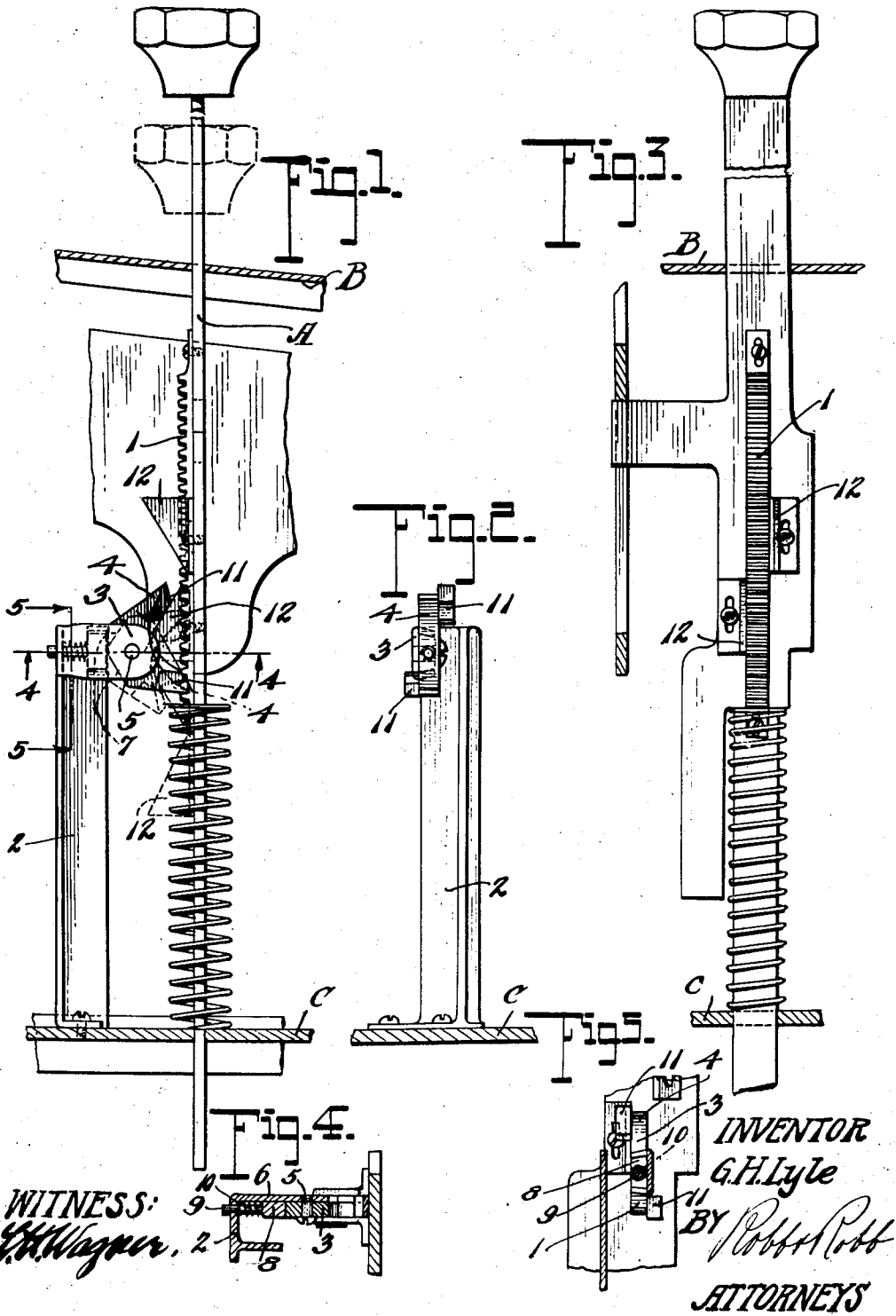


G. H. LYLE.
 FULL STROKE COMPELLING DEVICE.
 APPLICATION FILED MAY 28, 1918.

1,378,701.

Patented May 17, 1921.
 2 SHEETS—SHEET 1.

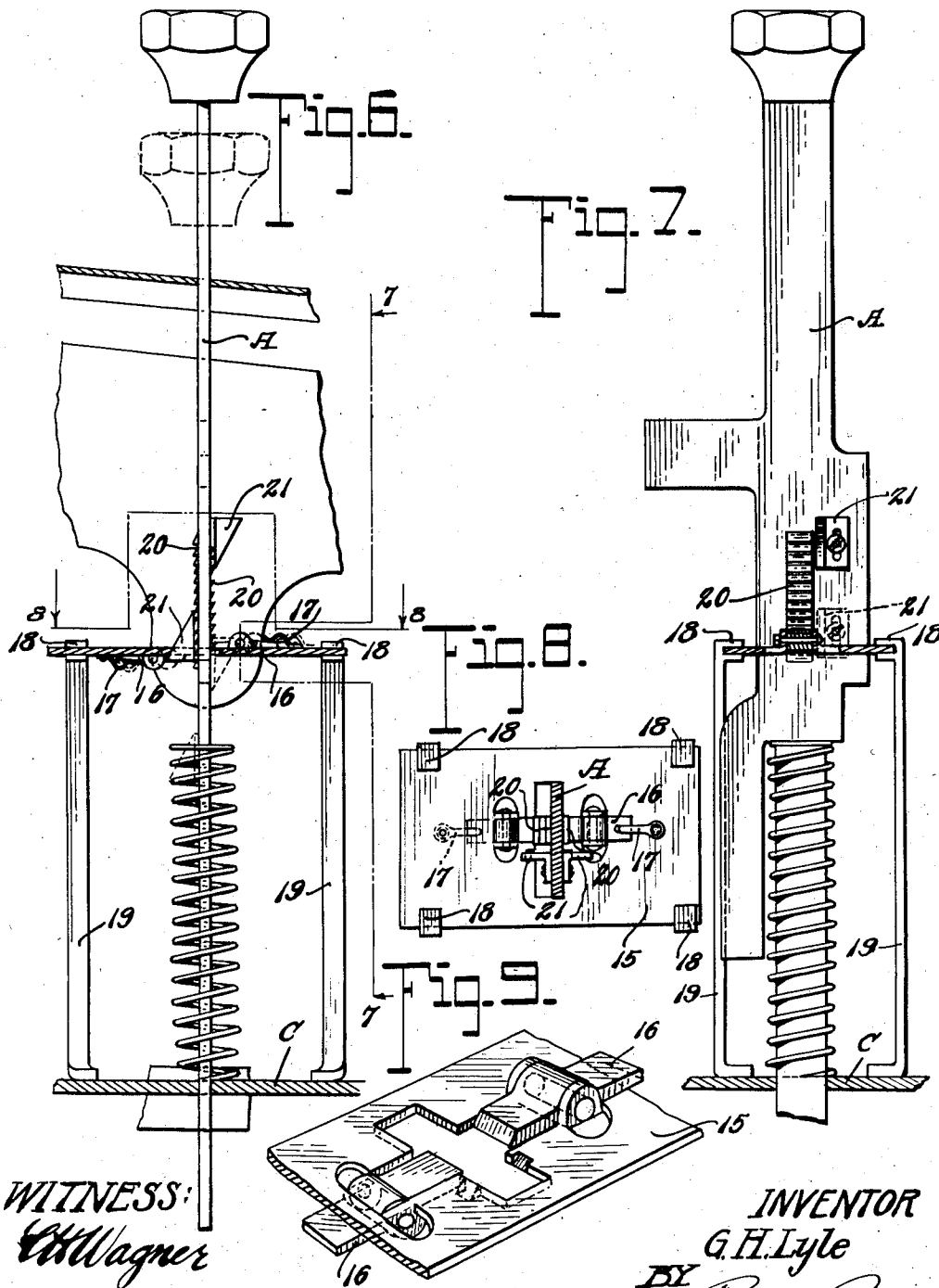


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WITNESS:
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FULL-STROKE COMPELLING DEVICE.

1,378,701.

Specification of Letters Patent.

Patented May 17, 1921.

Application filed May 28, 1918. Serial No. 237,087.

To all whom it may concern:

Be it known that I, GORDON H. LYLE, a citizen of the United States, residing at East Falls Church, in the county of Alexandria and State of Virginia, have invented certain new and useful Improvements in Full-Stroke Compelling Devices, of which the following is a specification.

In the art of calculating machines it is quite customary to use keyboard mechanism involving keys operable to control the registrations effected by registering wheels, and printing operations performed by suitable printing instrumentalities. In such machines where the keys constitute direct actuating means for the registers it is quite common to employ keys having variable movements in order that by their operation corresponding variable movements may be imparted to the registers controlled thereby. In this way smaller and larger numbers of units are accumulated on the registers according to the number of increments of movement capable of being transmitted to such registers by the predetermined keys. It is a desideratum in this art where keys are employed for the purpose mentioned that at full downward stroke as well as a full return or normalizing stroke of each controlling key be compelled; otherwise there is liability of mis-registration, with resultant disadvantages well known to those versed in this particular art.

The present invention involves certain novel provisions useful in connection with keys of calculating machines, or equivalent operating members employed in other arts whereby to compel full stroke operations of such keys or members.

These and such other objects as may hereinafter appear are attained by the novel construction, combination and arrangement of parts to be hereinafter specifically described and claimed. Reference will now be had to the accompanying drawings forming a part of this specification, wherein:

Figure 1 is a fragmentary vertical sectional view showing a full stroke compelling device adapted for cooperation with a depressible key of the calculating machine and constituting one embodiment of my invention;

Fig. 2 is a rear elevation showing more clearly the mounting of the pawl carrier cooperative with the key rack;

Fig. 3 is a view of the key stem, the illus-

tration being from a direction transverse to that from which Fig. 1 is taken and the pawl carrier and its support being omitted;

Figs. 4 and 5 are fragmentary sectional views taken about on the lines 4—4 and 5—5, respectively of Fig. 1;

Fig. 6 is a view similar to Fig. 1, illustrative of a modified adaptation of the invention;

Fig. 7 is a sectional view of said modification taken about on the line 7—7 of Fig. 6;

Fig. 8 is a horizontal sectional view taken about on the line 8—8 of Fig. 6;

Fig. 9 is a perspective view showing more particularly the pawl carrier and pawls mounted thereon.

The embodiments of my invention as presented herein are designed especially with a view to simplicity of construction and reliability of operation. Describing the constructions in detail and referring particularly to Figs. 1 to 5 inclusive, A denotes a conventional depressible key such as utilized commonly in calculating machines, B represents the keyboard plate, and C a base or guide plate through which the lower end of the key is adapted to slidably operate. The key A is equipped on one side thereof with a rack 1 which may be integral with the key but I have illustrated it as detachably connected thereto. At one side of the key A and supported by the guide plate C is a small standard 2 at the upper portion of which is mounted a pawl carrier 3 opposite ends of which are formed with the integral pawls 4. The carrier 3 is preferably pivoted at 5 to a lateral arm 6 of the standard 2 and said carrier is formed with flats 7 at its rear portion. A spring actuated detent 8 having the guide stem 9 surrounded by the coiled spring 10 is adapted to engage either one of the flats 7, dependent upon in which direction—upwardly or downwardly—the carrier 3 is tilted by means now to be set forth.

At opposite sides of the carrier and preferably integrally formed adjacent to the nose of each pawl 4 are projections 11. The projections 11 are arranged so that the upper one is in the path of and engageable with a cam 12 affixed to the key at one side of the rack 1 and the lower projection 11 is engageable with a corresponding cam 12 at the other side of the rack 1. The cams 12 may be integrally formed with the key but

I have illustrated them as detachable plate members.

Assuming the parts to be arranged in the positions illustrated in Fig. 1, the lower
 5 pawl 4 is held in engagement with the rack 1 through the coöperation of the detent 8 with one of the flats 7 of the carrier 3. On depression of the key A it is evident that the lower pawl 4 operates along the rack in
 10 the conventional manner of a ratchet device of this character, preventing upward movement of the key so long as it retains the operative position illustrated in full lines in Fig. 1. As soon as the key A has completed its full down stroke, the upper cam
 15 12 engages the lower projection 11 and causes tilting of the carrier 3 to its dotted line position of Fig. 1, thereby engaging the uppermost pawl 4 with the rack 1 and disengaging the lowermost pawl. In other
 20 words, the position of the carrier 3 is reversed by the above operation and the upper pawl now serves to prevent any possibility of downward movement of the key during its upward stroke. When the upward stroke
 25 is completed the lower cam 12 acts upon the upper projection 11 after the manner previously set forth and the pawl carrier 3 is reversed to resume its normal position of
 30 Fig. 1 illustrated by full lines. In the above way the pawls 4 act to prevent possibility of incomplete downward actuating movement of the key A and failure of completion
 35 of the upward stroke by which normalization of the key is obtained and necessary if accurate operation of the calculating instrumentalities is to be insured.

In Figs. 6 to 9 inclusive the modified adaptation of my invention appertains primarily to the full stroke compelling means
 40 alone. Those parts of the keyboard mechanism which correspond with that described above are correspondingly indicated. In this instance the pawl carrier is designated
 45 15 and consists of a plate slidable transversely to the direction of movement of the key A. The plate is equipped with the pawls 16 one on the upper side of the plate and the other beneath the plate. Both pawls
 50 are spring pressed by the springs 17. The pawl carrier 15 is mounted to slide horizontally in the guide lugs 18 at the upper ends of standards 19 supported on the guide plate C.

At opposite sides thereof the key A is equipped with the reversely disposed racks 20 and the reversely disposed cams 21. The
 55 pawls 16 are intended to alternately engage with said racks and with the construction thus presented the operation of this full stroke compelling means will be clear.

Assuming the parts to be in the position of Fig. 6, downward movement of the key
 60 A is compelled to the full completion of its stroke by the engagement of the upper pawl

16 with the rack 20 adjacent thereto. As the key reaches the limit of its downward stroke the upper cam 21 engages the carrier 15 at one edge of the opening therein
 70 through which the key operates and shifts the carrier laterally to the right in the present case. Said shifting movement disengages the upper pawl 16 from its rack 20 and causes engagement of the lower pawl
 75 with the reversely disposed rack 20 adjacent thereto. The lower pawl therefore compels a full upward stroke of the key in normalizing and as the key reaches the limit of its upward movement the lower cam 21 acts
 80 upon the carrier 15 to restore the parts to substantially the full line positions shown in Fig. 6.

As regards the details of the embodiments of my invention herein, I do not wish to be limited thereto, it being my intention to
 85 cover the general construction forming the basis of the principle of action of parts by which I utilize the carrier with ratchet pawl devices interchangeably coöperative
 90 with the key to compel the full stroke movement thereof in opposite directions, or at least in one direction. Obviously many different arrangements of the ratchet devices
 95 and controlling cams may be utilized within the spirit of my invention and the purview of the accompanying claims.

Having thus described my invention, what I claim as new is:—

1. In a calculating machine, the combination of an operating key, rack means
 100 thereon, a plate slidable transversely of the key and constituting a pawl carrier, pawls mounted on said pawl carrier and adapted to alternately co-act with the rack means of
 105 the key, and means on the key for causing sliding movement of said carrier to shift one pawl into engagement with the rack means while the other pawl is being shifted out of such engagement.

2. In a calculating machine, the combination of an operating key, rack means thereon, a plate slidable transversely of the key
 110 and constituting a pawl carrier, pawls mounted on said pawl carrier and adapted to alternately co-act with the rack means of the key, and means on the key for causing
 115 sliding movement of said carrier to shift one pawl into engagement with the rack means while the other pawl is being shifted out of such engagement, the pawl carrier being provided with an opening through
 120 which the key operates.

3. In a calculating machine, the combination of an operating key, rack means
 125 thereon, a plate slidable transversely of the key and constituting a pawl carrier, pawls mounted on said pawl carrier and adapted to alternately co-act with the rack means of the key, and means on the key for causing
 130 sliding movement of said carrier to shift

one pawl into engagement with the rack means while the other pawl is being shifted out of such engagement, the carrier aforesaid being provided with an opening through 5 which the key operates and the pawls of said carrier being mounted at opposite sides of the key.

4. In a calculating machine, the combination of an operating key, racks on opposite sides of said key, supporting standards, a horizontally movable pawl carrier 10 slidable on said standards transversely to the key and have an opening through which the key operates, pawls on said carrier at opposite sides of the key adapted to co-act 15 with the racks on the key, cams disposed on opposite sides of the key and arranged to

engage said carrier under certain conditions to shift the carrier in opposite directions for bringing the pawls alternately into and 20 out of co-action with the racks.

5. In a calculating machine, the combination with an operating key, of rack means thereon, a slidably mounted plate disposed transversely of the key, a pair of pawls 25 mounted upon the plate and arranged to alternately coöperate with the rack means to compel full stroke movements of the key in opposite directions, and means actuated by the key at either limit of its movement to 30 slide the plate and reverse the position of the pawls.

In testimony whereof I affix my signature.

GORDON H. LYLE.