as illustrated in Figs. 2 and 3, a double-leaf spring 53 being secured to the extension 47 by means of a screw 48. The pawl 51 acts purely as a holding pawl and its coöperation with the other elements will appear as this description proceeds. The rocking lever 40 carries an arm 54 which projects into a position so that upon the up-stroke of the pawl 44 it will engage the underside of the pawl 52 and will lift the pawl 52 out of engagement with the ratchet 37, as illustrated in Fig. 3. It will now appear that for every stroke of the lever 40 from the position shown in Fig. 2 to the position shown in Fig. 3, the pawl 44 will be carried up one tooth. It will also be clear that during this upward movement of the pawl 44 it will be impossible, by any drag or friction effect, to move the operating unit in a clockwise direction, (Fig. 2), because the holding pawl 51 is in engagement with one of the teeth, as illustrated in Fig. 2. Nor will any hesitancy, irregularity or backlash in the movement of the member 40 cause or permit any movement of the operating unit in a counter-clockwise direction, because the pawl 52 is in engagement with one of the teeth of the ratchet 37. In other words, while the pawl 44 is rising the operating unit is locked against operation in either direction because the teeth of both directions are firmly locked against pawls in engagement therewith. However, as the upward movement of the pawl 44 continues, the arm 54 finally strikes the pawl 52 and just as the pawl 44 is raised sufficiently to drop over the succeeding tooth, the pawl 52 is lifted by the arm 54 sufficiently to be disengaged from the ratchet 37. The pawl 44 then starts on its return movement and the operating unit is free to move in a counter-clockwise direction, that is, in the direction of the arrow *y*, since the pawl 52 is disengaged from the ratchet 37, and, immediately after the return movement of the pawl 44 begins, the pawl 52 is thrown into the next notch and slides down into engagement with the succeeding tooth to absolutely prevent any overthrow and to absolutely limit the movement of the operating unit in the direction of the arrow *y*. The movement which has thus been given the operating unit is exactly sufficient to allow the pawl 51 to slide over and drop into engagement with the next tooth,

and, in this way, the operating unit becomes absolutely locked against any movement in a clockwise direction. Thus, the parts are brought back to normal and the operating unit is locked against movement in either direction by means of the simultaneous engagements of the two pawls 51 and 52 with their respective ratchets. This is the cycle of operations for each forward and back stroke of the lever 40. Each of these operations secures the predetermined advance of the operating mechanism and each of them is absolutely limited to the accurately predetermined periodical movement. There is no opportunity for either overthrow or backlash and at no time during this operation is there any condition wherein the operating mechanism is released from the restraining and positively limiting action of the locking mechanism.

All the automatically operating parts of the structure are mechanically connected to this operating unit and it will be seen that in each instance I tie each part to this operating unit in such a way that the locking of the operating unit is transmitted to such part, the result being that all parts are locked at all times with the operating unit.

I claim as new and desire to secure by Letters Patent:

1. In combination, a first ratchet, a holding pawl for said first ratchet, a second ratchet having ratchet teeth facing opposite to the teeth on said first ratchet, a holding pawl for said second ratchet, said ratchets being secured together and having driving connection with a member to be driven, an operating link having forward and backward movement, an operating pawl carried on said operating link, said operating pawl

engaging a succeeding tooth of the first ratchet upon forward movement of the operating link and rotating the ratchets upon backward movement of the operating link, and an arm carried on said operating link adapted to disengage the holding pawl from said second ratchet the moment the operating pawl engages with the said succeeding tooth on the first ratchet and to reengage the holding pawl with said second ratchet when said operating link starts on its backward movement.

2. In combination, a first ratchet, a holding pawl for said first ratchet, a second ratchet having ratchet teeth facing opposite to the teeth on said first ratchet, a holding pawl for said second ratchet, said ratchets being secured together and having driving connection with a member to be driven, an operating link having forward and backward movement, an operating pawl actuated by said operating link, said operating pawl engaging a succeeding tooth of the first ratchet upon forward movement of the operating link and rotating the ratchets upon backward movement of the operating link, and means adapted to disengage the holding pawl from said second ratchet the moment the operating pawl engages with the said succeeding tooth on the first ratchet and to reengage the holding pawl with said second ratchet when said operating link starts on its backward movement.

In witness whereof, I hereunto subscribe my name this 10th day of November, A. D., 1913.

ALFRED L. SOHM.

Witnesses:

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