(No Model.) 2 Sheets—Sheet 1.

F. W. COLE.

TOWER STRIKER.

No. 566,843. Patented Sept. 1, 1896

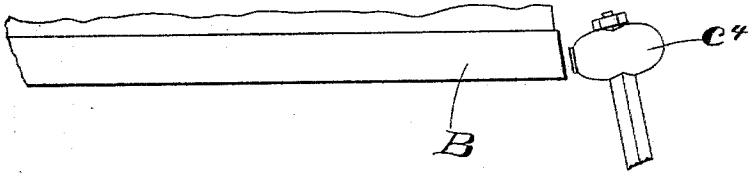


Fig. 1.

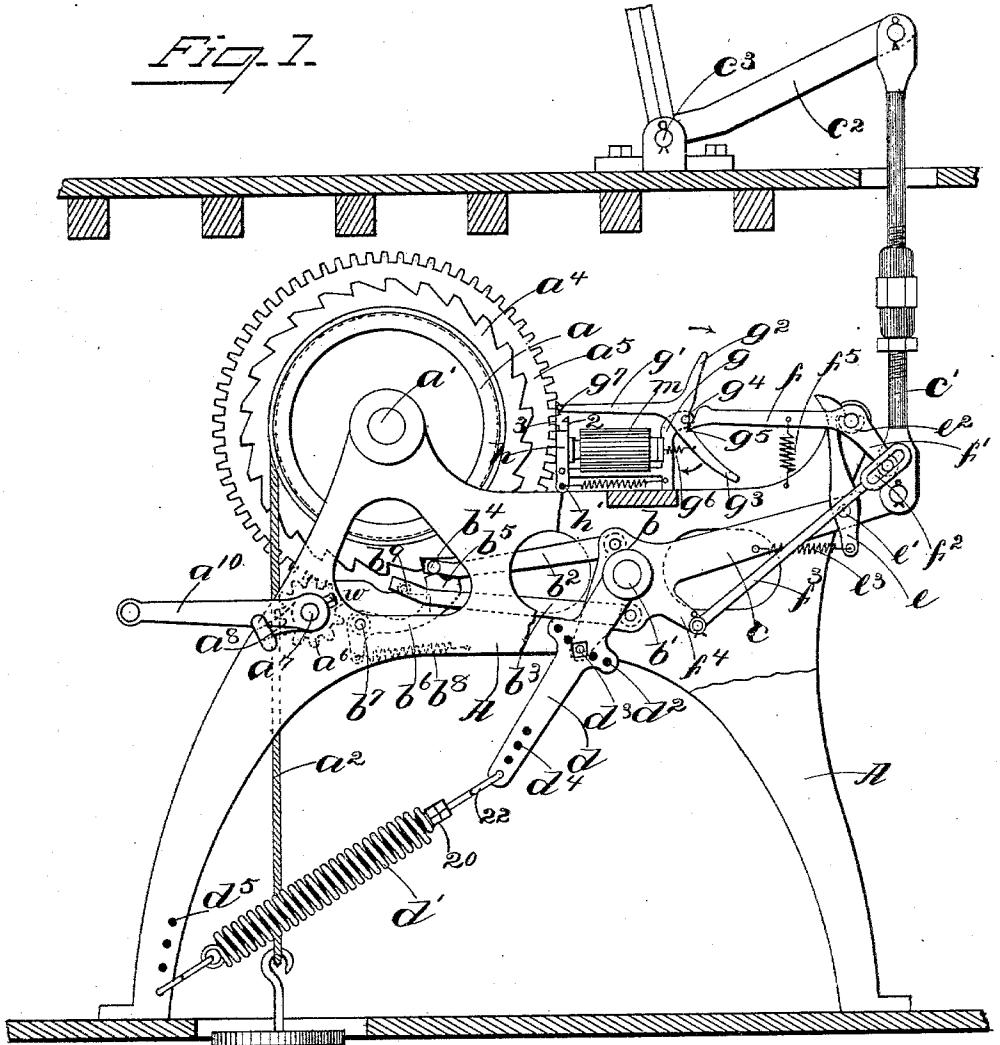
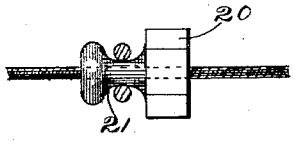


Fig. 4.



WITNESSES.

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(No Model.) 2 Sheets—Sheet 2.

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TOWER STRIKER.

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Fig. 2.

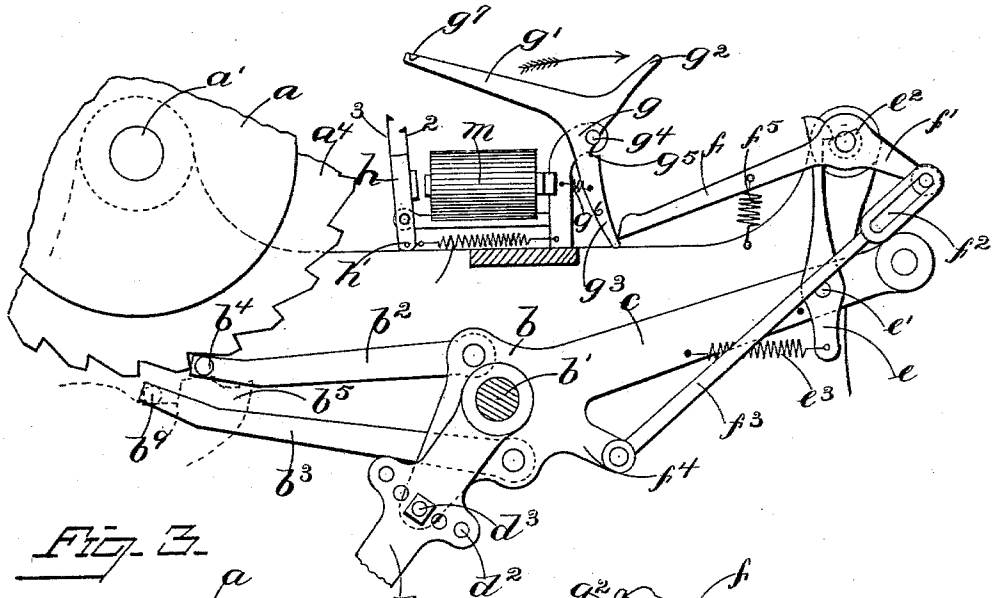

Fig. 3.

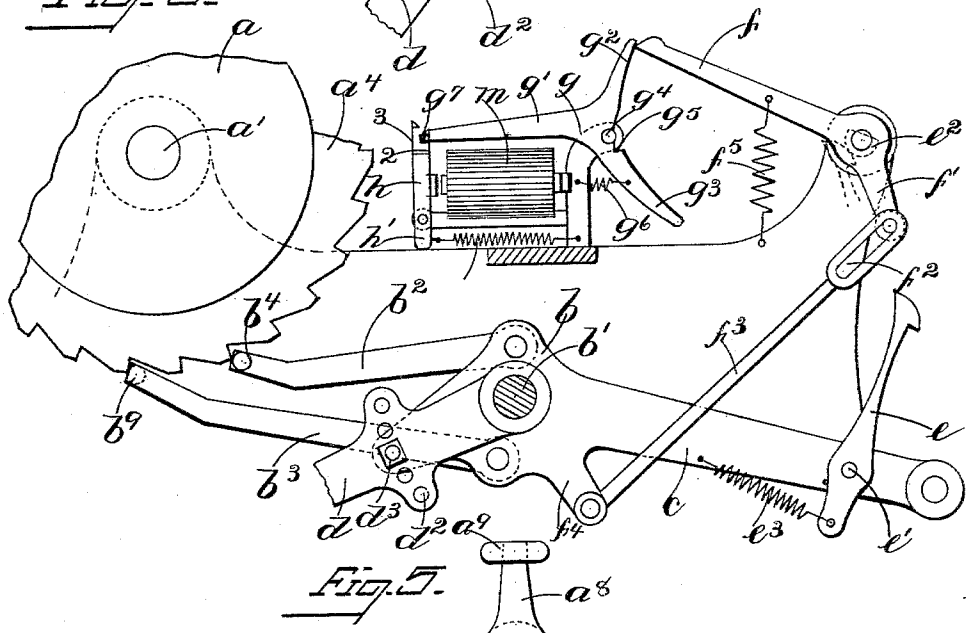

Fig. 5.

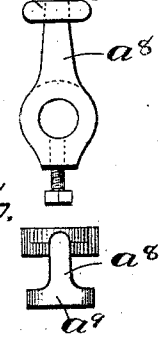

Fig. 6.

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UNITED STATES PATENT OFFICE.

FREDERICK W. COLE, OF NEWTON, MASSACHUSETTS.

TOWER-STRIKER.

SPECIFICATION forming part of Letters Patent No. 566,843, dated September 1, 1896.

Application filed July 24, 1894. Serial No. 518,469. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK W. COLE, of Newton, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Tower-Strikers, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to improve and simplify the construction of tower-strikers, which generally form a part of an ordinary fire-alarm system; and the invention consists in many details of construction to be hereinafter pointed out.

Figure 1 shows in side elevation a tower-striker embodying this invention, the parts being represented in their normal position of rest and the electric circuit by which the striker is operated being normally closed; Fig. 2, an enlarged detail of the operating parts of the striker just after the electric circuit is opened, but before the striking-lever has been moved; Fig. 3, a detail of the same parts, showing the position that they assume after the electric circuit has been opened and the striking-lever has been moved to carry the hammer away from the bell; Figs. 4, 5, and 6, details to be referred to.

The main frame A, a portion of which is broken away in Fig. 1 to disclose some of the operating parts, is or may be of any suitable construction.

The winding-drum a, supported upon a shaft a', the cord a^2, weight a^3, ratchet-wheel a^4, and toothed gear a^5, adapted to be engaged and rotated by a pinion a^6, are all as usual in tower-strikers.

The pinion a^5 is secured to a shaft a^7, to which is secured a dog a^8 (see Figs. 1, 5, and 6) by means of a set-screw, said dog having a laterally-extended T-shaped end piece a^9, bent angularly, as shown, and a detachable winding-lever a^{10} is placed on the shaft a^7, the shank of which engages the angular T-shaped end piece when turning the shaft, being prevented from slipping off by reason of said T-shaped end.

The cradle b, mounted upon the shaft b', has two pawls b^2 b^3 loosely connected to it at opposite sides of its shaft or pivot, said pawls alternately engaging the ratchet-wheel a^4, and by said wheel are operated in usual manner.

One of the pawls, as b^2, for instance, has at its outer end a laterally-projecting pin b^4, which bears upon the cam-shaped end b^5 of a bell-crank lever b^6, (see dotted lines, Fig. 1,) pivoted to the main frame at b^7, one arm of said lever having connected to it a spring b^8, which is connected with the frame, the action of said spring being to raise the lever b^6, and thereby keep the pawl b^2 in elevated position or in engagement with the ratchet-wheel, although the cam-shaped end of the pawl is such that when the pin is bearing upon the highest part thereof the pawl is in engagement with the ratchet-wheel, and when bearing upon the lowest part thereof said pawl is in position to allow the ratchet-wheel to pass by. By thus pivoting the lever b^6 or otherwise providing a yielding support for the cam b^5 it is possible to turn the ratchet-wheel a^4 backward to wind the cord on the drum. The pawl b^3 likewise has a pin b^9, which bears upon a cam-shaped portion w, formed upon the inner side of the frame, said cam-shaped portion being such as to permit the pawl to have the same functions or movements as the pawl b^2, *i. e.*, when the pawl bears upon the highest part of the cam it will be held in engagement with the ratchet-wheel and when bearing upon the lowest part of the cam will permit said ratchet-wheel to pass by.

The cradle b has an outwardly-projecting arm c, to the extremity of which is loosely or pivotally connected the lower end of a vertical rod or link c', preferably made adjustable longitudinally and extending up to the belfry or apartment containing the bell B, and connected at its upper end to the extremity of one arm, as c^2, of a bell-crank lever pivoted at c^3, the other arm of said lever bearing the hammer c^4, which strikes the bell, said rod c' being the connecting-rod hereinbefore referred to.

As the hammer is made quite heavy, a counterbalancing-spring is necessary, and such springs have heretofore been applied in different ways, but so far as I am aware they have been connected with and made to directly operate upon the striking-lever, and therefore have been located in the belfry or

apartment containing the bell, and when so located they are subjected to the inclement weather, and also are more or less inaccessible and therefore objectionable. The construction and method of attaching such springs have also been such that they are easily broken, especially in extremely cold weather. Herein I have placed loosely upon the shaft b' an arm d and provided means for adjustably connecting it with the cradle, and to the lower end of said arm one end of a counterbalancing-spring d' is connected, the other end of said spring being connected with the frame or other fixed point. As a means of adjustably connecting the arm d with the cradle I have herein provided the arm with a series of holes d^2, arranged in an arc of a circle about the shaft b' as a center, and the bolt d^3 passes through any one of said holes and into the cradle. As a further means of adjustment the lower end of the arm d is provided with a series of holes d^4, and the upper end of the counterbalancing-spring may be connected with any one of them, and so also the frame is provided with a series of holes d^5, and the lower end of the counterbalancing-spring may be connected with any one of them. I preferably employ all of these adjustments, but they are not absolutely necessary.

As a preferable way of connecting the counterbalancing-spring with the arm d, I employ a nut 20, having a reduced neck 21, which is embraced by the end coil of the spring, said nut being screwed upon an eye 22, hooked into the end of the arm.

It will be observed from Fig. 1 that whenever the cradle is in one position, as therein shown, the arm d and counterbalancing-spring d' occupy a position at one side of a straight line intersecting the shaft b' and extreme point of attachment of the spring, but as said cradle is turned into the position shown in Fig. 3 the arm and counterbalancing-spring pass to a like position upon the opposite side of said line, the spring acting during such movement to counterbalance the weight of the hammer, that is to say, the spring assists in starting the hammer and also in stopping it. Yet I do not desire to limit my invention to this specific relative arrangement of the counterbalancing-spring.

Heretofore, as a means of holding the cradle-arm and connecting-rod of the bell-hammer in its elevated position, a latch has been provided, connected with or acting upon an arm at a point more or less distant from its axis or pivot, said arm forming a coöperative part of the let-off mechanism, and because the point of support for the parts to be held was so located at a considerable distance from the axis of the arm the let-off mechanism was necessarily more or less complicated in order that a great weight might be supported.

I have found that by arranging the parts so that the latch may be supported or held as near the axis of the arm as possible the leverage is very materially reduced and a great weight may be very much more easily sustained, thereby simplifying the construction and accelerating the action, as well as increasing the efficiency of the apparatus. In carrying out this part of my invention I have pivoted a latch e upon the cradle-arm c and have slabbed off or formed the shaft e^2 with a flat face, which is normally engaged by the upper latched end of the latch e, and by slightly rocking the segmental shaft thus formed it will be seen that the latch may easily slip off. To the segmental shaft e^2 a bell-crank lever is secured, one arm, as f, of which engages a dog g and the other arm, f', of which bears a pin, which enters a slot f^2, provided at one end of a link f^3, the other end of said link being connected with a projection f^4 on the cradle. A spring f^5 connects the arm f with the frame, the action of which is to draw arm f down. The dog g is herein shown as composed of three arms g' g^2 g^3, radiating in different directions and pivoted at g^4 to a stand on the frame. The dog is notched, as at g^5, to receive the end of the arm f, said notch being just below the pivot g^4, and a spring g^6 is connected with the arm g^3, which acts to turn said dog in the direction of the arrow, *i. e.*, into the position shown in Fig. 2. The arm g' has at its outer end and at one side a **V**-shaped projection g^7, which coöperates with two detents 2 3, secured to the armature-lever h, pivoted at h', and bearing the armature of an electromagnet m.

The detent 3 is located at a greater distance from the pivot h' than the detent 2, and said detents are secured to the armature-lever so as to face each other, as shown.

The arm f of the bell-crank lever, which is connected with the segmental shaft or any equivalent latch-engaging shaft, together with the dog g and electromagnetically-controlled detents 2 3, constitute an electromagnetic let-off mechanism for the segmental shaft, but so far as my invention is concerned said let-off mechanism may be differently constructed and yet accomplish the same, or substantially the same, results, namely, to let off or release the segmental shaft e^2 by means of an electromagnet, as, for instance, if the hammer is not very heavy the **V**-shaped projection g^7 may be formed directly upon the end of the arm f, thereby omitting entirely the dog g, but if the hammer is quite heavy the compound leverage is usually required. So also the means herein shown for restoring the let-off mechanism by means of the cradle may be differently constructed without departing from the essence of this invention, but the link f^3, connecting the cradle directly with the arm f', is a simple way of accomplishing this result and is therefore preferable.

The parts of the striker when in their normal position of rest are as shown in Fig. 1,

the pawl b^2 being in engagement with the ratchet-wheel a^4, the hammer in position beside the bell, and the let-off mechanism locked by the detent 3 on the armature-lever.

When the circuit is broken, the armature retracts, the arm g' of the dog g is thrown upward, as represented in Fig. 2, by the combined action of the spring g^6 and the pressure of the arm f, and as the arm g' is thus thrown upward the arm f is released and is drawn downward by the spring f^5, the end of said arm rubbing along upon the edge of the arm g^3. As the arm f is thus released the segmental shaft e^2 is turned, so that the latch e, which is normally in engagement therewith, slips off, and just as the latch e thus disengages the segmental shaft e^2 the cradle b is rocked by reason of the ratchet-wheel a^4 acting upon the end of the pawl b^2. As the ratchet-wheel thus acts upon the pawl b^2 it frictionally holds it in elevated position until the pawl b^3 has moved up the inclined portion of the cam w and been brought into engagement with one of the teeth of the ratchet-wheel, and just as soon as such engagement is effected the movement of the ratchet-wheel is suddenly checked, and by reason of the momentum of the heavy hammer and connecting parts the ratchet-wheel recoils, allowing the pawl b^2 to fall upon the lower part of the cam-shaped end b^5 of the lever b^6. During this movement of the cradle the connecting-rod c' is drawn down and the bell-hammer c^4 swung away from the bell preparatory to striking a blow, and the link f^3, which is in engagement with the arm f', draws said arm down, thereby raising the arm f, and as the arm f thus rises its end portion passes along the edge of the arm g^2, restoring the dog g, while its V-shaped projection g^7 is brought into engagement with the detent 2, and thereby locked. The ratchet-wheel a^4 then immediately acts upon the pawl b^3, moving the cradle b back to its normal position, raising the connecting-rod c', and striking the bell, and during this movement of the cradle the latch e is thrown up into engagement with the segmental shaft e^2, the arm f is restored to its normal position in engagement with the notch g^5 of the dog g by means of the spring f^5, and the parts, it will be observed, are then restored to the position shown in Fig. 1. When the circuit closes, the armature is attracted and the detent 2 releases the V-shaped projection g^7, but said projection is immediately caught by the detent 3 and by it held until the circuit is again opened.

I claim—

1. In a tower-striker, a motor-driven ratchet-wheel, a rocking cradle connected with the hammer, and bearing two pawls b^2, b^3, which are alternately engaged by said ratchet-wheel to rock the cradle, combined with a cam-shaped support for the end of the pawl b^3, and an independent spring-controlled pivoted lever b^6, having a cam-shaped end which supports the end of the pawl b^2, substantially as described.

2. In a tower-striker, a motor-driven ratchet-wheel, a rocking cradle and two pawls connected thereto, and operated by said ratchet-wheel, a hammer, and connections between it and said rocking cradle, combined with an arm d placed loosely upon the shaft of the rocking cradle, and adjustably connected with said rocking cradle, and a counterbalancing-spring connected with said arm d, substantially as described.

3. In a tower-striker, a motor-driven ratchet-wheel, a rocking cradle and two pawls connected thereto, and operated by said ratchet-wheel, a hammer, and connections between it and said rocking cradle, combined with an arm d connected with said rocking cradle, and moving to and fro within prescribed limits determined by the movement of the cradle, and a counterbalancing-spring connected at one end with said arm, and at the other end to a fixed part in line with said arm or midway between its two extreme positions, whereby as the cradle rocks the spring assists in starting and also in stopping the hammer.

4. In a tower-striker, the combination of a motor-driven ratchet-wheel, a rocking cradle and pawls connected therewith and operated by said ratchet-wheel, a hammer and connections between it and the cradle, electromagnetic let-off mechanism, and restoring mechanism therefor, a counterbalancing-spring d' connected at its lower end with the frame, the nut 20 having a reduced neck embraced by the end coil, at the upper end of said spring, and the link 22, substantially as described.

5. In a tower-striker, the combination of a motor-driven ratchet-wheel, a rocking cradle and pawls connected therewith and operated by said ratchet-wheel, a hammer and connections between it and the cradle, an electromagnetic let-off mechanism, and restoring mechanism therefor, a winding mechanism for said ratchet-wheel consisting of a dog a^8, secured to the winding-shaft having an angular T-shaped end a^9, and the detachable crank a^{10}, substantially as described.

6. In a tower-striker, the combination of a motor-driven ratchet-wheel, a rocking cradle, and pawls connected therewith and operated by said ratchet-wheel, a hammer and connections between it and the cradle, a segmental shaft, the pivoted latch e engaging it, the extension c projecting from and reciprocating with the cradle, to which said latch is pivoted, and a spring e^3 for said latch, and electromagnetic let-off mechanism for said segmental shaft, substantially as described.

7. In a tower-striker, the combination of a motor-driven ratchet-wheel, a rocking cradle, and pawls connected therewith and operated by said ratchet-wheel, a hammer and con-

nections between it and the cradle, a segmental shaft, a pivoted latch engaging it borne by an extension on the cradle, and electromagnetic let-off mechanism for said segmental shaft, a coöperative part of which is secured to said shaft, and a link connecting the cradle with a piece on said shaft, whereby both the shaft and let-off mechanism are restored by said cradle, substantially as described.

8. In a tower-striker, the combination of a motor-driven ratchet-wheel, a rocking cradle, and pawls connected therewith and operated by said ratchet-wheel, a hammer and connections between it and the cradle, a segmental shaft and latch engaging it, connected with the cradle, a bell-crank lever secured to said shaft, a link slotted at one end and connected with one arm of said bell-crank lever, and connected at the other end with the cradle, a dog holding the other arm of said bell-crank lever, a detent for said dog, and an electromagnet controlling the operation of said detent, substantially as described.

9. In a tower-striker, the combination of a motor-driven ratchet-wheel, a rocking cradle, and pawls connected therewith and operated by said ratchet-wheel, a hammer and connections between it and the cradle, a segmental shaft and latch engaging it, connected with the cradle, a bell-crank lever secured to said shaft, a link slotted at one end and connected with one arm of said bell-crank lever, and connected at the other end with the cradle, a dog holding the other arm of said bell-crank lever, and two detents for said dog, and an electromagnet controlling the operation of said detents, substantially as described.

10. In a tower-striker, the combination of a motor-driven ratchet-wheel, a rocking cradle, and pawls connected therewith and operated by said ratchet-wheel, a hammer and connections between it and the cradle, a segmental shaft and latch engaging it, connected with the cradle, a bell-crank lever secured to said shaft, a link slotted at one end and connected with one arm of said bell-crank lever, and connected at the other end with the cradle, a dog holding the arm of said bell-crank lever, an electromagnetically-controlled detent for said dog, an arm g^3 on said dog against which the extremity of the bell-crank lever bears, when the parts are let off, substantially as described.

11. In a tower-striker, the combination of a motor-driven ratchet-wheel, a rocking cradle, and pawls connected therewith and operated by said ratchet-wheel, a hammer and connections between it and the cradle, a segmental shaft and latch engaging it, connected with the cradle, a bell-crank lever secured to said shaft, a link slotted at one end and connected with one arm of said bell-crank lever, and connected at the other end with the cradle, a dog holding the other arm of said bell-crank lever electromagnetically-controlled detent for said dog, the arm g^2 on said dog against which the bell-crank bears to restore the dog, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK W. COLE.

Witnesses:

B. J. NOYES,

C. B. CROCKER.