

H. HOLLERITH.
REGISTERING APPARATUS.
APPLICATION FILED FEB. 7, 1906.

974,272.

Patented Nov. 1, 1910.

2 SHEETS-SHEET 1.

Fig. 1,

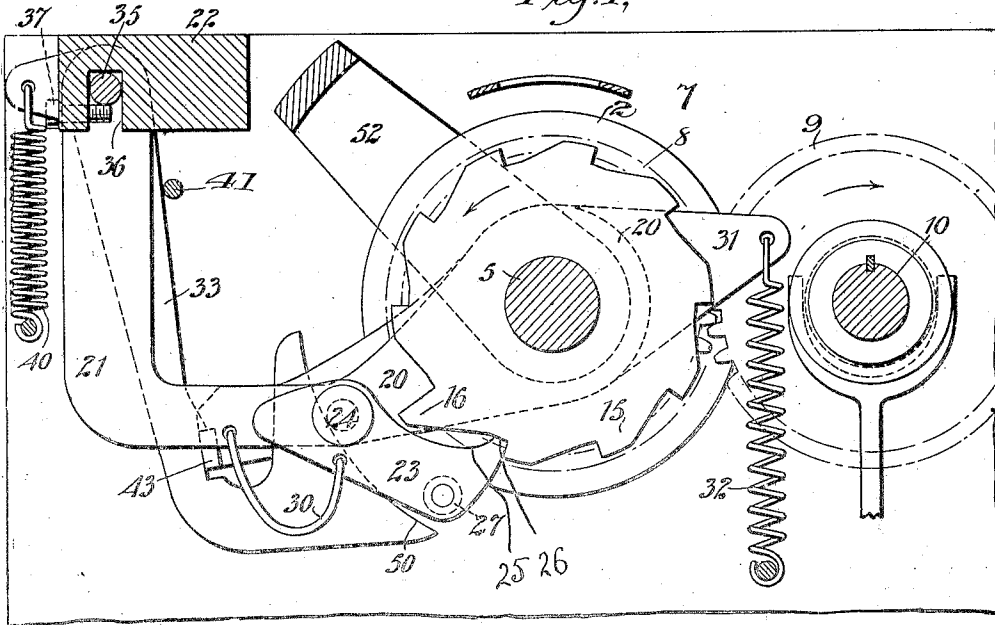
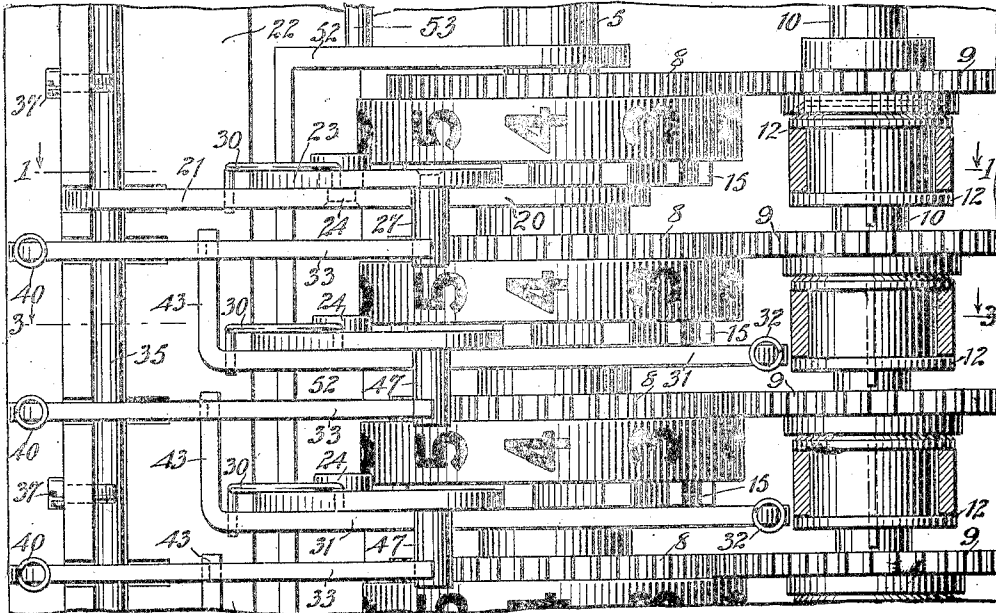


Fig. 2,



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2 SHEETS—SHEET 2.

Fig. 3,

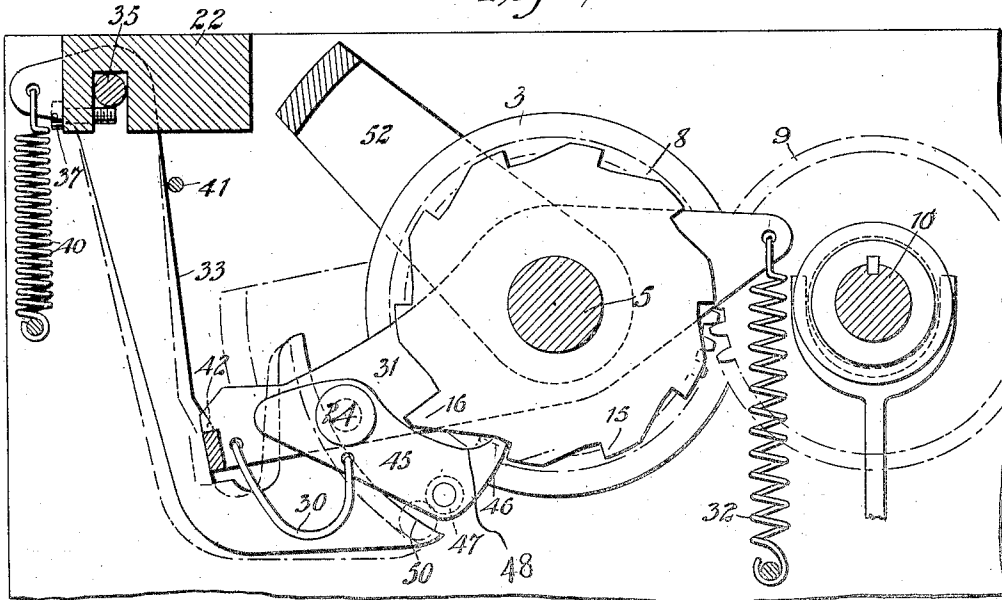
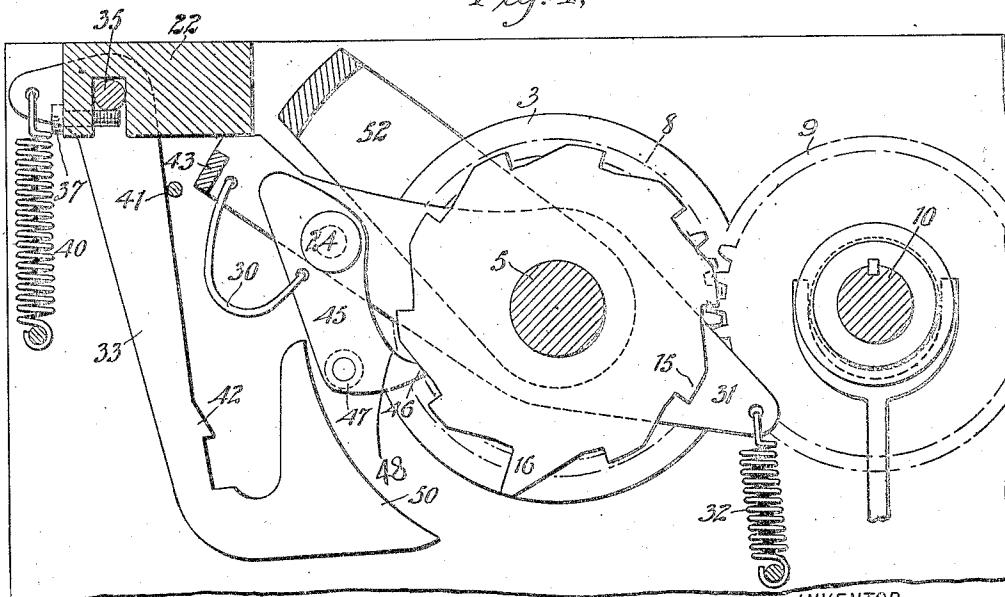


Fig. 4,



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UNITED STATES PATENT OFFICE.

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REGISTERING APPARATUS.

974,272.

Specification of Letters Patent.

Patented Nov. 1, 1910.

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To all whom it may concern:

Be it known that I, HERMAN HOLLERITH, a citizen of the United States, and a resident of Garrett Park, Montgomery county, Maryland, have invented certain new and useful Improvements in Registering Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to registering apparatus and has for its object the provision of means for effecting the transfer from each registering element to that of next higher order.

The invention is particularly adapted for integrating registering apparatus or counters in which items of any amount, within the limits of the apparatus, may be registered at one operation, or in other words, in which any number of the registering elements of the apparatus are actuated simultaneously to effect the registration.

My invention comprises broadly an arrangement of mechanism in which is included a member, provided with what I have termed herein a cam-surface, or its equivalent, having a limited reciprocatory movement relatively to or around the axis of the registering elements, cooperating with a device moving in fixed relation with a registering element which may engage said surface at any point in its reciprocatory movement to actuate the releasing devices for the carry-pawl, or its equivalent, of the registering element of next higher order.

My invention also comprises the combination with registering wheels and carry-pawls therefor, or their equivalents, of the aforesaid members having a reciprocatory movement relatively to the registering elements, latches for releasing the carry-pawls and means for maintaining said latches and said members in operative relation throughout the limits of the reciprocatory movement of the latter.

My invention also comprises various details of construction which are more fully set forth in the claims.

I have selected for purposes of description a preferred form of my apparatus which is shown in the accompanying drawings, but I desire to have it understood, that subject to such limitations only as may be expressly defined by the claims, my inven-

tion, which I consider broadly new in its principle of operation, is not to be limited to the specific features of construction herein illustrated and described, since many modifications will naturally suggest themselves to those skilled in the art.

In the accompanying drawings Figure 1 is a sectional elevation on the line 1—1 (Fig. 2); Fig. 2 is a partial bottom plan view; Fig. 3 is a sectional elevation on the line 3—3 (Fig. 2), and Fig. 4 is a similar sectional elevation showing the mechanism in its released position ready to be moved to the position shown in Fig. 3 to complete the transfer.

Similar reference characters are employed in all the views to designate corresponding parts.

The apparatus, in the form shown, comprises a series of registering elements consisting of rotary counters or wheels 1, 2, 3, 4, mounted to turn independently of each other on an arbor 5 suitably supported in a frame 7. Secured to each registering wheel is a gear 8 which meshes with the gear 9 loosely journaled on a rotating shaft 10. Clutch disks 12 are splined on the shaft 10 so as to rotate therewith but may be moved into engagement with their respective gears 9. The clutch disks 12 are normally held out of engagement with the gears 9, but when one of them is moved into engagement with its gear, the gear will turn with the shaft 10 and the counter will be rotated so long as such engagement is maintained.

The operating mechanism for the counters forms no part of my invention and any suitable mechanism may be used. The particular arrangement shown is simply for illustrative purposes and it will be apparent that the movement of each registering wheel is determined by a period during which the motion of the rotating shaft 10 is imparted to the respective counter wheels in any suitable manner, for example in the manner shown and described in my pending application No. 274,641 filed August 17, 1905.

Each of the registering wheels is adapted to bear peripheral numbers 0 to 9, which are preferably arranged so that the number on each wheel, which is in reading position, will register with a suitable sight opening. As shown, provision is made for one series for each wheel, but as will be understood, the invention is not limited to the employment

of wheels or registering elements bearing a single series of numbers or to the employment of any particular series of numbers. Secured to each wheel is a ratchet disk 15 having one tooth for each number in the series on the wheel. One of said teeth, 16, is higher than the other teeth of its series to act as a carry-tooth as presently explained, but it will be understood that a stud or other tripping device rotating with its wheel will answer the same purpose as this high tooth.

The four registering wheels illustrated, are simply the first four wheels of an ordinary integrating counter, 1 being the units wheel, 2 the tens wheel, 3 the hundreds wheel and 4 the thousands wheel; and as the transfer mechanism about to be described, which is actuated by the units wheel, differs slightly in its operation from that of the higher orders, due to the fact that no transfer is received by the units wheel, I will describe the construction thereof first.

Referring to Fig. 1, an arm 20 is at one end supported on the arbor 5 and its opposite end is rigidly secured in place by an arm 21, supported by a bar 22 extending across the frame of the apparatus. A pawl 23 is pivotally secured at 24 to the arm 20. The pawl 23 is provided on its inner side with a surface 25, with which the high tooth 16 will engage, during a relative movement of the wheel and the pawl, as will presently be more fully described. When such engagement occurs, it will cause the pawl 23 to swing back on its pivot, producing in effect a camming action upon the pawl and the devices which are actuated thereby, and I have therefore, for the sake of brevity, in defining my invention, but without intending any literal limitation, hereinafter referred to this surface, as well as to each of the similar surfaces on the members for the higher orders to be presently described, as a cam-surface. A stud 27, which for the reasons above stated, I have hereinafter referred to in describing this and each of the similar members for the higher orders, as a cam-member, is carried by the pawl 23. A spring 30 holds the tooth 26 of the pawl 23 lightly against the face of the teeth on the ratchet 15.

A lever 31 for each of the registering wheels above the units wheel is journaled on the arbor 5, and has a reciprocatory movement around the axis of the registering elements or wheels from the position shown in Fig. 3, to that shown in Fig. 4. A spring 32, one for each lever, is secured at one end of said lever and at the opposite end to the frame of the apparatus, tending to hold said lever in the position shown in Fig. 4. Each of said levers is restrained from movement by a latch 33, which is pivoted in the bar 22, being thus pivotally supported on a rod 33 in a groove 36 in said bar by screws 37.

Springs 40 tend to hold the latches against the stops 41. A detent 42 is formed on each of the latches 33 and engages with an arm 43 projecting from the corresponding lever 31. Each of the levers 31, carries upon a stud 24, a pivotally mounted pawl 45, similar in all respects to the pawl 23 heretofore described, having a pawl tooth 46 and carrying a stud or cam-member 47, as in the case of the units actuated mechanism. Each of the pawls 45 is also provided with a cam-surface 48 similar to that on the pawl 23. In their limited reciprocatory movement above referred to, the levers 31 carry with them the pawls 45 and impart a corresponding reciprocatory movement of the cam-surfaces 48, and also to the studs or cam-members 47. Each of the latches 33 is provided with a cam-actuated surface 50, arranged concentrically with the axis of the register wheels, and extending beyond the limits of this reciprocatory movement of the cam-members 47.

As will be understood, the cam-member 27 of the units actuated device, engages with the latch 33, which engages with the arm 43 on the lever 31 carrying the pawl 45 for the tens wheel; the cam-member 47 carried by the tens actuated pawl engages the next latch 33, which engages with the arm 43 on the lever 31 carrying the hundreds pawl and so on throughout the apparatus.

A universal carry lever 52 is shown as journaled on the arbor 5 and having an operating device 53, by which the lever 52 is reciprocated either manually or automatically, after each operation. When the carry lever is swung downwardly, it will engage all the levers 31 which are in the position shown in Fig. 4, and move them down simultaneously to reengage their latches and complete the transfer.

Assuming that the register wheels are in a position to indicate 0999, (which is the position shown in Fig. 3), and 1 unit be added to the total, the units wheel will be moved through one tenth of a revolution, or the distance represented by one tooth of the ratchet. In this movement of the units wheel, the high tooth 16 will engage the cam-surface on the inner side of the pawl 23, swinging the pawl on its pivot to move the cam-member 27 radially outward against the cam-actuated surface of the latch 33, and will press said latch back, releasing it from engagement with the arm 43 on the lever 31 for the tens wheel. This end of said lever 31, under the action of its spring 32, will be carried up until arrested by engaging the frame 22, as shown in Fig. 4. In the upward movement of said lever, the cam-surface of the pawl 45 carried thereby, will ride over the high tooth 16 of the tens wheel, which will move the cam-member 47 on the pawl 45 outwardly against

the cam-actuated surface 50 on the next latch 33, forcing back said latch out of engagement with the arm 43 on the lever 31 of the hundreds wheel, and said lever will move upwardly as did the tens lever, carrying the cam-surface of its pawl 45 over the high tooth 16 on the hundreds wheel and releasing the engagement of the next latch with the arm 43, which will cause the cam-surface on the next pawl to be carried up in a similar manner; but as that wheel stands at zero, the high tooth thereon will not be in position to actuate the releasing mechanism for the next wheel and the action of the transfer mechanism will stop at this point. Upon depressing the carry lever 52 as before explained, to relatch the levers 31, the pawls 45 of the tens, hundreds and thousands wheels, each of which has been carried up to gain one tooth on its wheel, will move the tens and hundreds wheel to zero, and the thousands wheel to one and the number 1000 will be indicated by the register wheels. This moving of the wheels by the carry lever 52 to complete the transfer, is accomplished simultaneously, thus simplifying the mechanism and effecting a saving in time, which is an important factor.

From the foregoing description of the operation of the apparatus, it will be observed that in the example given, the first latch is released by the movement of the units wheel, while the other latches, are, in this instance, released not by the movements of the wheels of higher order, but by the reciprocatory movement of the cam-surfaces on the pawls 45 over the high teeth of their wheels. Hence the releasing of the carry-pawl levers 31 to set the carry mechanism for their respective wheels, does not depend alone upon the movement of a wheel of lower order, but may also be effected during the reciprocatory movement of the cam-surface, while its wheel is stationary, or by the simultaneous movement of a cam-surface and its wheel in opposite directions.

As will be understood, it frequently happens in the operation of registering apparatus that the operation of the transfer mechanism of itself necessitates a transfer to the next registering element. That is to say, if in the counting or registering operation, an element of lower order is moved beyond the 9 position, a transfer must be made to the element of next higher order, and if the higher element should stand at 9, there must be a transfer to the next element, and in order to avoid the loss of a transfer thus due to the operation of the transfer mechanism, in contradistinction to a transfer due to the direct operation of the apparatus, provision has usually been made to secure a successive or step by step operation of the transfer mechanism for the different orders, as for example by operating the carry-pawls

one after the other from the lower to the higher orders; but with my invention, I am enabled to dispense with this requirement for successive operation either in the direct operation of the registering elements or in the releasing or resetting of the carrying mechanism, for, as will be noted, the transfer devices for any order may be released either before or after the release of the devices for the lower orders, and the resetting of the device is accomplished simultaneously for all the orders by a single movement of the carry lever.

These features of my invention, so far as I know, are broadly new, and by means thereof, I not only avoid the possible loss of a transfer during the operation of the transfer mechanism, but secure a great increase in the operative speed of the apparatus.

In the particular form of apparatus embodying my invention, which I have shown in the drawings, the cam-surface above referred to, is formed directly on a carry-pawl, but while I prefer this construction because it simplifies the apparatus, it is not an essential feature of my invention, and I do not intend to exclude from its scope a construction in which the cam-surface or its equivalent, is formed on or carried by, a member separate from the carry-pawls for, obviously, the apparatus is susceptible of material modification in this respect as well as in the manner of mounting and actuating the latches and the members carrying the cam-surfaces so as to maintain them in operative relation at all points within the limits of the reciprocatory movement of the cam-surfaces relatively to the axis of the registering wheels.

Having thus shown and described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a transfer mechanism for registering apparatus, comprising registering elements of higher and lower orders, a member which acts as a carry pawl for its registering element and as a releasing means for the carrying mechanism for the next registering element.

2. In a transfer mechanism for registering apparatus, carry pawls, latch devices for holding the pawls and means for releasing the latch devices by the carry pawls

3. In transfer mechanism for registering apparatus the combination of registering elements and carry pawls, means for imparting a relative movement to such of the registering elements and carry pawls as are to be actuated during a transfer and means for simultaneously moving a plurality of said carry pawls and registering elements to complete the transfer.

4. In a transfer mechanism for registering apparatus, comprising carry-pawls and

register wheels, means for rotating said pawls and wheels in opposite directions and means actuated either by the movement of a wheel, or during the rotatory movement of its pawl, for releasing the carry-pawl of the next higher wheel.

5. In transfer mechanism for registering apparatus the combination with the register wheels, carry pawls therefor, means for imparting a radial movement to the pawls by the rotation of the wheels, means for imparting to said pawls a movement around the axis of the wheels, latches for holding said pawls against such movement and means for releasing any latch by the radial movement of the pawl of next lower order.

6. In transfer mechanism for registering apparatus, the combination of the registering wheels, carry pawls therefor having both a rotatory and a radial movement relatively to the axis of the wheels, latches for holding said pawls against said rotatory movement, and means actuated by the radial movement of the pawls for releasing said latches.

7. In transfer mechanism of the character described, the combination of carry pawls supported to rotate about the axis of the registering wheels, latches for said supports, means for moving said pawls on their supports, and releasing means for said latches comprising coöperative devices carried by the latches and pawls and maintained in operative relation to each other during the movement of said pawl supports.

8. In transfer mechanism of the character described, the combination of register wheels, carry pawls, supports for said carry pawls having a rotatory movement relatively to the axis of the wheels, latches for said supports, means actuated by the wheels for moving said pawls on their supports and means carried by the pawls for releasing said latches when the pawls are moved on their supports.

9. In transfer mechanism of the character described, the combination of register wheels, carry pawls, supports for said carry pawls having a rotatory movement relatively to the axis of the wheels, latches for said supports, means actuated by the wheels for moving said pawls on their supports, means carried by the pawls for releasing said latches when the pawls are moved on their supports, and means for simultaneously moving said supports to complete the transfer.

10. In transfer mechanism for registering apparatus, the combination with register wheels, carry pawls having a rotatory motion around the axis of the wheels and latches for holding the pawls against such movement, of releasing devices for said latches comprising a cam member movable with a pawl and a cam-actuated surface

carried by a latch and maintained in operative relation during the rotatory movement of the pawl.

11. In transfer mechanism of the character described the combination with register wheels and their operating mechanism, carry pawls having a rotatory movement relatively to the axis of the wheels and latches for holding the pawls against such movement, of cam members movable with the pawls and cam-actuated surfaces carried by the latches, means for maintaining the same in operative relation at different points in the rotatory movement of the pawls and means moving with the register wheels to actuate said cams to release the latches.

12. In transfer mechanism of the character described, the combination with register wheels and their operating mechanism, carry pawls having a rotatory movement relatively to the axis of the wheels and latches for holding the pawls against such movement, of cam members having a radial and a reciprocatory movement, means moving with the wheels in fixed relation thereto for imparting a radial movement to said cam members and means for transmitting such movement to the latches to release the carry pawls.

13. In transfer mechanism for registering apparatus, the combination with the register wheels, operating mechanism therefor, carry pawls having a rotatory movement relatively to the register wheels or their operating means, and latches for restraining such movement, of tripping means such as a tooth and means actuated thereby for releasing said latches at different positions of the tripping means.

14. In transfer mechanism for registering apparatus, the combination with the register wheels, operating mechanism therefor, carry pawls having a rotatory movement relatively to the register wheels or their operating means, and latches for restraining such movement, of tripping means such as a tooth and means actuated thereby for releasing said latches at different positions of the tripping means, and means for simultaneously moving the carry pawls to complete the transfer.

15. In transfer mechanism the combination with the registering elements, carry pawls and controlling devices therefor, of a member, such as a wheel, means for imparting a reciprocatory and a radial movement thereto and means for transmitting such radial movement to the controlling devices of the next order.

16. In transfer mechanism of the character described the combination with register wheels and their operating mechanism, carry pawls having a rotatory movement relatively to the axis of the wheels and latches for holding the pawls against such move-

ment, of cam members having a reciproca-
 tory movement relatively to the axis of the
 wheels, means moving with the wheels in
 fixed relation thereto for imparting a radial
 movement to said cam members, and means
 for transmitting such movement to the
 latches to release the carry pawls and means
 for simultaneously moving the pawls to
 complete the transfer.

17. In a transfer mechanism for register-
 ing apparatus, register wheels and operat-
 ing means therefor, a cam-surface for each
 register wheel, having a radial and a recip-
 rocatory movement, means actuated by a
 register wheel for imparting a radial move-
 ment to each cam-surface to actuate a con-
 trolling device for the transfer mechanism
 of a wheel of higher order at any point
 within the limits of the reciprocatory move-
 ment of the cam-surface.

18. In a registering apparatus, the combi-
 nation with register wheels and operating
 means therefor, of carry pawls, supports for
 said pawls, latches for said supports, cam
 members for actuating said latches, means
 moving with the wheels for imparting a ra-
 dial movement to the cam members to re-
 lease the latches, means for imparting a re-
 ciprocatory movement to the cam members,
 means for maintaining the cam members
 and latches in operative relation at all points
 in the reciprocatory movement of the cam
 members and means for moving the carry
 pawls to complete the transfer.

19. In transfer mechanism for registering
 apparatus, the combination with the regis-
 tering elements and their operating means,
 of members, each provided with a cam-sur-
 face having a limited reciprocatory move-

ment around the axis of the registering ele-
 ments, devices, moving with the registering
 elements, for engaging said cam-surfaces at
 any point within the limits of their recip-
 rocatory movement, and means actuated by
 such engagement, for controlling the trans-
 fer movement of the next registering ele-
 ment.

20. In transfer mechanism for registering
 apparatus, the combination with the regis-
 tering elements and their operating means,
 of devices, such as carry-pawls, for impart-
 ing a transfer movement to the registering
 elements, members having a limited recip-
 rocatory movement relatively to the axis of
 the registering elements, latches for holding
 the carry-pawls, means for maintaining said
 latches and said members in operative rela-
 tion at all points in the reciprocatory move-
 ment of the latter, and means, moving with
 the registering elements, for actuating said
 members to release said latches.

21. In transfer mechanism for registering
 apparatus, the combination with the regis-
 tering elements and their operating means,
 of devices, such as carry-pawls, for impart-
 ing a transfer movement to the registering
 elements, members having a limited recip-
 rocatory movement relatively to the axis of
 the registering elements, latches for holding
 the carry-pawls, and means moving with a
 registering element for actuating a member
 to release the latch for the next element at
 any point within the limits of the recip-
 rocatory movement of said member.

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Witnesses:

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 PERCY F. SMITH.