(No Model.) 3 Sheets—Sheet 1.

C. A. RANDALL.

ELECTRO MECHANICAL TIME STAMP.

No. 419,068. Patented Jan. 7, 1890.

Fig. 1.

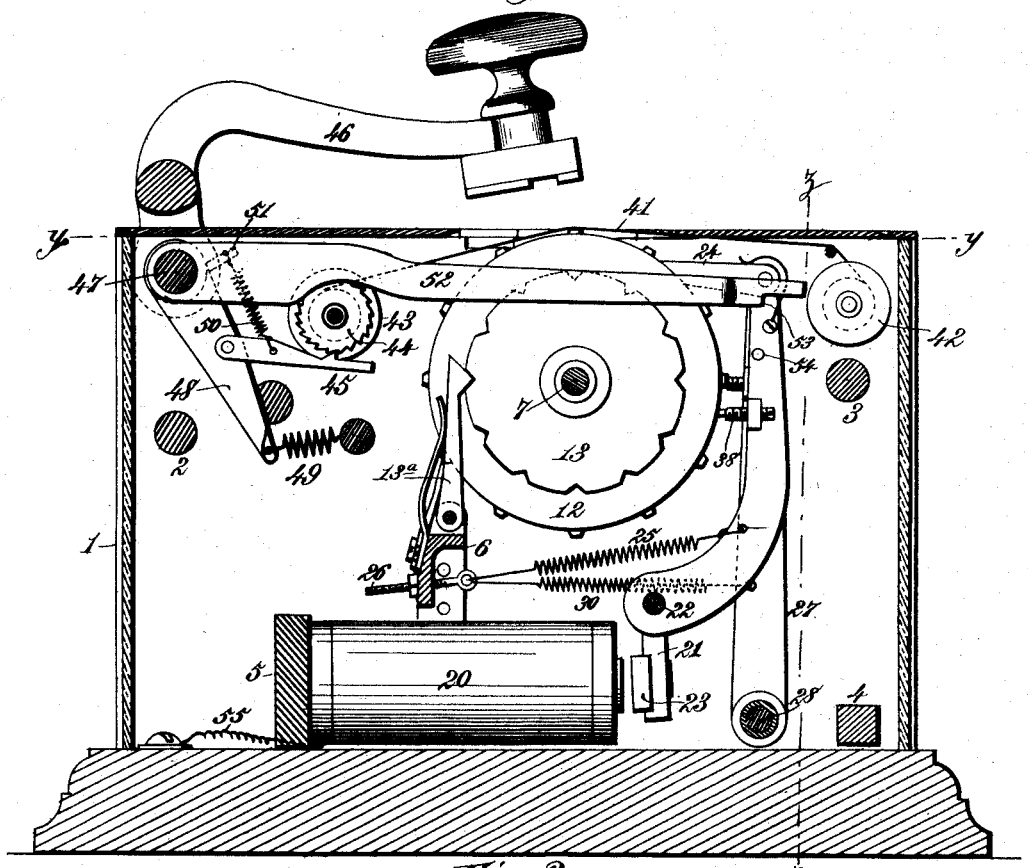
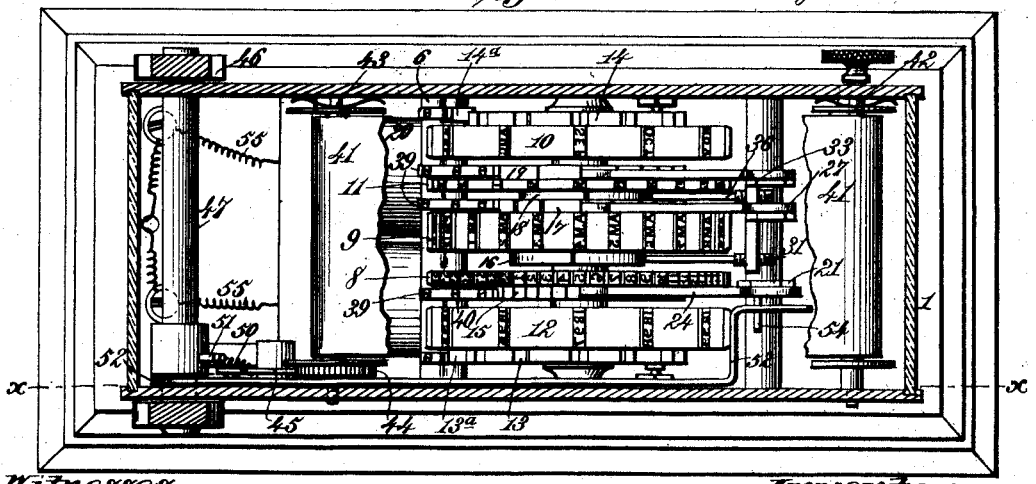


Fig. 2.



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

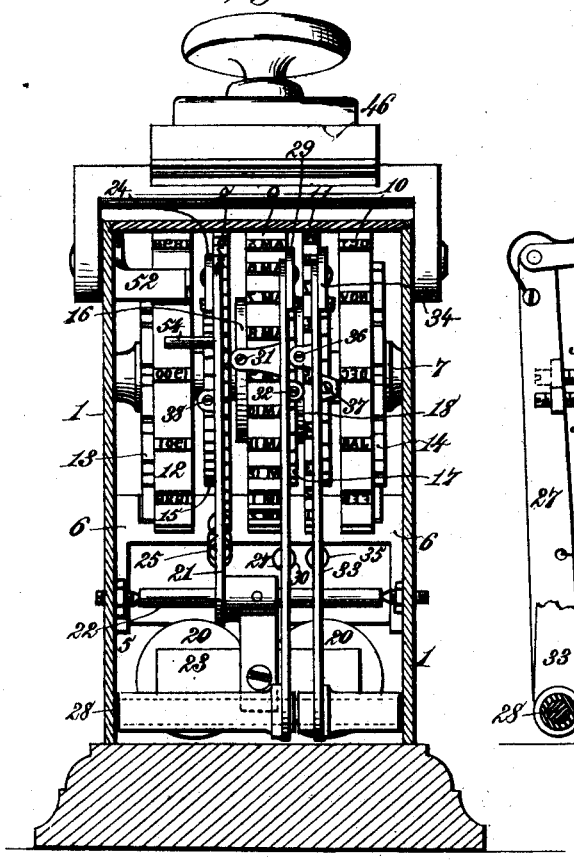

Fig. 4.

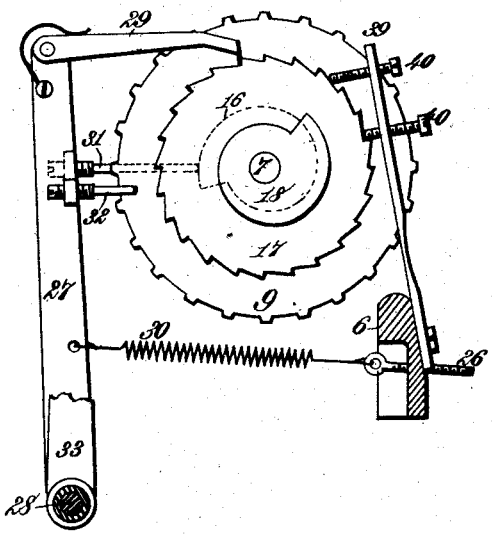

Fig. 5.

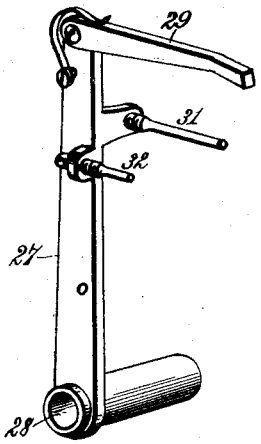

Fig. 6.

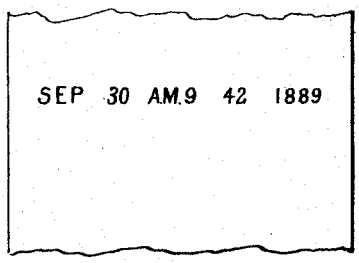

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Fig. 7.

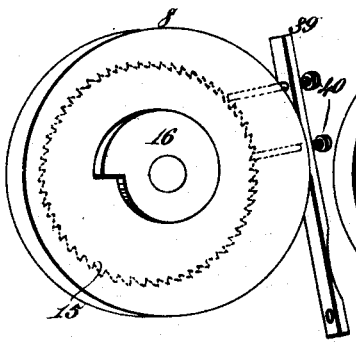


Fig. 8.

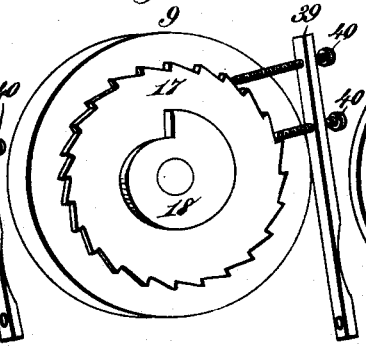


Fig. 9.

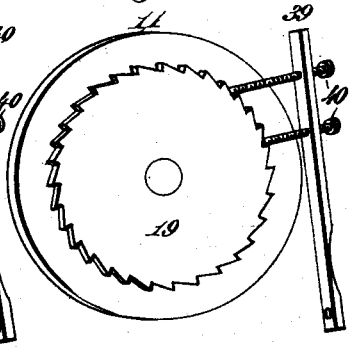


Fig. 10.

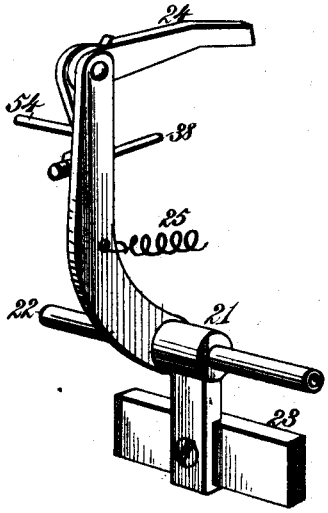
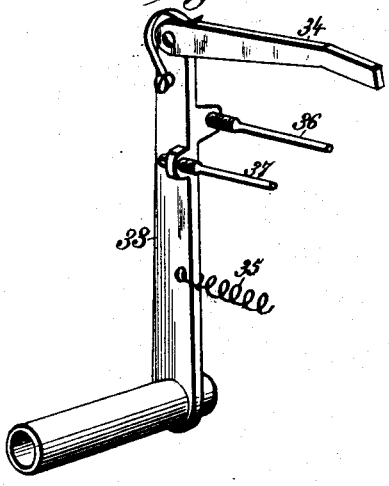


Fig. 11.



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UNITED STATES PATENT OFFICE.

CHARLES ADAMS RANDALL, OF LONDON, ENGLAND, ASSIGNOR TO THE ELECTRIC DATE AND TIME STAMP COMPANY, OF EAST ST. LOUIS, ILLINOIS.

ELECTRO-MECHANICAL TIME-STAMP.

SPECIFICATION forming part of Letters Patent No. 419,068, dated January 7, 1890.

Application filed March 21, 1889. Serial No. 304,122. (No model.) Patented in England May 17, 1888, No. 7,308.

To all whom it may concern:

Be it known that I, CHARLES ADAMS RANDALL, a citizen of the United States, residing at London, England, have invented new and useful Improvements in Electro-Mechanical Time-Stamps, (for which I have obtained Letters Patent in Great Britain, No. 7,308, dated May 17, 1888,) of which the following is a specification.

This invention relates to the electrical time-recording hand-stamps for which Letters Patent numbered 380,594 and 380,595 were issued to me April 3, 1888, wherein type-wheels are periodically rotated by electro-mechanical mechanism connected electrically with a controlling time-piece or clock.

The objects of my present invention are to simplify the type-wheel-operating mechanism; to provide a more economical machine; to avoid the employment of gear-wheel connections between the electro-magnet and the type-wheels; to reduce the number of electro-magnets; to provide novel, simple, and efficient means for rotating the minute, hour, and day type-wheels; to simplify the means for setting or adjusting the type-wheels as required; to provide novel means for locking and thereby preventing movement of the type-wheels in either direction, except when advanced by the feed-pawls on spring-retracted levers; to provide novel means for preventing feed movement of the pawl-carrying armature-lever while an impression is being made, and, finally, to otherwise improve the machine, as will hereinafter fully appear.

The objects of my invention I accomplish by the features of construction and the new combination of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1 is a vertical sectional view taken on the line *x x*, Fig. 2. Fig. 2 is a sectional plan view taken on the line *y y*, Fig. 1. Fig. 3 is a vertical sectional view taken on the line *z z*, Fig. 1. Fig. 4 is a detail sectional view showing the spring-retracted pawl-carrying lever for the hour type-wheel. Fig. 5 is a detail perspective view of one of the spring-retracted pawl-carrying levers. Fig. 6 is a diagram of an impression from the type-wheels. Fig. 7 is a detail perspective view of the minute type-wheel and its holding spring and pins. Fig. 8 is a similar view of the hour type-wheel. Fig. 9 is a similar view of the day type-wheel. Fig. 10 is a detail perspective view of the armature-lever for rotating the minute-wheel. Fig. 11 is a similar view of the lever for rotating the day type-wheel.

In order to enable those skilled in the art to make and use my invention, I will now describe the same in detail, reference being made to the drawings, wherein—

The numeral 1 indicates an inclosing box or case of any desired construction, having its sides connected by cross-bars 2, 3, 4, and 5 and a bridge-piece 6, some of which parts constitute supports for elements of the mechanism; and 7 indicates the stationary main shaft, that carries the rotating minute type-wheel 8, hour type-wheel 9, month type-wheel 10, day type-wheel 11, and year type-wheel 12, all of which are supplied with marks or characters indicating time, as is fully explained in my Letters Patent No. 380,594.

The year type-wheel is provided with an attached disk 13, having angular or V-shaped notches in its periphery engaged by the beveled end of a spring-pressed dog 13^a, Fig. 1, and the month type-wheel carries a similar notched disk 14, engaged by a dog 14^a, like that shown for the notched disk on the year-wheel. These disks and dogs are for the purpose of locking the year and month wheels against accidental rotation after they have been properly set by hand.

The minute type-wheel 8 is provided at one side with an attached ratchet feed-wheel 15 and at the opposite side with a cam 16, and the hour-wheel 9 carries at one side a similar ratchet feed-wheel 17, to which is fixed a cam 18, like that on the minute type-wheel. The cam connected to the minute-wheel is shown by dotted lines, Fig. 4, and the cam on the feed-wheel of the hour-wheel is shown by full lines in the same figure. The day-wheel 11 is supplied with a similar ratchet feed-wheel 19, and these feed-wheels and cams are acted upon by devices which will be clearly explained hereinafter.

The electro-magnet 20 is shown as carried by the cross-bar 5, and its core is arranged in proper relation to an armature 23 on an ar-

mature-lever 21, (which can rock or vibrate with or on a shaft 22,) and the upper end of the armature-lever is provided with a pivoted spring-pressed pawl 24, that engages and moves the feed-wheel 15 of the minute-wheel one tooth each time the upper end of the armature-lever is retracted toward said wheel by the action of a retractile spring 25, which is secured at one end to the lever and at the other end to an adjustable screw-pin 26, carried by the bridge-piece 6.

A vibrating lever 27, supported by a shaft 28, is provided at its upper end with a pivoted spring-pressed feed-pawl 29, which engages and moves the feed-wheel 17 of the hour-wheel 9 each time the lever is retracted toward said hour-wheel by a retractile spring 30, secured to the lever and to an adjustable screw-pin 26 or other device. The lever 27 is provided with oppositely-projecting lugs, one carrying an adjustable screw-pin 31, of sufficient length to extend to and bear against the edge of the cam 16, secured to the minute-wheel 8, and the other carrying a similar screw-pin 32, which extends to and abuts against the back of one of the teeth of the feed-wheel 17 on the hour-wheel when the lever 27 is in its normal retracted position. A vibrating lever 33, also supported by the shaft 28, is provided with a similar spring-pressed feed-pawl 34, that engages and moves the feed-wheel 19 of the day-wheel 11 each time the lever is retracted toward the said wheel by a retractile spring 35, secured to the lever and to a screw-pin 26 or other device. The lever 33 is also provided with oppositely-projecting lugs, one carrying an adjustable screw-pin 36, which bears against the cam 18 on the hour-wheel 9, and the other carrying a similar screw-pin 37, that bears against the back of one tooth of the feed-wheel 19 on the day-wheel 11 when this lever is in its normal retracted position. The armature-lever 21 is provided with a lug and an adjustable screw-pin 38, that bears against the back of one tooth of the feed-wheel 15 of the minute-wheel 8 when the armature-lever is in its normal retracted position.

The screw-pins 32, 37, and 38, respectively, limit the feed-strokes of the spring-retracted levers, while the cam 16 moves the lever 27 into position to be retracted at a certain time to advance the hour-wheel one step, and the cam 18 serves the same purpose for the lever 33 to advance the day-wheel 11 one step.

The adjustable screw-pins permit the minute, hour, and day type-wheels to be conveniently and accurately set, as occasion may demand, and, in connection with the cams, greatly simplify the construction and reduce the cost of manufacturing this class of machines.

It is important to provide contrivances for preventing movement of the minute, hour, and day wheels except when advanced by the feed-pawls, and to accomplish this simply and efficiently I provide each feed-wheel with holding or locking stop-pins, as in Figs. 4, 7, 8, and 9. As they are all alike in construction and operation, a description of one will be sufficient to enable them to be clearly understood. A flat yielding support or spring-plate 39 is secured at its lower end to the bridge-piece 6, and its upper end portion carries two lengthwise-adjustable screw-pins 40, the lower one of which engages with the acting-face of a tooth of a feed-wheel and the upper one of which bears against the back face of another tooth of the same wheel. The lower screw-pin prevents movement of the wheel in one direction, and the upper screw-pin prevents movement thereof in the opposite direction; but by reason of the yielding support or spring-plate 39, which carries the pins, the latter offer no obstruction to the rotation of the feed-wheel when acted upon by its proper feed-pawl. The yielding support or spring-plate 39 being somewhat stiff, the stop-pins 40 need only touch by their points the teeth of a feed-wheel, so that but a slight flexure of the spring-plate permits the feed-wheel to turn when acted upon by its feed-pawl. By these devices I provide simple, efficient, and reliable means for preventing movement of the type-wheels at the time the impression is being taken, thereby insuring clear and distinct printing; and, further, by the duplicate stop-pins on a yielding support, as explained, I avoid the necessity of providing extraneous devices for lifting pivoted locking-pawls at certain periods. I also avoid two separately-pivoted pawls for each wheel, and provide simple means whereby the stop-pins and their yielding support are moved laterally by the pressure of the feed-wheel itself when the latter is forced to turn by the action of the feed mechanism.

The type-wheels are inked through the medium of an inking-ribbon 41, wound at one end upon a spool 42 and at the other end upon a spool 43, having an attached ratchet-wheel 44, which is rotated intermittently by a ratchet-pawl 45, actuated by the impression-pad lever 46, which is forked or bifurcated at one end to embrace the case or box 1 and is mounted on a rock-shaft 47. The ratchet-pawl is pivoted on a tail-piece 48 of the lever, which is subject to the action of a spring 49, that tends to keep the upper end of the lever elevated in position to be struck or forced down to produce an impression from the type-wheels. The ratchet-pawl is connected by a spring 50 with a pin 51 on the rock-shaft, the tendency of which spring is to raise the pawl and keep it in engagement with the ratchet-wheel 44, all in such manner that when the impression-pad lever rises after an impression the spool 43 is turned one step and the inking-ribbon correspondingly wound up to present a fresh surface to the type-wheels.

A locking-bar 52, secured at one end to the rock-shaft, is provided at its opposite and free end with an offset 53, so that when the im-

pression-pad lever is depressed such locking-bar is lowered and its offset caused to fall in front of a stop lug 54, extending from the armature-lever 21, thereby preventing the possibility of the armature-lever moving to rotate the minute-wheel while an impression is being taken from the type-wheels.

In the practical use of the machine the electro-magnet is, by the terminals 55, in electrical connection with a controlling time-piece or clock, substantially as set forth and illustrated in my patents hereinbefore alluded to, for which reason I do not deem it essential to here show such connections, and assuming the type-wheels set to the required time as regards year, month, and day, and the hour and minute corresponding to the clock, the circuit closer at the clock closes the circuit and the electro-magnet 20 is vitalized to attract the armature 23, thereby moving the armature-lever 21 and its pawl 24 from one tooth to another of the feed-wheel 15 on the minute type-wheel 8. The instant the circuit at the clock is broken, as in the patents mentioned, the magnet is demagnetized, the armature is released, and the armature-lever is quickly retracted by its retractile spring 25, thereby advancing the said feed-wheel one tooth or step and correspondingly moving the minute type-wheel and the cam 16 and changing the minute, this operation continuing each minute so long as the clock runs and the battery remains effective. The cam 16, acting on the pin 31 of the lever 27, gradually moves the latter away to bring the feed-pawl into engagement with another tooth of the feed-wheel 17 on the hour type-wheel 9, so that upon a complete revolution of the cam 16 the pin 31 passes from the point of greatest diameter of the cam, whereupon the spring 30 retracts the lever 27 and causes its pawl 29 to advance the feed-wheel 17 one tooth or step, thus correspondingly moving the hour type-wheel and the cam 18 and changing the hour at the sixtieth impulse from the clock. The cam 18, acting on the pin 36 of the lever 33, gradually moves the latter away to bring the feed-pawl 34 into engagement with another tooth of the feed-wheel 19 on the day type-wheel 11, so that after a complete revolution of the cam 18, or at the twenty-fourth revolution of the minute-wheel, the pin 36 passes from the point of greatest diameter of the cam 18, and the spring 35 retracts the lever 33 and causes its pawl 34 to advance the feed-wheel 19 one tooth or step, thereby changing the day, which will occur at midnight.

The automatic mechanism for changing the position of the minute, hour, and day type-wheels could be carried into effect in connection with the month and year wheels; but for simplicity and economy I prefer to set them manually and to provide the locking disks and dogs to prevent them from moving except intentionally.

The range of movement of the impression-lever is limited by suitable stops, cushioned or otherwise constructed, located in proper relation to the tail of the lever.

I may employ a word or sign wheel or wheels, as in my Letters Patent No. 380,594, and the type-wheels may be of the construction therein explained or any other suitable structure.

Having thus described my invention, what I claim is—

1. In a time printing-stamp, the combination of an impression pad-lever, a minute, hour, and day type-wheel, each having a feed-wheel, a shaft on which all of said wheels are loosely mounted to independently rotate, the two cams attached, respectively, to the side of and rotating in unison with the minute and hour type-wheels on the shaft, an electro-magnet, a pawl-carrying lever having an armature for rotating the minute-wheel and its cam, a pair of pawl-carrying levers having pins which respectively extend along the sides of the minute and hour type-wheels and bear against the cams attached to and rotating with said type-wheels, and a retracting-spring for each lever, substantially as described.

2. In a time printing-stamp, the combination of a series of type-wheels each having a feed-wheel, a shaft on which said wheels are mounted, a cam attached to one side of and rotating in unison with each of two type-wheels, swinging pawl-carrying levers, a lengthwise-adjustable screw-pin on each lever which abuts upon the respective feed-wheels, and lengthwise-adjustable screw-pins on a pair of the levers which respectively bear upon the cams attached to and rotating with the type-wheels, substantially as described.

3. In a time printing-stamp, the combination of a primary type-wheel having a feed-wheel and a cam attached to one side of and rotating in unison with said type-wheel, a second type-wheel rotating beside the primary type-wheel and having a feed-wheel, a pawl-lever for rotating the primary type-wheel, and a lever having a pawl and a pin, with the pawl adapted to engage the feed-wheel of the second type-wheel and the pin extending along the side of the primary type-wheel and bearing against the cam attached to and rotating with the latter, substantially as described.

4. In a time printing-stamp, the combination, with a rotating type-wheel having a toothed feed-wheel and mechanism for rotating the same at intervals, of a yielding spring-plate having two stop-pins, one engaging the acting-face of a tooth on the feed-wheel and the other bearing against the back face of another tooth, said spring-plate with its two pins being moved laterally by the pressure of the feed-wheel when forced to rotate by the rotating mechanism, substantially as described.

5. In a time printing-stamp, the combination of rotating type-wheels, each having a feed-wheel attached to one side, pawl-levers

moved at intervals to engage and turn the feed-wheels, and lengthwise-adjustable screw-pins mounted on the pawl-levers and respectively abutting upon the feed-wheels, substantially as described.

6. In a time printing-stamp, the combination, with the primary type-wheel having a feed-wheel, of a pivoted swinging pawl-carrying lever and a pivoted swinging impression-pad lever provided with a locking-arm for engaging a part of the pawl-lever when the impression-lever is depressed to lock the pawl-lever against a swinging movement, substantially as described.

7. The combination, in an electro-mechanical recording hand-stamp, of a type-wheel having a feed-wheel, an electro-magnet, a pawl-carrying armature-lever having a lateral stop-lug, a retractile spring for the lever, a rock-shaft carrying an impression-pad lever, and a locking-arm on the rock-shaft having an offset to engage the stop-lug on the lever when the impression-pad lever is depressed, substantially as described.

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

CHARLES ADAMS RANDALL.

Witnesses:
WILMER M. HARRIS,
WALTER J. SKERTEN,
Both of 17 *Gracechurch St., London.*