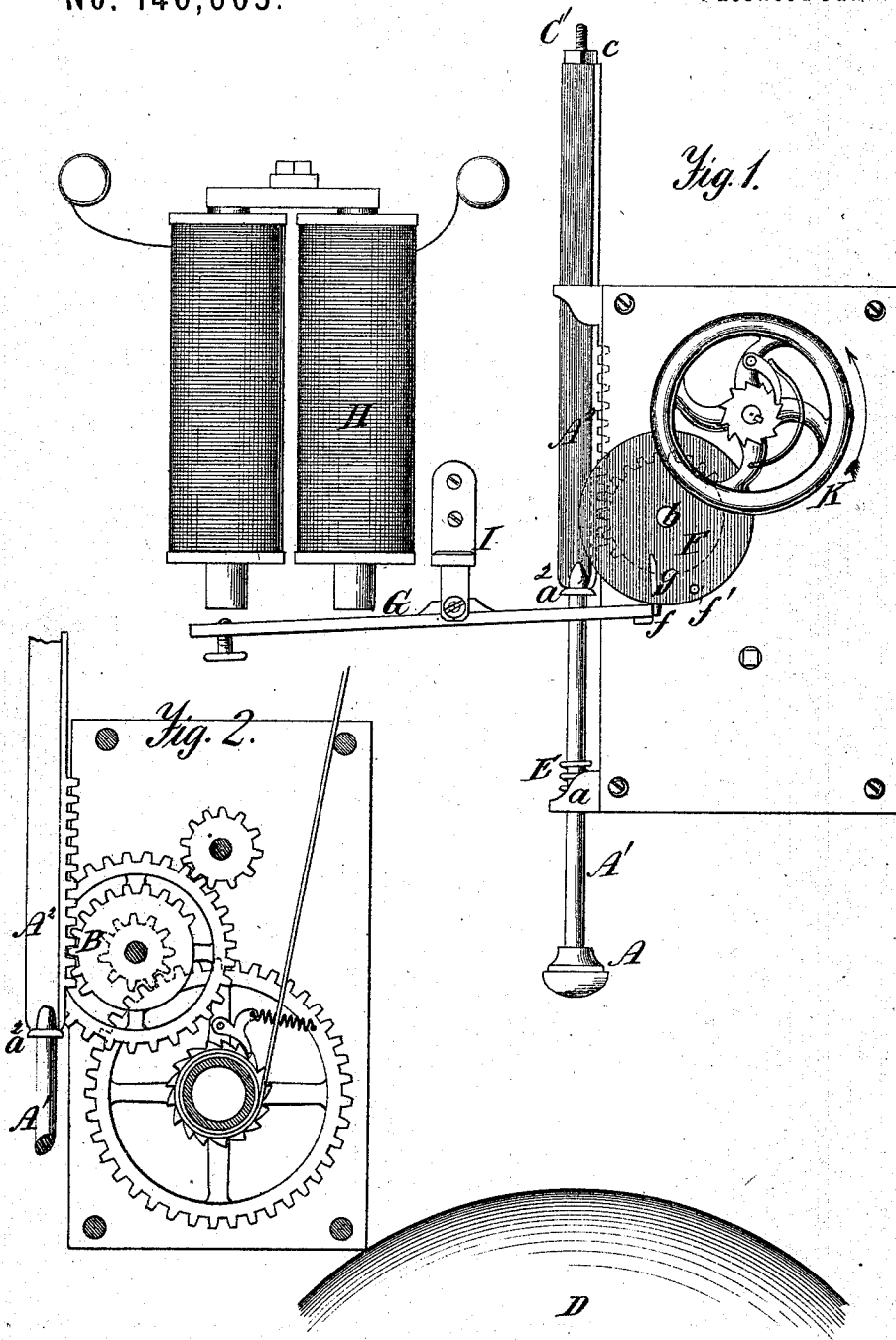


L. H. McCULLOUGH.
Electric Bell-Striking Apparatus.

No. 146,603.

Patented Jan. 20, 1874.



Witnesses.
 A. Ruppert
 C. H. E. E. E.

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 Inventor.
 D. P. Holloway & Co
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Fig. 3.

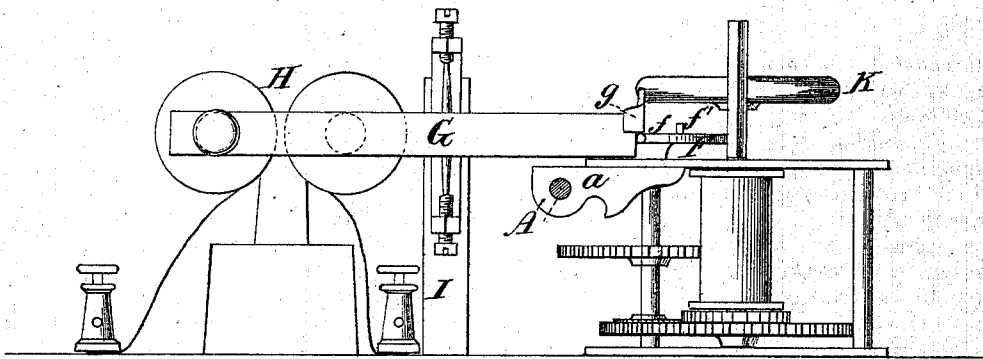
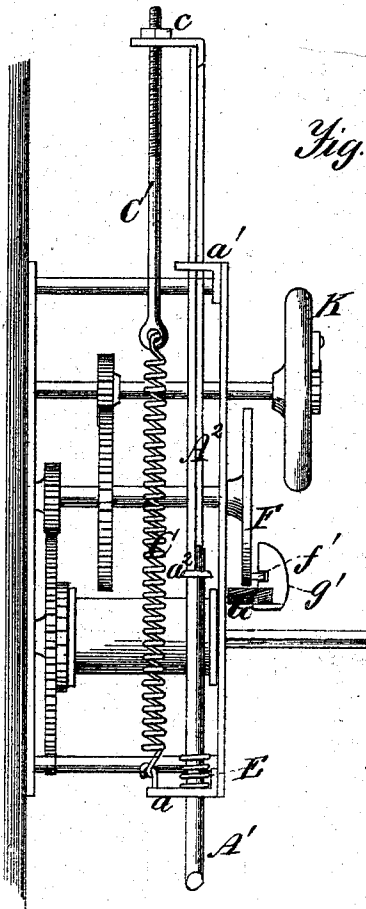


Fig. 4.



Witnesses:
A. Ruppert.
C. Edof. Cils

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Atty.

UNITED STATES PATENT OFFICE.

LEWIS H. McCULLOUGH, OF RICHMOND, INDIANA, ASSIGNOR OF TWO-THIRDS HIS RIGHT TO ELLWOOD PATTERSON AND ISAAC G. DOUGAN, OF SAME PLACE.

IMPROVEMENT IN ELECTRIC BELL-STRIKING APPARATUS.

Specification forming part of Letters Patent No. **146,603**, dated January 20, 1874; application filed September 4, 1873.

To all whom it may concern:

Be it known that I, LEWIS H. McCULLOUGH, of Richmond, in the county of Wayne and State of Indiana, have invented certain Improvements in Electro-Magnetic Alarm-Bells, of which the following is a full, clear, and exact specification:

The nature of my invention consists of an alarm-bell in which the hammer is always held suspended, in readiness to deliver a blow, by clock-work, stopped by the armature of an electro-magnet, and which is actuated, in delivering a blow, by the resilience of a spring, which stores up, in lifting the hammer, an amount of power nearly counterbalancing the lifting-weight or spring, so that the stop-pin will bear with only a very slight force against the armature, and oppose but little resistance to the attraction of the latter by the magnet when charged.

In the annexed drawings, Figure 1 is a front elevation of my improved electro-magnetic alarm-bell. Fig. 2 is a sectional elevation of the wheel-work. Fig. 3 is an end view. Fig. 4 is a side elevation of the wheel-work.

The same letters of reference are used in all the figures in the designation of identical parts.

The hammer A is secured to a long vertical stem, A¹, terminating in a bar, the part A² of which has cogs upon one of its edges, forming a rack, which stands in line with a segmental pinion, B, of a train of wheels constituting a clock-work, which is operated preferably by a weight. The clock-work is supported in a suitable frame, provided with guides *a* and *a*¹, in which the stem of the hammer moves up and down. A spiral spring, C, secured at one end to the frame, and with its other end connected to the stem of the hammer, is expanded or compressed, according as it is connected, on lifting the hammer by the clock-work through the medium of the toothed portion of the pinion B and the rack A², and by its recoil, which takes place the moment the rack A² is released from the segmental pinion B, sends the hammer downward to deliver the blow upon the bell D. In its descent an offset or shoul-

der, *a*², on the stem of the hammer, brings up against a spring, E, so disposed that it will slightly retract the hammer from the bell the moment it has delivered the blow, so that the bell may give out a clear sound. The spring C is, in the example illustrated, connected by a rod, C', to a laterally-projecting lug on the end of the hammer-stem. The end of this rod is screw-threaded, and, passing through said lug, receives a nut, *c*, by which the power of the spring can readily be regulated. The power of the spring is so adjusted that when it is expanded by lifting the hammer it will almost counterbalance the power of the clock-work. The spindle *b*, which carries the segmental pinion B, projects through the face-plate of the frame, and supports, on its overhung end, a fast disk, F, which is provided with a radial stop-pin, *f*, in its periphery, and another stop-pin, *f'*, in its outer face. In the position of the rack A² and segmental pinion B, (shown in Figs. 1 and 2,) the hammer being lifted to nearly its highest elevation, the stop-pin *f* brings up against the end of the gravitating armature G of the electro-magnet H, and arrests the further movement of the clock-work until the armature is attracted by the magnet, which throws down its short arm so as to release the stop-pin *f*. The disk F is then again turned by the clock-work until the stop-pin *f'* strikes the vertical lug *g* on the short arm of the armature, again arresting the movement until the armature recedes from the magnet on the breaking of the current, when the notch *g'* in the lug *g*, coming opposite to the stop-pin *f'*, permits its passage. The clock-work again turns the disk and raises the hammer until the toothed portion of the pinion B escapes from the rack A², when the hammer is discharged by the recoil of the spring C. The clock-work, in the meanwhile, continues to run, and the blow of the hammer has scarcely been delivered when the pinion B again engages the rack A², and lifts the hammer until the movement is again arrested by the stop-pin *f* bringing up against the end of the short arm of the armature. The latter is a simple lever, pivoted on center pins, as

usual, on the post I. Its long and heaviest arm is under the magnet, and provided with a set-screw to adjust its extent of motion upward when attracted by the magnet.

It is important to govern the speed of the wheel-work during the time that the segmental pinion is out of gear with the rack of the hammer-stem, to ease the shock with which the pinion again engages the rack. For this purpose I provide a fly-wheel, K, hung on the last spindle of the wheel-work. It is placed loosely on the shaft, and is made to turn therewith by means of a ratchet and pawl, as clearly shown in Fig. 1. It will retard the speed of the wheel-work while disengaged from the rack of the hammer, and when again thrown into gear therewith will turn loosely on the shaft until its momentum is spent.

The second stop-pin f' is not absolutely essential to the operation of the apparatus, where only a momentary current passes through the magnet at a time; but to make certain that under all circumstances the exact number of strokes desired may be delivered, this stop-pin is very useful, for it will not permit the discharge of the hammer until the current is broken.

The apparatus is more especially intended as an alarm-bell for fire-alarm telegraphs, but may be used for other purposes.

The clock-work may be operated by a coil-spring, instead of a weight; but, in that case, a fusee and chain must be used to equalize the power of the spring.

The hammer being always ready to deliver the blow enables the apparatus to strike blows in very rapid succession.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. A bell, hammer, and detent, in combination with a prime mover for raising the hammer and a spring for discharging it, the opposing forces being nearly balanced when the hammer is held suspended, so as to reduce the pressure on the detent to a minimum.

2. An alarm-bell in which the hammer is lifted against the force of a spring, and thus held suspended by clock-work, ready to deliver the blow.

3. An alarm-bell in which during each beat of the work the hammer delivers a blow, and is also again lifted and held suspended for another discharge.

4. The combination of the segmental pinion B of suitable clock-work, rack A^2 on the stem of the hammer, spring C, revolving stop-pin f , and armature G of an electro-magnet, substantially as and for the purpose specified.

5. The combination of the rack A^2 on the stem of the hammer, spring C, pinion B, revolving stop-pins f and f' , and armature G, provided with a notched lug, g g' , substantially as and for the purpose set forth.

6. The spring-cushion E, in combination with the shouldered stem A^1 a^2 of the hammer, substantially as and for the purpose specified.

7. The loose fly-wheel K, in combination with the segmental pinion B of the clock-work and rack A^2 of the hammer, substantially as and for the purpose specified.

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

LEWIS H. McCULLOUGH.

Witnesses:

D. P. HOLLOWAY,
B. EDW. J. EILS.