

No. 883,645.

L. G. JULIHN.

PATENTED MAR. 31, 1908.

KEY LOCK FOR KEY OPERATED MACHINES.

APPLICATION FILED APR. 3, 1907.

2 SHEETS—SHEET 1.

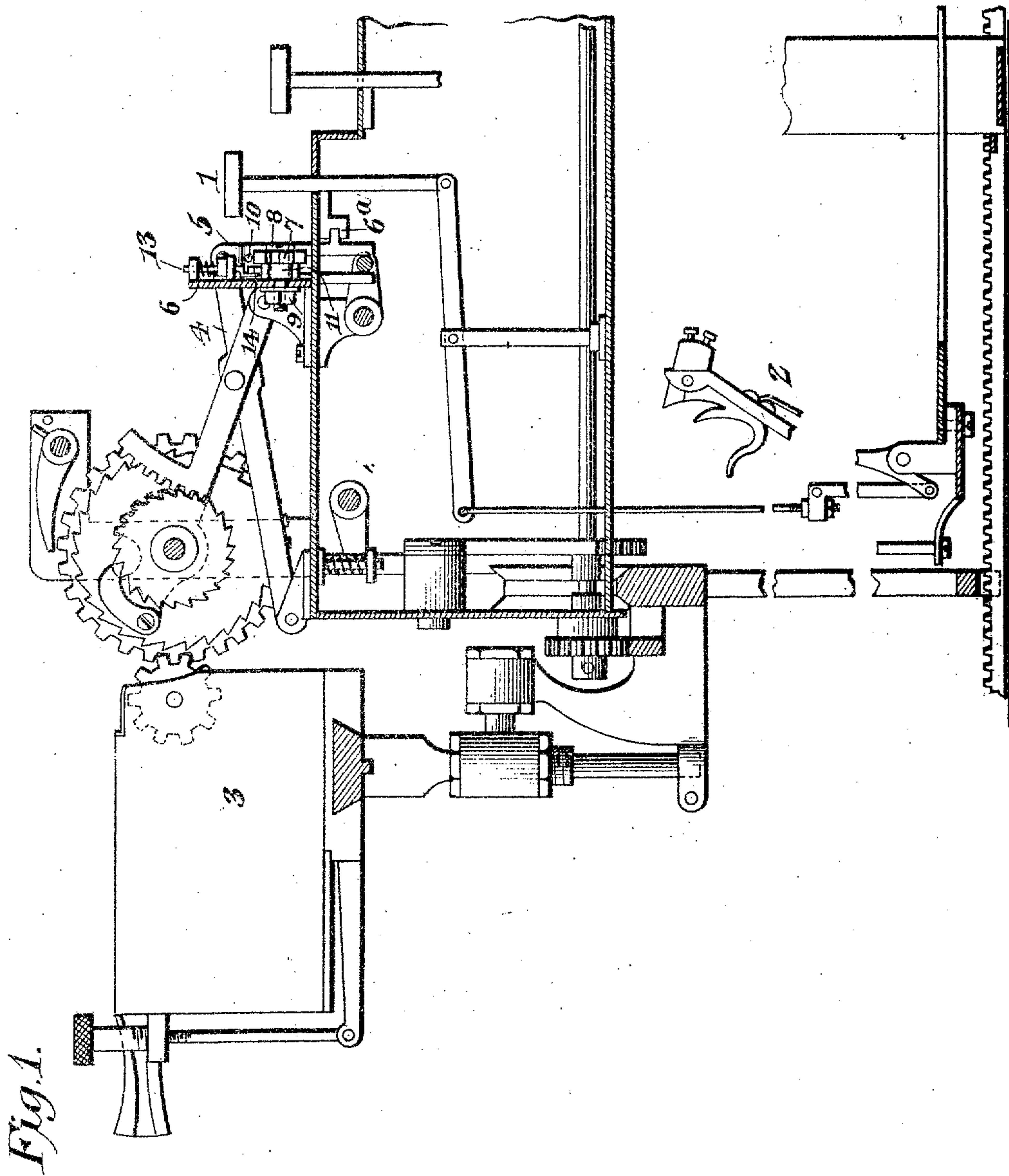


Fig. 1.

Louis G. Julihn, Inventor

By

E. G. Siger

Attorney

Witnesses

Jas. E. McLaughlin

Bl. H. H.

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L. G. JULIHN.
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2 SHEETS—SHEET 2.

Fig. 2.

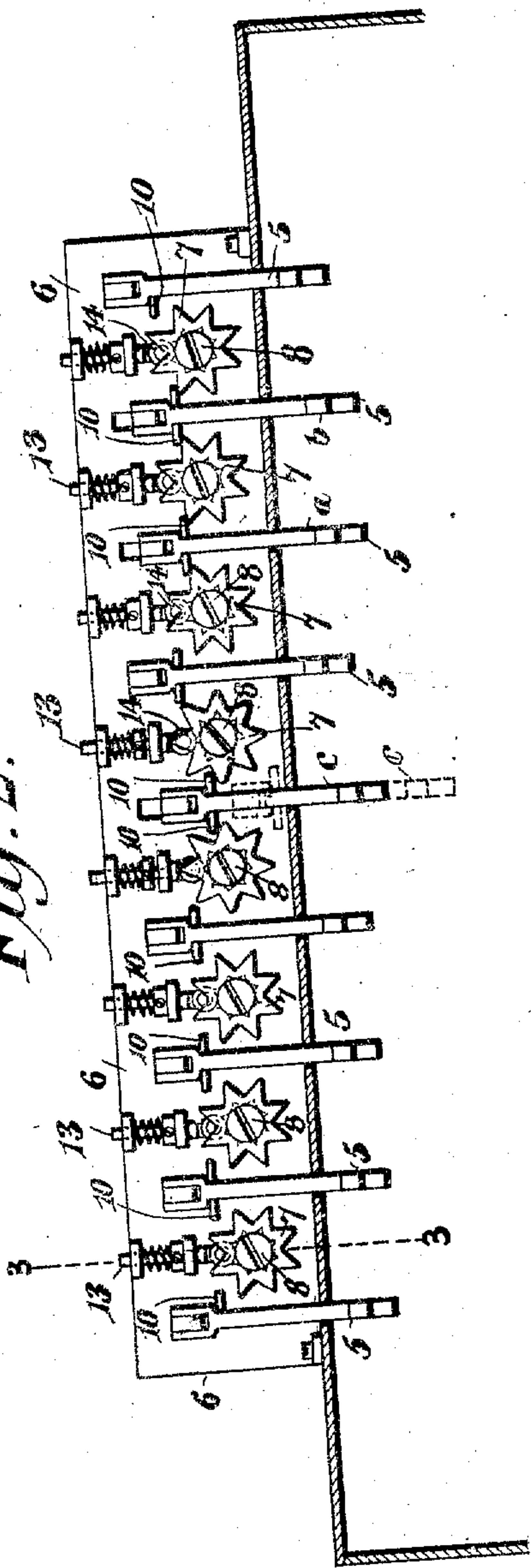


Fig. 5.

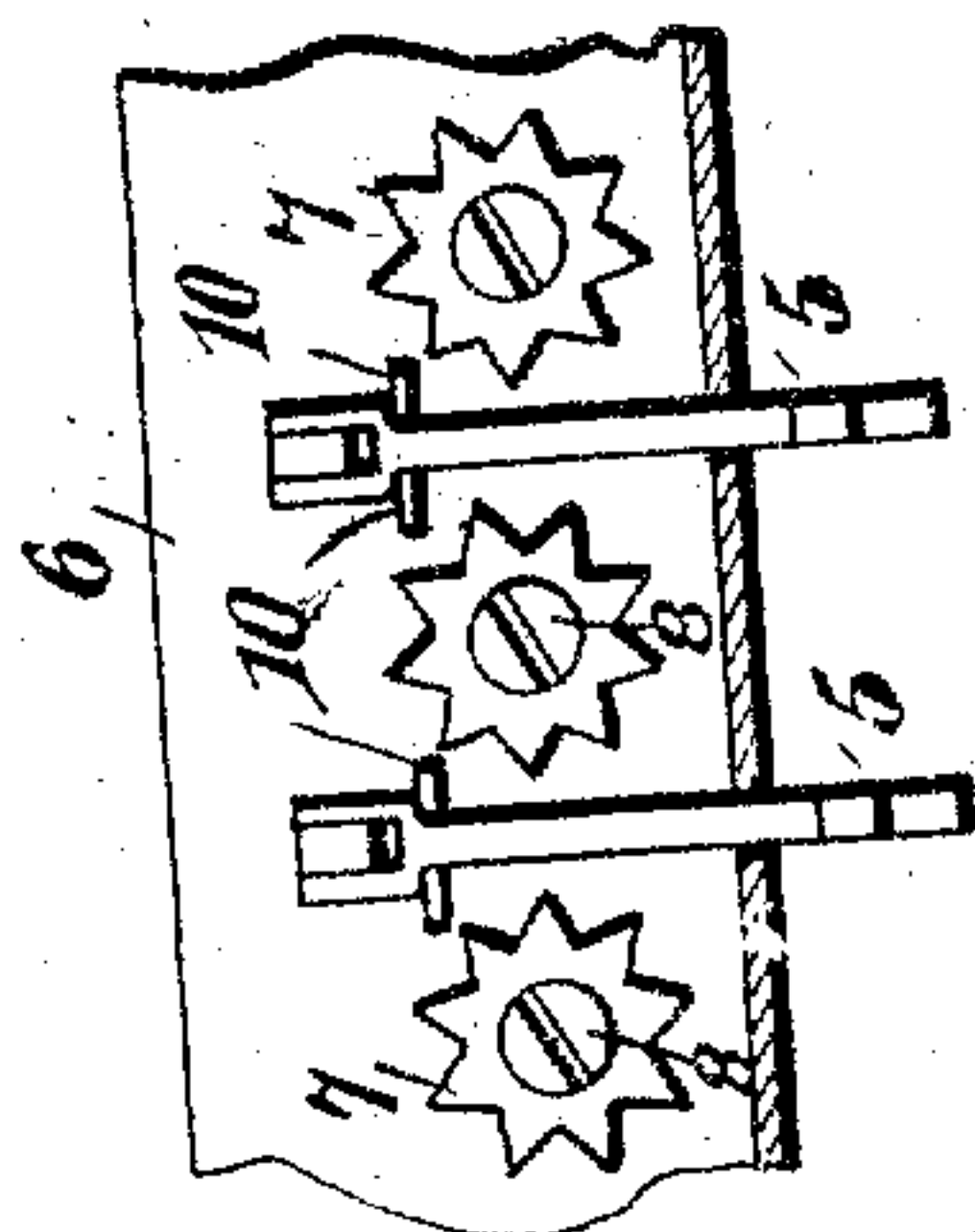


Fig. 4.

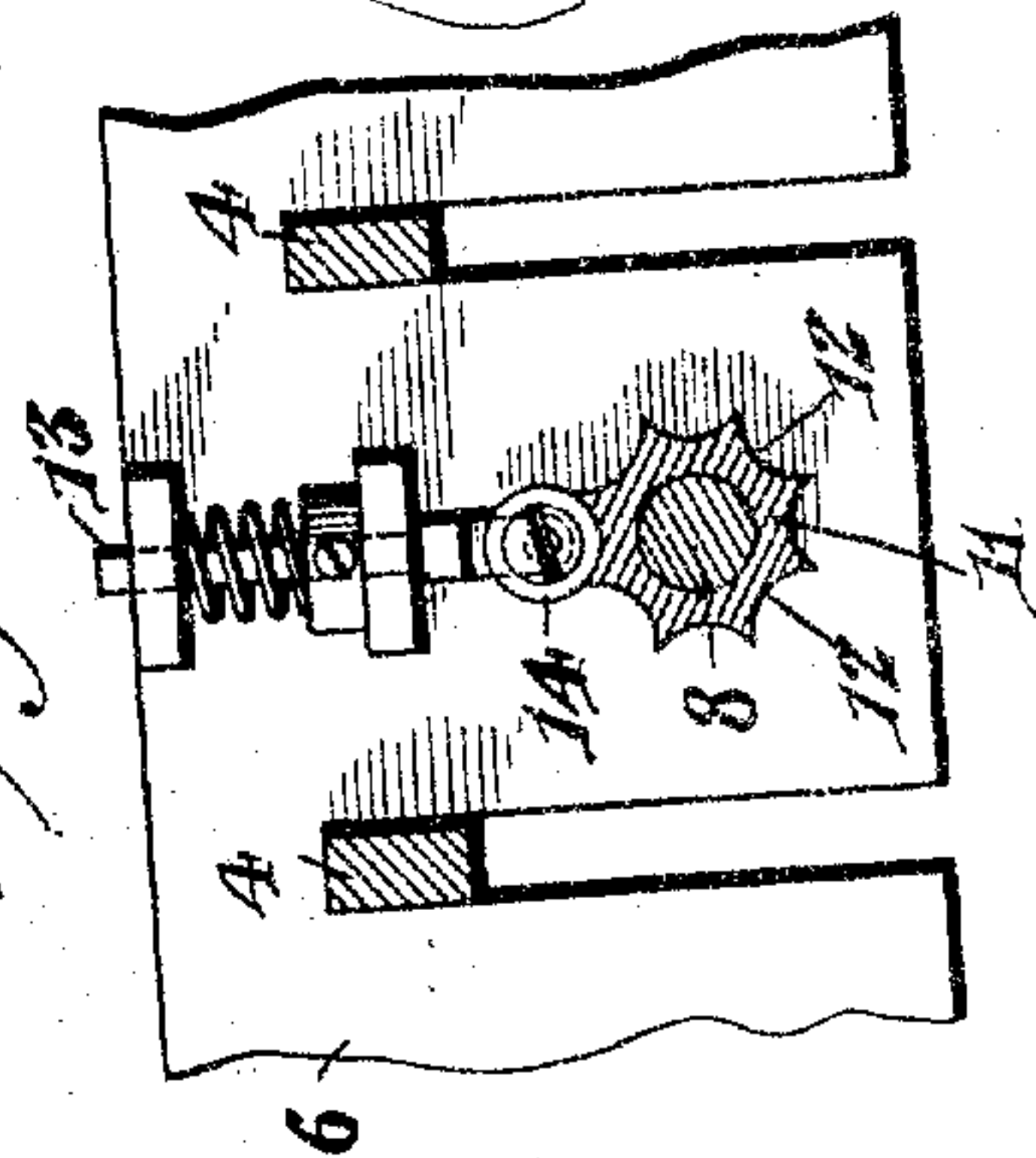
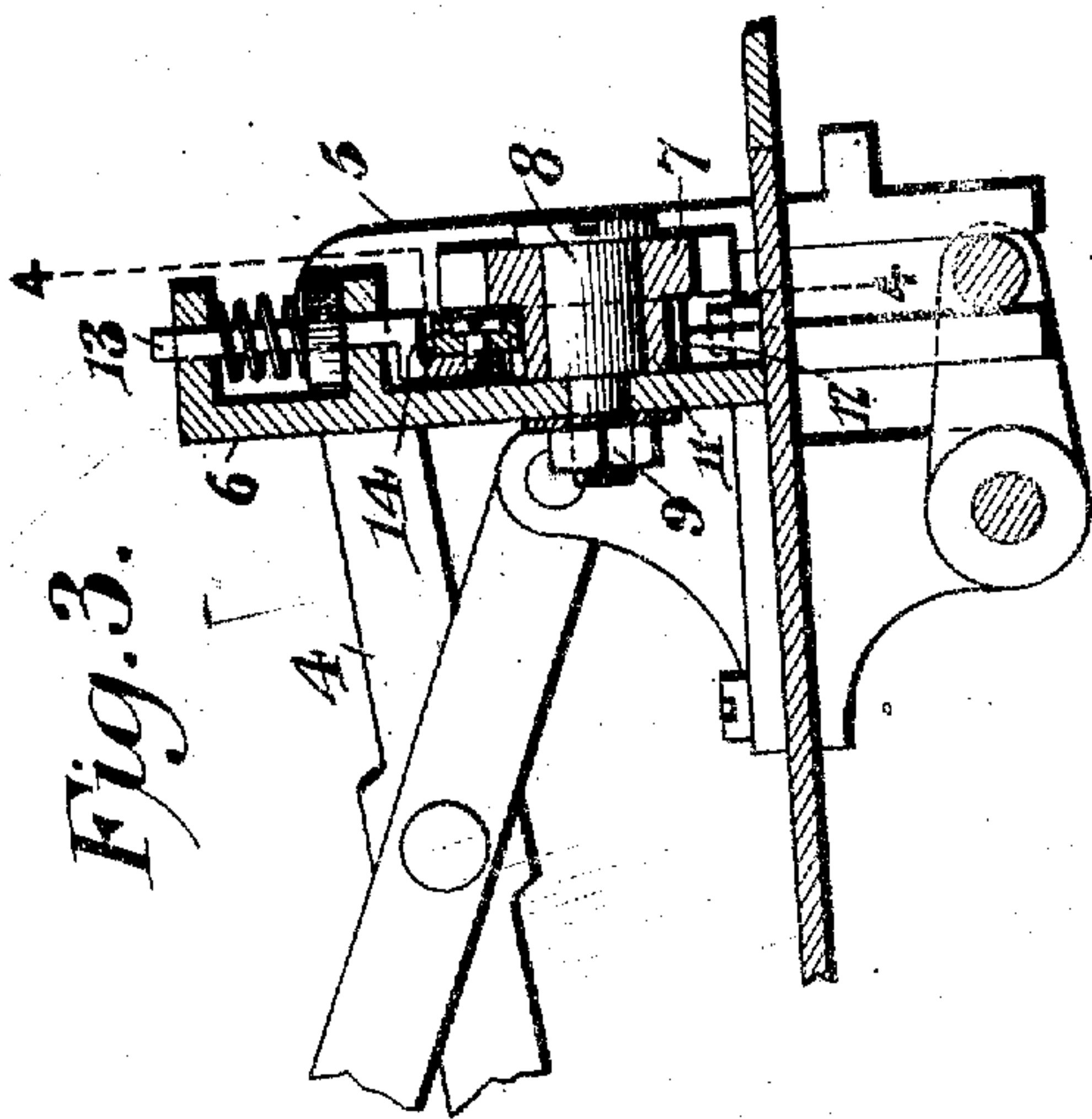


Fig. 3.



Louis G. Julihn, Inventor

By

E. G. Figg

Attorney

Witnesses

Jas. E. McLaughlin

Bl. Int.

UNITED STATES PATENT OFFICE.

LOUIS G. JULIHN, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR TO ELLIOTT-FISHER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

KEY-LOCK FOR KEY-OPERATED MACHINES.

No. 883,645.

Specification of Letters Patent.

Patented March 31, 1908.

Application filed April 3, 1907. Serial No. 366,210.

To all whom it may concern:

Be it known that I, LOUIS G. JULIHN, a citizen of the United States, residing at Washington, in the District of Columbia, have invented a new and useful Key-Lock for Key-Operated Machines, of which the following is a specification.

This invention relates to key-operated machines, and more particularly to means for preventing the simultaneous depression of two adjacent keys.

In typewriting, adding and other key-operated machines a possibility of error arises from the fact that two adjacent keys may be inadvertently struck and depressed simultaneously. It has therefore been proposed to provide such machines with means which will prevent the simultaneous depression of adjacent keys, but will permit the keys to be operated singly. Those key locking devices with which I am familiar are objectionable, however, in that they prevent the operation of the machine at high speed because upon the initial depression of one key, the adjacent keys are locked and such adjacent keys remain locked until their release is effected by the complete retraction of the key which has been operated.

The object of my invention is to produce a mechanism which, while preventing the simultaneous depression of adjacent keys, will nevertheless permit the operation of a key immediately adjacent to the one operated, while the operated key is moving back to its normal position.

Subordinate objects will appear as the description of the illustrated structure is developed.

In the accompanying drawings—Figure 1 is a sectional elevation of an Elliott-Fisher billing machine equipped with my invention. Fig. 2 is a sectional view through the top of the carriage and showing a series of key-operated members associated with a series of devices which prevent the simultaneous operation of adjacent keys. Fig. 3 is an enlarged section on the line 3—3 of Fig. 2. Fig. 4 is a section on the line 4—4 of Fig. 3, and Fig. 5 is an elevation of a plurality of key-operated members and a plurality of modified key locking devices.

For the purposes of this disclosure, it is unnecessary to describe in detail the machine

to which my invention is shown applied. It is only necessary to call attention to the fact that it includes a series of keys 1 which operate printing mechanism 2 and a computing mechanism 3, the operating connections between the keys and the computing mechanism including levers 4 from the front end of which depend links 5 connected to the key stems by suitable means indicated at 6^a. The connection between the keys and links is such that they move in unison, and therefore, in the present embodiment of the invention, I control the operation of the keys by associating detents, or locking devices, to be described, with the links 5.

The levers 4 extend through and are guided by a plate 6. This plate therefore affords a convenient support for a series of star wheels or rotary detents or key locking devices 7 rotatably mounted upon the front face of the plate 6, as for instance by screw studs 8, extended through the plate 6 and secured in place by nuts 9, as shown in Fig. 3. The star wheels 7 alternate with the links 5 and each wheel coöperates with lateral projections 10 on the adjacent side faces of the two contiguous links. Normally, the two projections 10 are disposed as shown at the left hand end of Fig. 2, that is to say, the projections are disposed above oppositely disposed teeth of the wheel 7, so that, if the two links are simultaneously depressed, the projections 10 thereon will strike the teeth of the rotary detent or wheel and will be held against further simultaneous movement by reason of the fact that the detent cannot rotate in both directions at the same time. This operation of the detent to arrest the simultaneously depressed links will be made clear by reference to the links marked *a* and *b*, which are shown in Fig. 2 sufficiently depressed to bring the projections 10 into contact with the detent. It will thus be seen that after slight simultaneous depression of adjacent keys, they will both be arrested by one of the detents, and will thus be locked against further simultaneous movement. It is unnecessary, however, to permit both keys to return to normal position. The appropriate key can be operated, because, if the key improperly struck is released, it will yield to permit the detent to rotate as the depression of the proper key is continued. That is to say, if

one of the two keys which are locked by a detent is released, the other may continue its downward movement, since such movement will be permitted by the rotation of the detent.

5 If a single key is depressed, see link *c*, Fig. 2, the projections 10 thereon will engage the teeth of the adjacent detents and will merely rotate the latter in opposite directions, the locking means opposing no appreciable resistance to this normal operation of the key. 10 It will be understood in this connection why the projections 10 are normally located slightly above the underlying teeth of the detents, since it will appear that when a link, as for instance the link *c*, is depressed, the adjacent links at opposite sides thereof must be sufficiently elevated to permit the teeth of the detents to clear the projections as the rotation of the detents would otherwise be 15 blocked, and the link *c* would be arrested before its complete depression.

When a link has been completely depressed, it occupies the dotted position of the link *c* in Fig. 2, it being noted that the projections 10 25 on said link are below the teeth of the adjacent star wheels. It will now be evident that as the link *c* rises, the adjacent sides of star wheels engaged by its pins, will move upwardly. The remote sides of the wheels will 30 consequently move downwardly. This downward movement will be in the direction of depression of the adjacent keys, and therefore, as the link *c* rises, either of the adjacent links may be depressed. In fine, since the opposite sides of a star wheel located between 35 adjacent links or key-operated members move in opposite directions, the links may likewise move simultaneously in opposite directions so that one may be depressed, 40 while the other is returning from its stroke. It will therefore appear that the object of the invention is attained, since it is impossible to effect material simultaneous depression of two adjacent keys, and since the depression of one key, while the adjacent key is 45 rising, is permitted.

It is believed that the construction thus far described comprehends a complete embodiment of the invention, since it is thought 50 that in any position which may be assumed by loosely mounted detents they will be effective to accomplish their purpose. For instance, if the two teeth of a given star wheel, which underlie the adjacent pins or projections 10, are not spaced the same distance 55 below said projections, it is immaterial, because if the two keys are depressed, the pin which is nearest a tooth will strike the same and thus rotate the detent so that the tooth at the opposite side of the detent will move 60 up, while the projection on the adjacent link is moving down. Thus, in any event, the two adjacent links will be arrested at a predetermined point, regardless of the initial 65 position of the star wheel. It may, never-

theless, be desirable to insure a given normal position of the wheels, and I have therefore shown a simple arrangement whereby this end may be attained. As shown in Figs. 3 and 4, each star wheel 7 is provided with a 70 hub 11 formed with peripheral concavities or dwells 12 corresponding in number and position with the interdental spaces of the star wheel. Coöperating with the hub is a spring pressed plunger 13 suitably mounted above 75 the hub on the plate 6 and carrying at its lower end a roller 14 which engages one of the dwells or concavities 12 of the hub and thus serves to locate the star wheel and yieldingly retain the same in its located position. 80

While it is perhaps preferable to form the star wheels with an even number of equidistant teeth, as shown in Fig. 2, this is not essential, as each of said wheels may be provided with an uneven or odd number of 85 teeth, as shown in Fig. 5, and this arrangement may perhaps be preferable when it is desired to eliminate the use of the locating or positioning devices for the wheels. It will, of course, be evident that while I have shown 90 the detents associated with the links 5, since this is a desirable location in the particular machine illustrated, it is, nevertheless, possible to associate these wheels or detents with the key stems, key levers or any other 95 parts of the key-operated mechanism, or in fact the keys themselves may directly coöperate with the detents, although this perhaps would be undesirable unless provision were made for preventing the detents 100 from extending above the level of the key tops.

It is thought that from the foregoing, the construction, operation and advantages of my key locking means will be clearly com- 105 prehended, but I wish to be distinctly understood as reserving the right to effect such changes, modifications, and variations of the illustrated structure as may come fairly within the scope of the protection prayed. 110

What I claim is:—

1. The combination with two keys and mechanism operated thereby, of means preventing the simultaneous effective operation of said keys and permitting the normal effective operation of either key at any time 115 during the retraction of the other key.

2. The combination with two keys, of mechanism operated thereby, each of said keys being capable of effective normal operation during the final portion of the effective stroke of the other key and also at any time during the retractile movement of said other key, and means preventing the simultaneous operation of said keys and permitting the 120 normal effective operation of either key during the final portion of the effective stroke of the other key or at any time during the retraction of said other key.

3. The combination with two keys, of 130

mechanism operated thereby, each of said keys being capable of effective normal operation during the retraction of the other key, and a rotary detent coöperatively related to the keys and arranged to obstruct the simultaneous effective movement of the keys and to yield to permit the normal effective operation of either key prior to the operation of the other key or during any portion of the retractile movement of the latter.

4. The combination with two keys, of mechanism operated thereby, each key being capable of effective normal operation during the retraction of the other key, a rotary detent, devices movable with the respective keys and arranged to engage the detent at opposite sides of the axis thereof to obstruct the simultaneous effective movement of the keys and to rotate the detent upon the operation of either key alone.

5. The combination with two keys, of mechanism operated thereby, each of said keys being capable of effective normal operation at any time during the retraction of the other key, an interposed toothed wheel obstructing the simultaneous effective movement of both keys, but rotatable to permit the effective operation of either key alone, said toothed wheel opposing no substantial resistance to the operation of one key either prior to the operation of the other key or during the retraction of said other key and opposing no substantial resistance to the complete retraction of such other key.

6. The combination with two keys and a single projection movable with each key, of a toothed wheel engaged at the opposite sides of its axis by said projection upon the initial simultaneous movement of the keys to prevent simultaneous effective movement thereof, said wheel being rotatable by either projection upon the operation of either key alone and disengaged from the projection of the operated key during the final portion of the effective stroke of said key.

7. In a key-operated machine, two keys, and mechanism operated thereby, each of said keys being capable of effective normal operation beginning during the final portion of the effective movement of another key or during the retraction of said other key, and means preventing the simultaneous effective operation of said keys and permitting the normal effective operation of one key provided said normal effective operation of the key last named is inaugurated during the final portion of the effective movement of the other key or during the retraction thereof.

8. The combination with two keys, and mechanism operated thereby, each of said keys being capable of an effective normal operation beginning during the final portion of the effective movement of the other key or during the retraction thereof, and means preventing the simultaneous effective operation

of said keys and permitting a normal operation of either key, beginning during the final portion of the effective movement of the other key or during the retraction thereof.

9. The combination with two keys and mechanism operated thereby, of a rotary detent coöperating with said keys to prevent the normal simultaneous operation thereof and rotatable to permit effective operation of either key alone, said detent being disengaged from the operated key during the final portion of the effective stroke of the latter, whereby said detent is left free to be rotated by the other key in order to permit an effective movement of the other key to be begun during the final portion of the effective stroke of the key first operated.

10. In a key-operated machine, the combination with a pair of keys and the mechanism operated thereby, of a rotary detent separate and distinct from said mechanism, and means operated by the keys and coacting with the detent at opposite sides of the axis thereof to detain the keys when simultaneously struck and to idly rotate the detent in one direction or the other when a single key is operated, the co-action of said means and the detent terminating prior to the completion of the effective stroke of the operated key.

11. In a key operated machine, a rotary detent and two keys detained thereby when simultaneously struck, said detent being rotatable in opposite directions by the respective keys when operated one at a time and having no coaction with the operated key during the final portion of its effected stroke.

12. In a key-operated machine, a rotary detent, two keys detained thereby when simultaneously struck, said detent permitting the operation of either key prior to the operation of the other key, or at any time during the retraction of said other key, said detent being incapable of assuming a position in which the same will prevent the proper operation of the keys.

13. In a key-operated machine, two keys, a rotary detent having teeth extending around its entire periphery, and a single projection movable with each key, said projection engaging the teeth at opposite sides of the detent and such engagement occurring only during the intermediate portion of the key stroke, whereby the detent and the operated key are out of coaction during the initial and final portions of the effective key stroke, substantially as and for the purpose specified.

14. In a key-operated machine, a pair of keys, an interposed star wheel mounted idly and serving the sole function of a detent, a pair of key-operated projections coöperating with the star wheel at opposite sides of the axis thereof, and a locating device yieldingly

retaining the star wheel in any one of several predetermined positions to insure at all times the proper location of the teeth of said wheel with respect to the projections.

5 15. The combination with a series of key-operated members each having oppositely extending projections and a series of rotary toothed detents alternating with said members and coacting with the projections of
10 adjacent members whereby the simultaneous operation of any two adjacent members will be prevented.

15 16. In a key-operated machine, a pair of keys, a single projection movable with each key, and a member movable about an axis, said projections being mounted to engage the member at opposite sides of the axis thereof to prevent complete simultaneous operation of the keys or to move the member

in either direction out of obstructing relation 20 to either key operated alone.

17. In a key-operated machine, a pair of keys, a rotary detent common to said keys, and locating means for the detent.

18. In a key-operated machine, a pair of 25 keys, and means preventing the simultaneous operation of both keys and permitting the operation of either key, said means including a toothed wheel, and yielding means for locating and detaining the wheel.

30 In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

LOUIS G. JULIHN.

Witnesses:

JOHN H. SIGGERS,

BLANCHE J. KALDENBACK.