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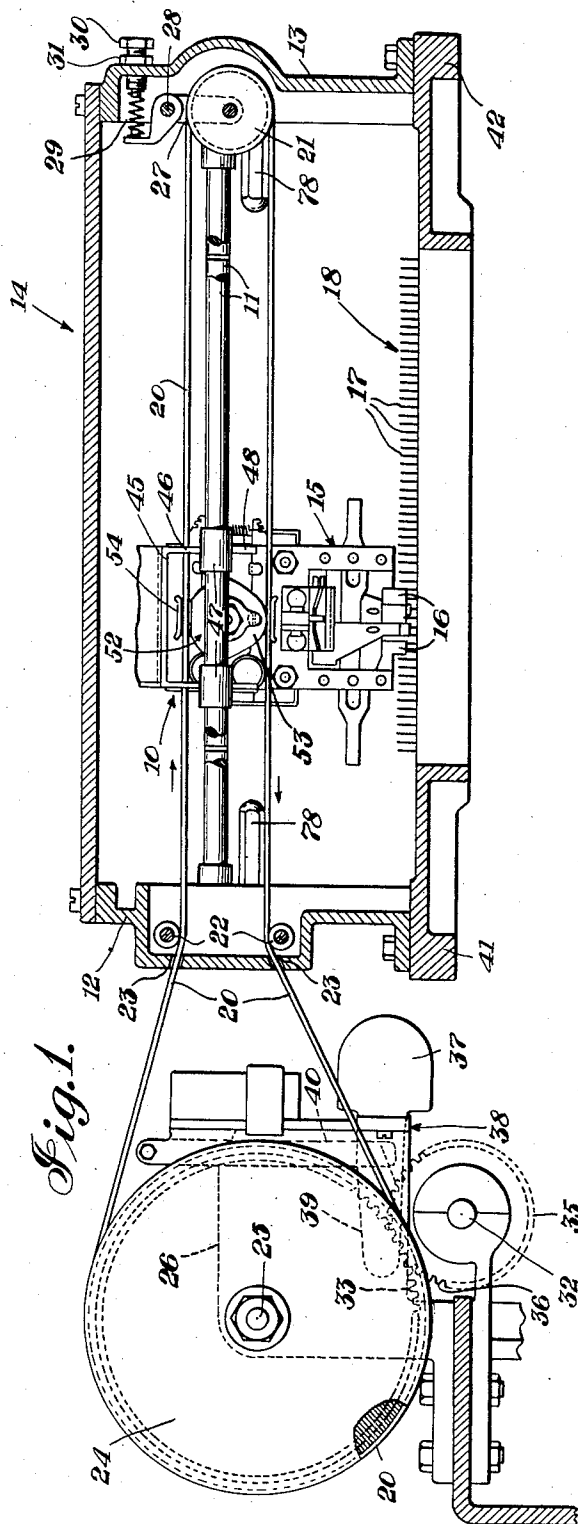
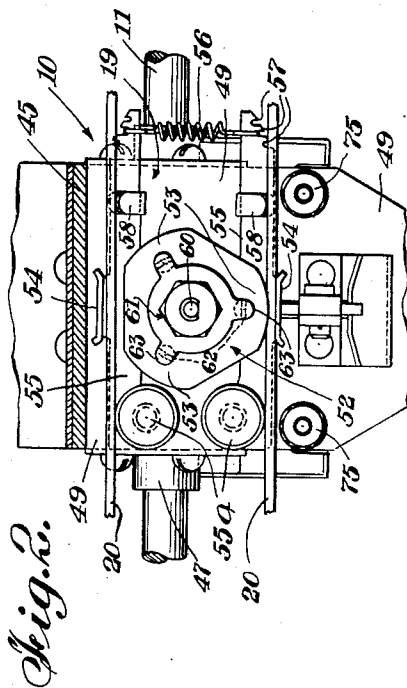
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SELECTOR SWITCH CARRIAGE CONTROL MEANS

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2 Sheets-Sheet 1



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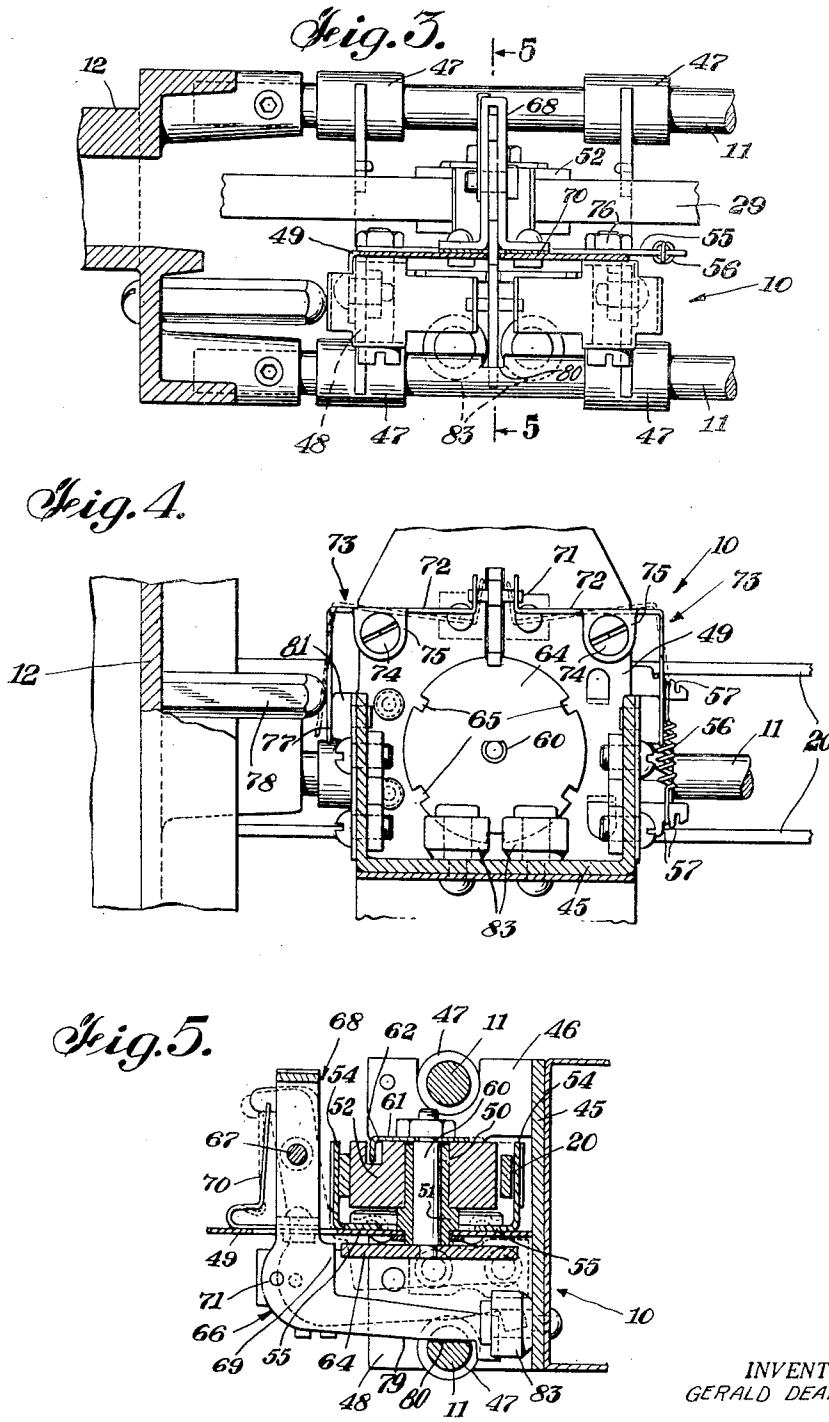
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SELECTOR SWITCH CARRIAGE CONTROL MEANS

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The present invention relates to improvements in means for driving reciprocating carriages such as brush carriages of selector switches, for example switches of this character used in automatic telephone systems as finder switches, group selectors, final connectors, marking switches or the like. More particularly, the invention relates to improvements in carriage-reciprocating means comprising an endless belt and a rotatable member on the carriage turned step by step to engage in belt reaches alternately.

In certain features this application is an improvement on the inventions of my co-pending applications Ser. No. 648,759, filed February 19, 1946, and Ser. No. 648,760, filed February 19, 1946 and which issued as Patent No. 2,510,084 on June 6, 1950.

As described in said applications a brush carriage was reciprocated across a flat terminal bank by means of a clutch element or clover leaf rotatably mounted on the carriage and having three belt-engaging parts to cooperate with belt supports or stops on the carriage and connect the carriage to one or the other of two parallel oppositely-moving runs or reaches of an endless belt driven in one direction only. Said belt-engaging parts were positioned with their central radial lines spaced at 120° intervals.

Upon striking an abutment at either end of the carriage path, the rotatable clutch element would be turned by the moving belt through a 60° angle whereby the connection would be shifted from one run or reach of the belt to the other, thus reversing the direction of movement of the carriage. It was also proposed to provide spring detent means to hold the rotary element in final shifted position until another shift took place.

However, in said prior developments there was no means to determine positively the movement of the rotary member to a definite position for the following direction of drive. For example, although the actual change of drive might be effected, the rotary clutch element might still have sufficient contact with the released reach of the belt to result in unnecessary wear of the belt. Other disadvantages might arise from lack of positive control of the movement and positioning of the rotary clutch element.

An important object of the invention is to provide a novel and advantageous belt clutch of the general character specified.

Another object of the invention is to provide means for positively locking said rotary clutch member in each of its belt clutching positions for each reach of the belt.

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Another object of the invention is to provide means for positively unlocking the rotary clutch member as the carriage approaches an end of its path.

Still another object of the invention is to provide means for unlocking said rotary clutch member from one reach of the belt as the carriage approaches the corresponding end of its path and maintaining the clutch member in unlocked condition until it is turned to a definite clutching position for the other reach of the belt.

Yet another object of the invention is to provide means for locking the brush carriage against movement when the carriage reaches an end of its path and to maintain the carriage in locked condition until the rotary clutch member after releasing one belt reach has been turned to a definite fixed position for clutching the other belt reach.

A further object of the invention is to provide means, effective at each end of the carriage path, to release the rotatable clutch and lock the carriage in fixed position and, upon turning the rotary clutch by the belt to the next effective position, to lock the rotary clutch against movement and unlock the carriage.

A still further object of the invention is to provide novel and advantageous means for centering in belt-clutching position the rotary clutching member or clover leaf.

A yet further object of the invention is to provide novel and advantageous means for indexing the clover leaf.

Other objects, features and advantages will appear upon consideration of the following detailed description and of the drawings in which:

Fig. 1 is a fragmentary section as seen from above, illustrating a preferred embodiment of the invention;

Fig. 2 is a top plan view on a larger scale of the brush carriage with the brush unit and other parts omitted;

Fig. 3 is a front view, partly in section and with the brush unit omitted, of the structure shown in Fig. 2 and certain other parts cooperating with the clutch mechanism to shift the clutch;

Fig. 4 is a partial bottom plan view of the structure illustrated in Fig. 3; and

Fig. 5 is a partial section on the line 5—5 of Fig. 3.

Referring more particularly to Fig. 1, a brush carriage 10 is mounted to slide on two fixed horizontal guides or rods 11. Said guides or rods 11 are secured at their ends to frame members 12

and 13 which may form part of a casing 14 in which the brush carriage is reciprocated.

Mounted on said brush carriage 10 is a brush unit 15 including brushes 16 to cooperate with terminal pins 17 of a flat terminal bank 18. In said carriage 10 is a support 19 for belt-gripping means for alternately connecting the brush carriage to two parallel oppositely-moving reaches of an endless belt 20 which is driven in one direction only.

As illustrated in Fig. 1, the endless belt 20 passes around a pulley 21 at the right end of the casing 14. From said pulley 21 extend parallel runs or reaches which at the other end of the casing pass between two guide rollers or pulleys 22 and then diverge through openings 23 in said frame or casing member 12 to the outside of the casing 14. There the belt 20 passes around a large driving pulley or wheel 24 fixed on a short or stub shaft 25 journaled in a bracket 26 constituting part of the frame of the assembled apparatus. The belt may be kept taut by pivotally mounting the pulley 21 on a frame 27 pivoted at 28 and urged in the proper direction by means of a compression spring 29 and a screw 30 for adjusting the spring action. The screw 30 may be held in adjusted position by means of a lock nut 31.

The pulley 24 around which the belt 20 passes is driven by suitable clutch mechanism from a vertical shaft 32 which is motor driven in a manner that is well known in so-called rotary telephone exchange systems. For example, this clutch mechanism is similar to clutch mechanisms already in use and comprises a thin flexible gear 33 fixed to the lower end of stub shaft 25.

A gear 35 is secured on shaft 32 to rotate therewith and to mesh with flexible gear 33 which may however be flexed to disconnect it from gear 35. Gear 35 may be in the form of a thin disk and may be mounted between two stiff disks only one of which, the disk 36 beneath the gear, is indicated. The flexible gear 33 is biased to engage disk 36. Said flexible gear clutch is controlled by a clutch magnet 37 mounted on a flange of bracket 26 with its pivoted armature 38 at the bottom thereof. An arm 39 extends from the armature to a point beneath the flexible gear 33 near the point of engagement of the two gears, and when moved upwardly by a suitable spring 40 will flex gear 33 out of mesh with gear 35. Upon energization of the magnet, for example as a result of starting a call or dialing, the armature arm 39 will be swung downwardly against the action of the spring 40 and the flexible gear 33 will mesh with driving gear 35, thus causing movement of belt 20 and reciprocation of the brush carriage, the brushes acting under control of usual brush spreaders.

The flat terminal bank 18 is mounted between vertical frame elements 41 and 42 to which casing ends or frame members 12 and 13, respectively, are secured. Other banks 18 may be mounted above and below the bank shown in Figure 1, and by merely turning the banks, the brush carriages and the driving means of a unit upside-down all of these parts could be used on the opposite side of the bay. If the gear 35 were used to drive a unit on the side of the bay opposite to that shown to be in use in Figure 1, the pulley 24 would be above the associated flexible gear 33 and the corresponding banks 18 at opposite sides of the bay would be at different levels.

The belt 20 may be made of textile strands woven or braided in the desired shape and impregnated with suitable material such as neoprene.

According to the illustrative embodiment of the present invention, the brush carriage 10 includes a plate 45 at the rear in Figs. 1 and 2 and at opposite ends thereof forwardly turned upper brackets 46 with bearings 47 slidable on the upper guide 11, and lower brackets 48 with bearings 47 slidable on the lower guide 11. Supported on the upper edges of lower brackets 48 is a plate 49 having at its edges flanges extending downwardly along the outer faces of said lower brackets and secured to these brackets by suitable means such as bolts.

Passing downwardly through a suitable opening in plate 49 is the lower end of a bushing 50 which has a collar 51 resting on the upper face of the plate. At the lower side of the plate 49 the bushing 50 is provided with means to prevent withdrawal from the opening in plate 49 and to hold it against turning.

Rotatably mounted on said bushing 50 above said collar 51 is a rotatable clutch member or clover leaf 52 in the form of a solid disk of suitable material with a central bore to receive the upper part of said bushing 50 and three belt-engaging lobes 53. These lobes have cylindrical surfaces described about the axis of the clover leaf, that is their end surfaces are circular arcs in cross section. The surface parts between the lobes are nearer the axis and may take any shape. Preferably, however, each of these intermediate parts has a plane surface.

Preferably the clover leaf is unyielding. To this end it may be made of hard plastic material, preferably a phenol-formaldehyde condensation product such as is known by the name of "Bakelite." It should be understood that the clover leaf may be made up in several parts and of different materials, the essential requirements being that the outer surface portions of the lobes be of suitable material and rigidly supported.

The clutch makes use of a flat belt 20 or one having a flat surface for engagement by the clover leaf 52. The clover leaf alternately presses the belt 20 against front and rear stops 54 to drive the brush carriage in one direction or the other. In view of the fact that the clover leaf 20 is unyielding, the stops 54 must be yieldingly mounted.

This result may be attained by having the stops rigidly supported on intermediate parts of two flat levers 55 resting on the upper surface of plate 49 and pivoted at 55a at one end of the carriage. At the other end of the carriage the levers 55 are urged toward each other by a helical spring 56 of which the tension may be varied by engaging the spring in different notches 57 arranged in inclined lines. Inward movement of levers 55 may be limited by fixed back stops 58 in the form of spring hooks cut out of plate 49 and which may exert pressure against opposite faces of the levers. With this arrangement the gripped portions of the belts are always at the same distance from the axis of the clover leaf and the pressure on the belt is uniform.

Mounted in said bushing 50 is the smooth cylindrical body of a bolt 60. At its upper end (Fig. 5), the bolt 60 has a reduced screw threaded portion providing a shoulder. Fitted over said reduced end and clamped against said shoulder is a disk portion of a connector 61 in the form of a spider which has three legs 62 extending downwardly from the edge of the disk portion into recesses 63 in the lobes or leaves of the clover leaf 52. This effects a driving connection between the bolt 60 and the clover leaf.

Fixed on the reduced lower end of bolt 60 is a

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locking disk 64 having six notches or slots 65 (Fig. 4) equally spaced around its circumference corresponding to the six positions assumed by the clover leaf in a complete rotation. The disk 64 and the clover leaf 52 are locked in the different positions required by means of a lever or arm 66 adapted to enter said notches.

The next matter to be considered is the control or indexing of the clover leaf by means including the flat lever or arm 66. Near its upper end, the arm 66 is pivoted at 67 between the closely adjoining sides of a bracket 68 of which the sides are connected at the top and at the bottom are secured to plate 49 at opposite sides of a slot accommodating the arm 66. Below the plate 49 the arm is provided with a projection 69 adapted to enter properly positioned notches or slots 65 in disk 64. Below the projection 69 the arm 66 turns rearwardly over the lower guide 11. The arm 66 extends above its pivot 67 and has a forward extension engaged by a spring 70 to move the projection 69 into one of said notches or to urge the arm in that direction.

As shown in Figs. 3, 4 and 5, the arm 66 is provided with a pin 71 projecting therethrough. Each of the parts of pin 71 at opposite sides of the arm 66 projects through an opening in the upturned end of one arm 72 of a lever 73 of flat material, said arm extending in a direction generally parallel to the carriage path and being pivoted by means of a screw 74 passing through perforated ears 75 turned back from opposite edges of the lever arm and secured to plate 49 by means including a nut 76 at the top of said plate. Just beyond the ears 75, the lever 73 has a right angle bend, thus providing an arm 77 extending part way across the carriage.

With the carriage moving to the left as indicated in Fig. 1, the lever arm 77 engages a fixed part 78 attached to the frame member 12 and by means of pin 71 moves arm 66 out of the notch or slot 65 of disk 64 to free the clover leaf. At the same time an indexing edge 79 of arm 66 enters a slot 80 in lower guide rod 11 attached to the selector frame and on which lower bearings 47 supporting the brush carriage slide. After lever arm 77 has shifted arm 66 out of slot 65, it encounters bumper 81 on the brush carriage, thus stopping the movement of the brush carriage 10 and causes the clover leaf 52 to rotate in the direction of movement of that side of the belt.

In due course the next preceding lobe or leaf 53 of the clover leaf 52 will engage the other reach of belt 20 and force it against the opposite stop 54. The brush carriage starts to move in the opposite direction when the friction becomes greater than between the belt and the other stop. The brush carriage 10 is free to move a short distance before the indexing edge 79 hits the outgoing edge of slot 80 in lower guide 11. Projection 69 of arm 66 rubs on the smooth edge of disk 64 between slots or notches 65 and holds the indexing edge 79 in slot 80.

The brush carriage 10 is, therefore, stopped until disk 64 rotates a sufficient distance to place the next slot 65 directly opposite the projection 69 of arm 66, in which position the clover leaf 52 is properly indexed and does not rub the belt on the free side. The surfaces of the indexing edge 79 and of slot 80 are suitably inclined and, together with spring 70, force said projection 69 into the corresponding slot 65, thus disengaging arm 66 from said lower guide 11. The brush carriage then travels to the opposite side of the

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selector where the corresponding lever arm strikes an abutment 78 and the brush carriage is reversed in the same manner, thus repeating a cycle.

As already set forth, the upper end of lever or arm 66 is held in position by the bracket 68. To hold said arm 66 in position at its lower end, use may be made of rollers 82 engaging the arm at opposite sides.

It should be understood that various changes may be made and that various features may be used without others, without departing from the true spirit and scope of the invention.

What is claimed is:

1. In a selector, the combination of a reciprocatory brush carriage, and means for reciprocating said carriage including an endless belt with two oppositely-moving parallel reaches, a clutch on said carriage including a device between said said reaches shifted at each end of the carriage path for clutching said reaches alternately, and a member on said carriage engageable with a stationary part of the selector for locking said carriage against movement in the opposite direction until the shifting of said clutching device from one reach to the other is completed.

2. In a selector, the combination of a reciprocatory brush carriage, and means for reciprocating said carriage including an endless belt with two oppositely movable parallel reaches, a clutch on said carriage including a rotatable device between said reaches having three equally spaced belt engaging portions and being shifted at each end of the carriage path for clutching said reaches alternately, stops at the outside of said reaches to support said reaches against pressure when clutched by said rotatable member, spring means connecting said stops, and means to limit the inward movement of said stops.

3. The combination according to claim 2 wherein said stops are mounted on levers pivoted at one end of the carriage and connected at the other end of the carriage by a spring.

4. The combination according to claim 2 wherein said rotatable device is a disk of hard plastic freely mounted on a pivot and having three equally spaced belt engaging portions with part cylindrical surfaces described about the axis depression therebetween, the peripheral dimension of said surfaces being such that before one portion separates from a reach the next portion in advance will engage the other reach.

5. In a selector, the combination of a reciprocatory brush carriage, carriage-supporting means including a guide extending along said path and having transverse slots at its ends, an endless belt with two oppositely moving reaches, a rotatable three-lobe clutch member on said carriage between said reaches and shiftable by said belt from one reach to the other, stops to support said belt when engaged by one of said lobes, a disk with six radial slots around its edge connected to said rotatable clutch member, a lever pivoted on said carriage to enter a disk slot and vacate a guide slot and vice versa, spring means urging said lever to enter a disk slot, and means effective at either end of the carriage path to withdraw the lever from a disk slot, the edge of the disk holding the lever out until the next disk slot is reached.

6. The combination according to claim 5 wherein said rotatable clutch member is rigid and said stops are yieldably drawn toward each other.

7. The combination according to claim 5 wherein said rotatable clutch member is of hard plastic, said stops are mounted on levers pivoted at

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one end of the carriage and connected at the other end by a tension spring hooked into notches arranged in inclined lines on the corresponding lever ends.

8. The combination according to claim 5 wherein there is a hollow bushing on said carriage and having a collar whereby said rotatable clutch member may be placed on the upper part of said bushing, a bolt rotatable in said bushing and having at the top a reduced threaded portion, a spider with a disk fixed on the reduced portion of said bolt and legs extending into openings in the lobes of said rotatable member, and means connecting the lower end of said bolt to said slotted-edge disk.

9. The combination according to claim 5 wherein the edge of said arm where it enters said slots in the guide is beveled at both sides and the inner faces of the slots in said guides are inclined to assist in shifting said arm out of said slots in the guide and into a slot in said disk.

10. In a selector the combination of a reciprocatory brush carriage and means for reciprocating said carriage including an endless belt with two oppositely movable parallel reaches, a clutch on said carriage including a device between said reaches shifted at each end of the carriage path for clutching said reaches alternately, means for positively locking said device in belt-clutching condition during travel of the carriage in either direction, means at each end of the carriage to unlock said device and lock said carriage to effect shifting of said device to clutch the other reach and free the first reach, and means effective during said shifting to maintain said clutch device lock ineffective and said carriage lock effective until the shifting is completed.

11. In a selector, the combination of a reciprocatory brush carriage and means for reciprocating said carriage including an endless belt with two oppositely movable parallel reaches, a clutch on said carriage including a device be-

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tween said reaches shifted at each end of the carriage path for clutching said reaches alternately, said device being rotatable and having three belt-engaging portions advanced step-by-step by the belt for alternate engagement with said reaches, and mechanism for positively locking said device in belt-clutching condition during travel of the carriage in either direction, said mechanism including a disk with six equally spaced slots at its edge, a pivoted arm adapted to enter one of said slots when opposite the same and lock said rotatable device, and means urging said arm toward the axis of said disk.

12. In a selector the combination of a reciprocatory brush carriage, means for reciprocating said carriage including an endless belt with two oppositely movable parallel reaches, a clutch on said carriage including a device between said reaches shifted at each end of the carriage path for clutching said reaches alternately, a locking member positively engageable with said device in belt-clutching condition during travel of the carriage in either direction, means for inactivating said locking member as the carriage approaches an end of its path and for again activating said member upon completion of the shifting of said device, and means including said locking member for locking the carriage against movement until the shifting of said device is completed.

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