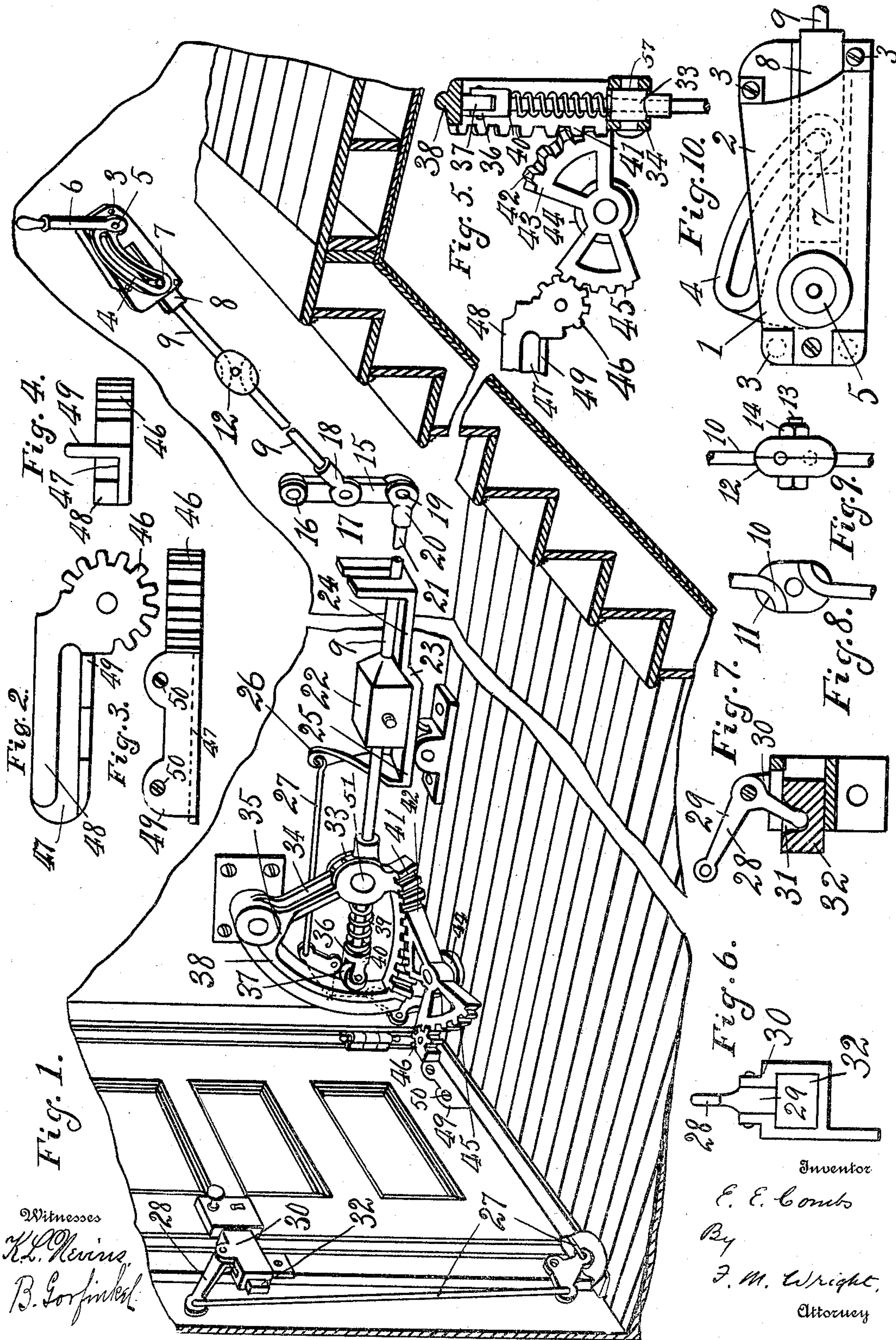


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E. E. COMBS.
DOOR OPENER.

APPLICATION FILED NOV. 21, 1904.



Witnesses
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DOOR-OPENER.

SPECIFICATION forming part of Letters Patent No. 793,421, dated June 27, 1905.

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To all whom it may concern:

Be it known that I, EDWARD ELVEY COMBS, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Door-Openers, of which the following is a specification.

This invention relates to an improved door opener and closer, the object of the invention being to provide a device of this character which shall be effective and certain in its action, easily assembled, and which will work with a minimum amount of friction.

In the accompanying drawings, Figure 1 is a broken perspective view of the apparatus applied to a door. Fig. 2 is a plan view of the rocking plate secured to the bottom of the door. Fig. 3 is a side view of the same. Fig. 4 is an end view of the same. Fig. 5 is a top plan view of the segment-gears. Fig. 6 is an end view of the latch-operating device. Fig. 7 is a longitudinal section of the same. Fig. 8 is a view of a half-coupling used in my improved door-opener with the ends of the wires therein. Fig. 9 is an edge view of the same. Fig. 10 is a side view of the controller.

Referring to the drawings, 1 represents a suitable casting secured to or within the wall at the point where the door-opener is to be operated and having a top plate 2 secured by screws 3. Within the cavity formed by said casting and top plate rocks a slotted cam 4, secured to a shaft 5, which is operated by the controller-lever 6. In said cam moves a roller 7, carried by a sliding block 8, sliding between the casting and the slotted cam, and screwed to said sliding block is the end of the connecting-rod 9. By operating the controlling-lever the connecting-rod can be reciprocated through the medium of the slotted cam and roller. This connecting-rod may be made in sections, joined together by a coupling, (shown in detail in Figs. 9 and 10,) in which the ends of the rod are bent through almost a quarter-turn, as shown at 10, and are laid in registering cavities or rounded grooves 11 in the two halves or sections of a coupling 12, said coupling-sections being held together by means of a bolt 13 and nut 14. In order to increase the

speed and distance traveled of the operative end of the connecting-rod relatively to that of the power end thereof, there may be provided a step-up consisting of a lever 15, suitably pivoted at a stationary point 16 near the line of the connecting-rod and pivotally connected, as shown at 17, with a block 18, into which the end of the rod 9, leading from the controlling-lever, is screwed, and also pivotally connected at a point 19 farther from the fulcrum of said lever with a block 20, into which the end of the connecting-rod 21, leading to the door, is screwed. It is evident that the motion of the latter portion of the rod will be greater than that of the former, owing to its greater distance from the fulcrum.

At the end of the connecting-rod 21 near the door is secured thereto a block 22, having an inclined plane, which when the steel rod 21 moves in the operation of opening the door impinges against a bent portion 23 of an arm 24 of a lever 25, suitably pivoted upon the wall near the door, the other arm, 26, of said lever being connected by a train 27 of wires and bell-cranks with an arm 28 of a lever 29, pivoted in a block 30, the other arm of said lever entering a socket 31 in a plunger 32, which pushes the latch into the lock, and so permits the door to open. By this means the first result of operating the controlling-lever is to unlatch the door. The end of said connecting-rod 21 passes through a collar 33, having trunnions 51, by means of which it rocks or oscillates in an arm 34 of a rocking segment-lever 35, said lever being pivoted on the side of the wall near the door. This oscillatory connection of the collar 33 with the lever 35 is evidently necessary to permit free movement of the lever. On the end of said rod passed through said oscillating collar is screwed a carrier 36 for a roller 37, said roller running on the inner edge of another arm 38 of said segment-lever. A spring 39 is interposed between the head 40 of said carrier 36 and the end of the oscillating collar, and this spring normally presses the roller 37 against the side of the arm 38; but the principal function of this spring is to take up the power transmitted

from the controller and store the same until the door is unlatched, when the force of the spring immediately throws the door open. On the arc of said segment-lever is formed a segmental bevel-gear 41, which meshes with a segmental bevel-gear 42 on an angular lever 43, pivoted on a bracket 44 at the side of the wall, the other arm of which carries a segment-gear 45, which meshes with a segment-gear 46 on a plate 47, secured to the bottom edge of the door in such position that the center of the segment-gear 46 is in the central vertical line of the door-hinges. Said plate 47 is secured to the bottom edge of the door by means of a tongue 48, which is mortised into said bottom edge, and also by means of flanges 49, which rest against the side of the door and have screw-holes 50 therethrough, through which the plate may be secured to the door.

The following are the advantages of this construction: The spring 39 causes the door to open quickly as soon as the latch is released. The plunger 32 impinges upon the latch squarely, and so avoids wearing the latch. The construction of the plate 47 is advantageous because it permits of easily removing the door without separating any of the parts of the door-opener except to take out the screws through the flanges 49. The construction of the controlling device, consisting of the slotted cam and the roller, provides a controller which avoids friction and applies the force in the most direct manner. The arrangement for unlatching the door by means of the block 22 is simple and efficient. The step-up allows for a considerable motion to be given to the segment-gears from a comparatively small motion of the roller in the controlling device, and thus permits said controlling device to be made comparatively small. The coupling for the rod-section is simple and compact.

I claim—

1. In an apparatus of the character described, a lever for opening the door, a connecting-rod operatively connected at one end with the source of power, and a spring connection for opening the door between the other end of the rod and the lever, said spring having force to open the door imparted thereto by the movement of the rod, and transmitting

said force to the lever when the door is unlatched, substantially as described.

2. In an apparatus of the character described, the combination of a lever suitably pivoted near the door, one arm of said lever being operatively connected with the door to swing the same open, an oscillating collar in the other arm of said lever, a rod passing through said collar and operatively connected at its other end with a source of power, and a spring between the collar and the near end of the rod, substantially as described.

3. In an apparatus of the character described, the combination of a rocking segment-lever pivoted near the door, an operative connection between said lever and the door to impart motion to the latter, an oscillating collar in one of the arms of said lever, a rod passing therethrough and operatively connected with the source of power, a roller carried by the end of said rod and engaging the other arm of the lever, and a spring interposed between the end of said rod carrying the roller and the oscillating collar, substantially as described.

4. In an apparatus of the character described, in combination with means for pressing back the latch of the door, and means for swinging the door open when unlatched, a rod connected to said latter means, a block having an inclined plane carried by said rod, and a device engaged by said plane, when the rod is moved to operate the opening device, and operatively connected with the means for pressing back the latch of the door, substantially as described.

5. In an apparatus of the character described, in combination with a door, a plate secured to the bottom edge thereof having a tongue mortised into the bottom edge of the door and having a flange engaging the side of the door near the bottom edge and adapted to be secured to the side of the door, and means for swinging said plate to open the door substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

E. E. COMBS.

Witnesses:

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