

June 5, 1945.

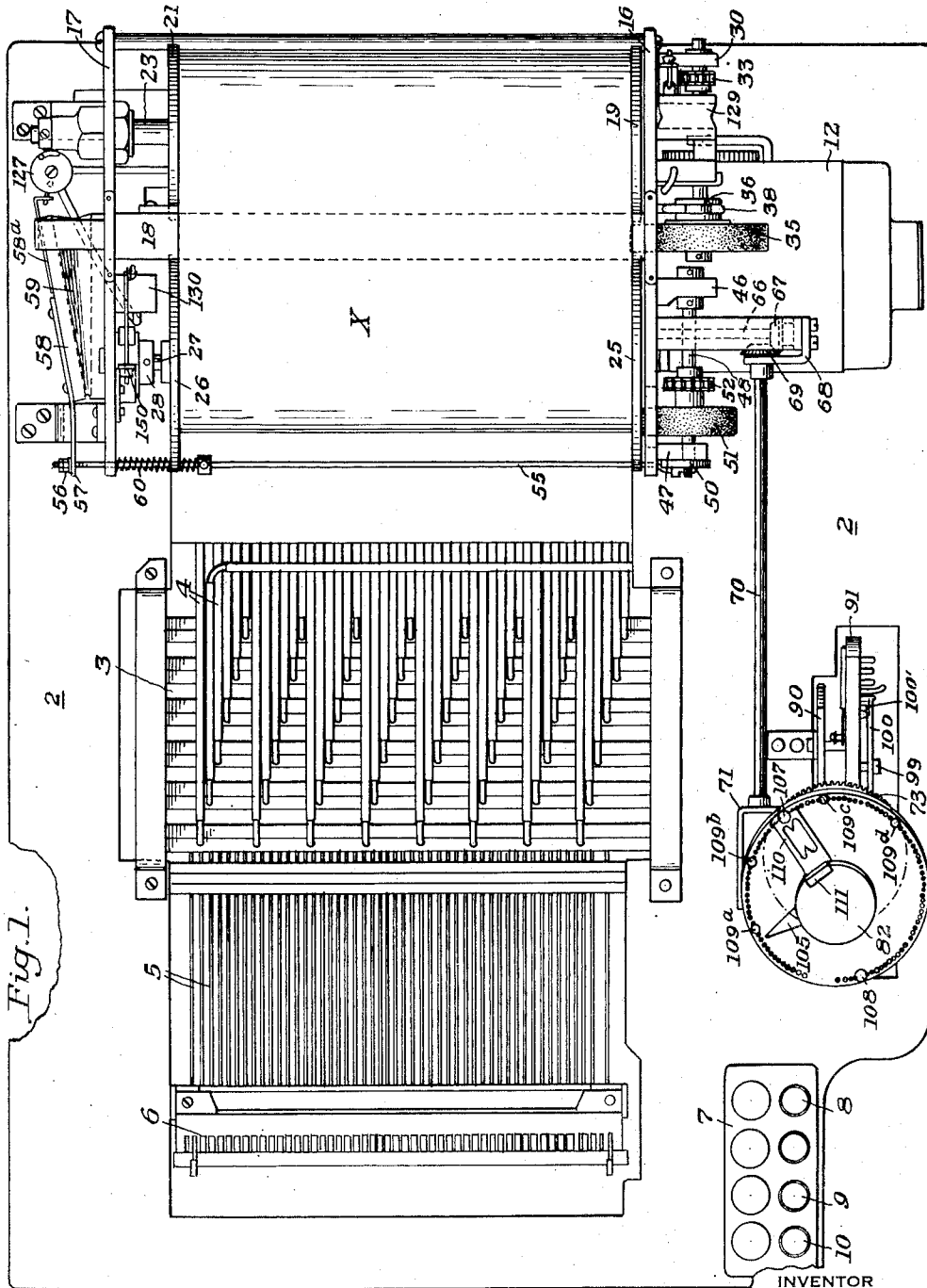
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2,377,323

RECORD DRIVING MECHANISM FOR PNEUMATIC ACTIONS

Filed April 25, 1940

7 Sheets-Sheet 1



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RECORD DRIVING MECHANISM FOR PNEUMATIC ACTIONS

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7 Sheets-Sheet 2

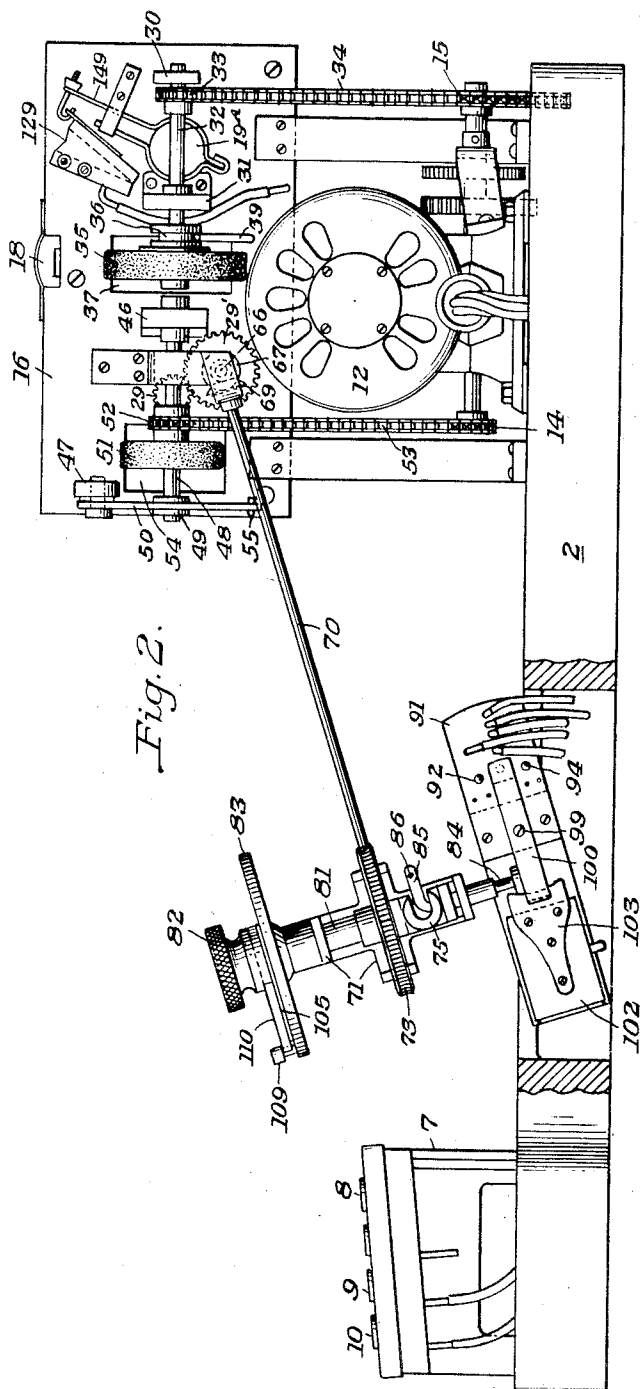


Fig. 2.

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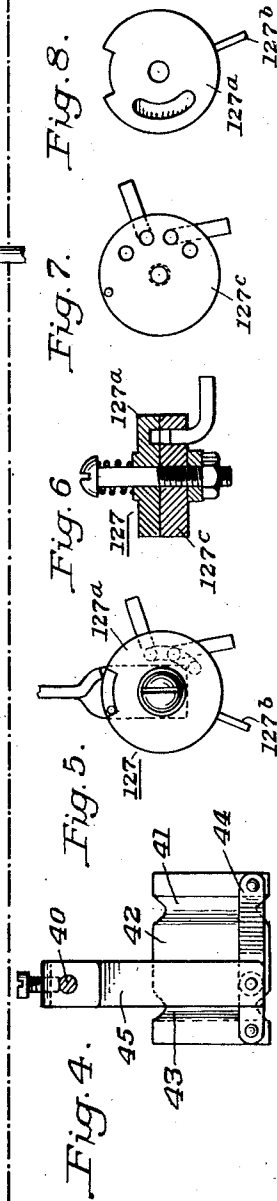
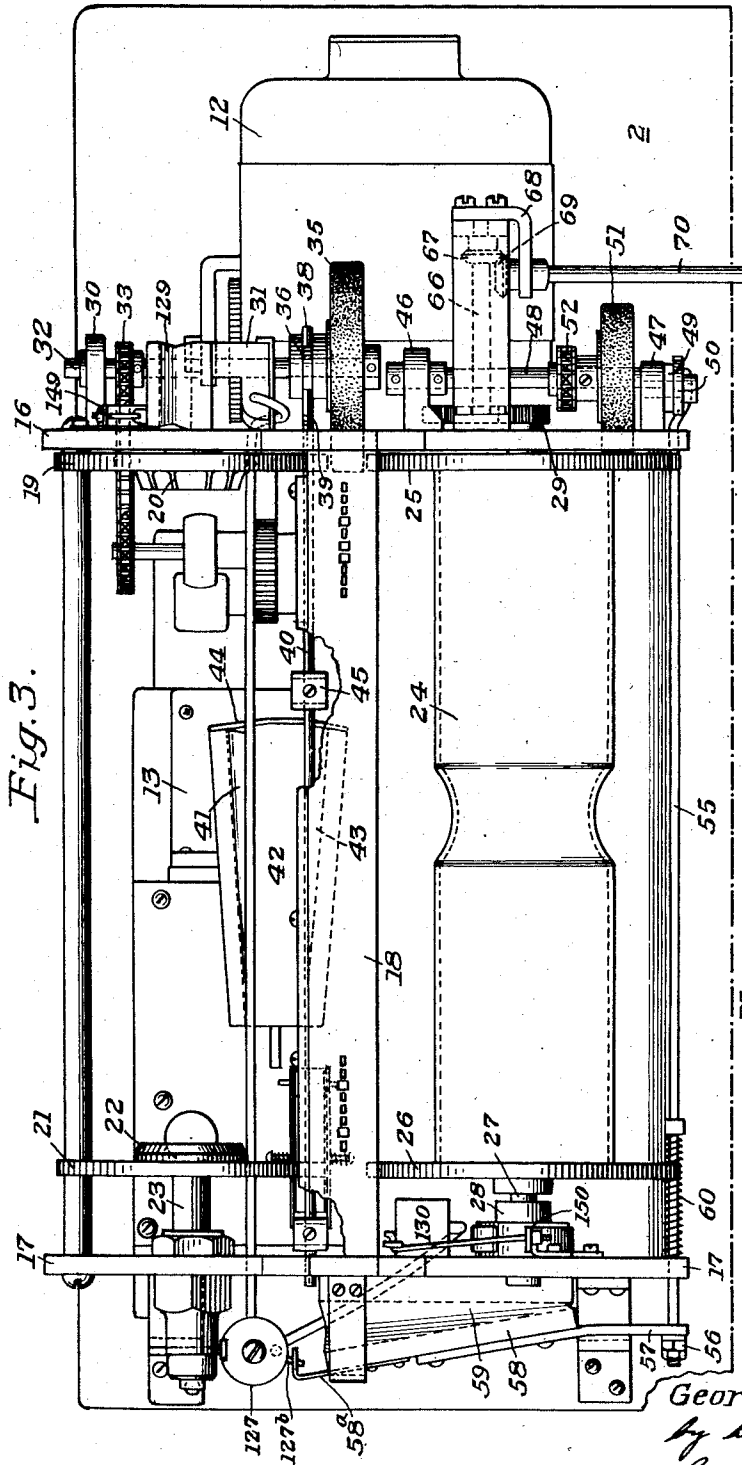
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RECORD DRIVING MECHANISM FOR PNEUMATIC ACTIONS

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7 Sheets-Sheet 3



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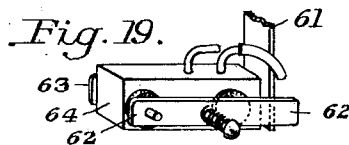
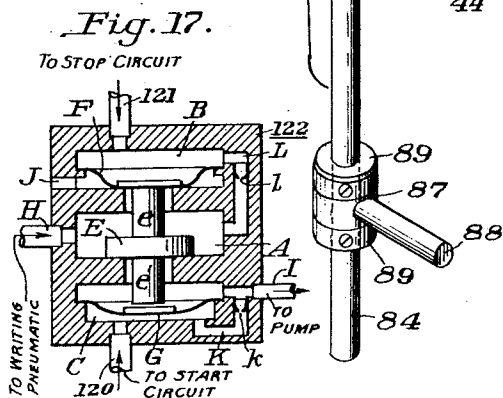
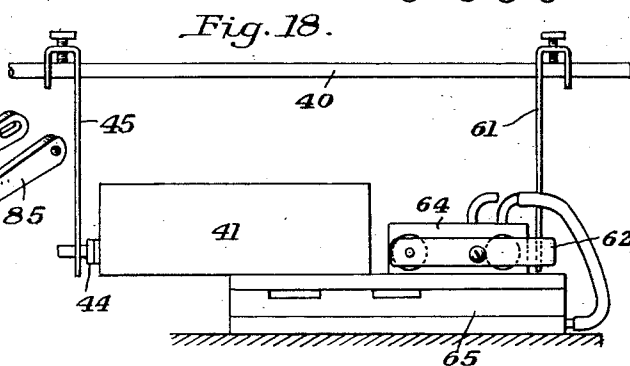
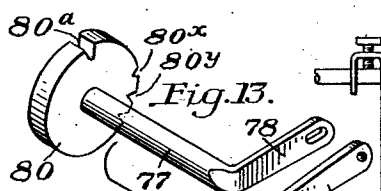
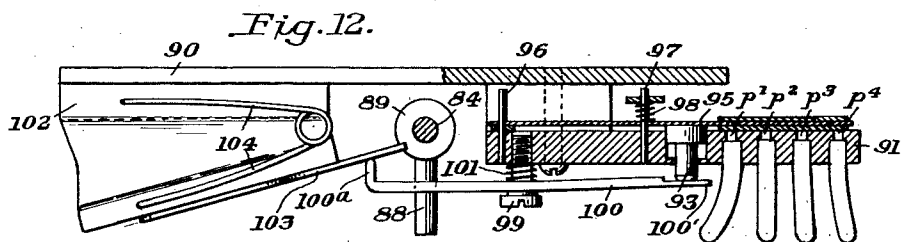
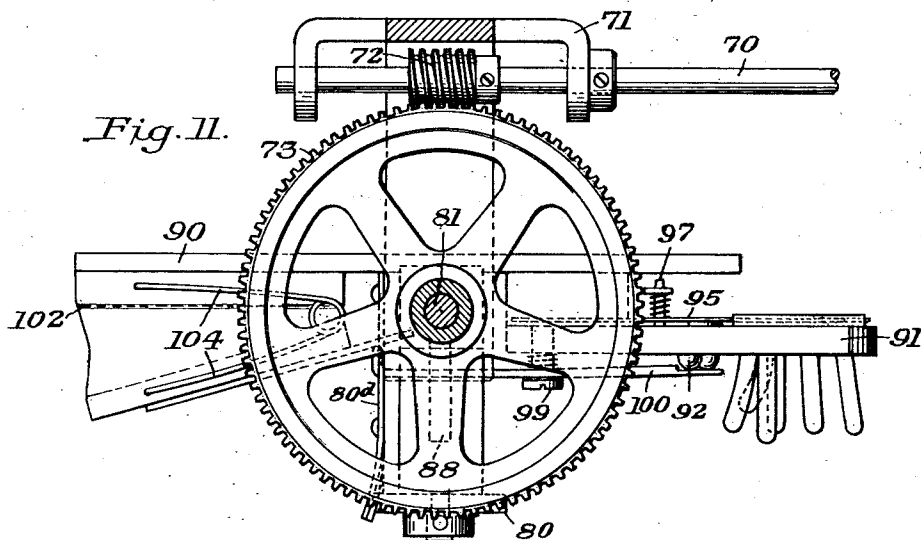
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RECORD DRIVING MECHANISM FOR PNEUMATIC ACTIONS

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7 Sheets-Sheet 5



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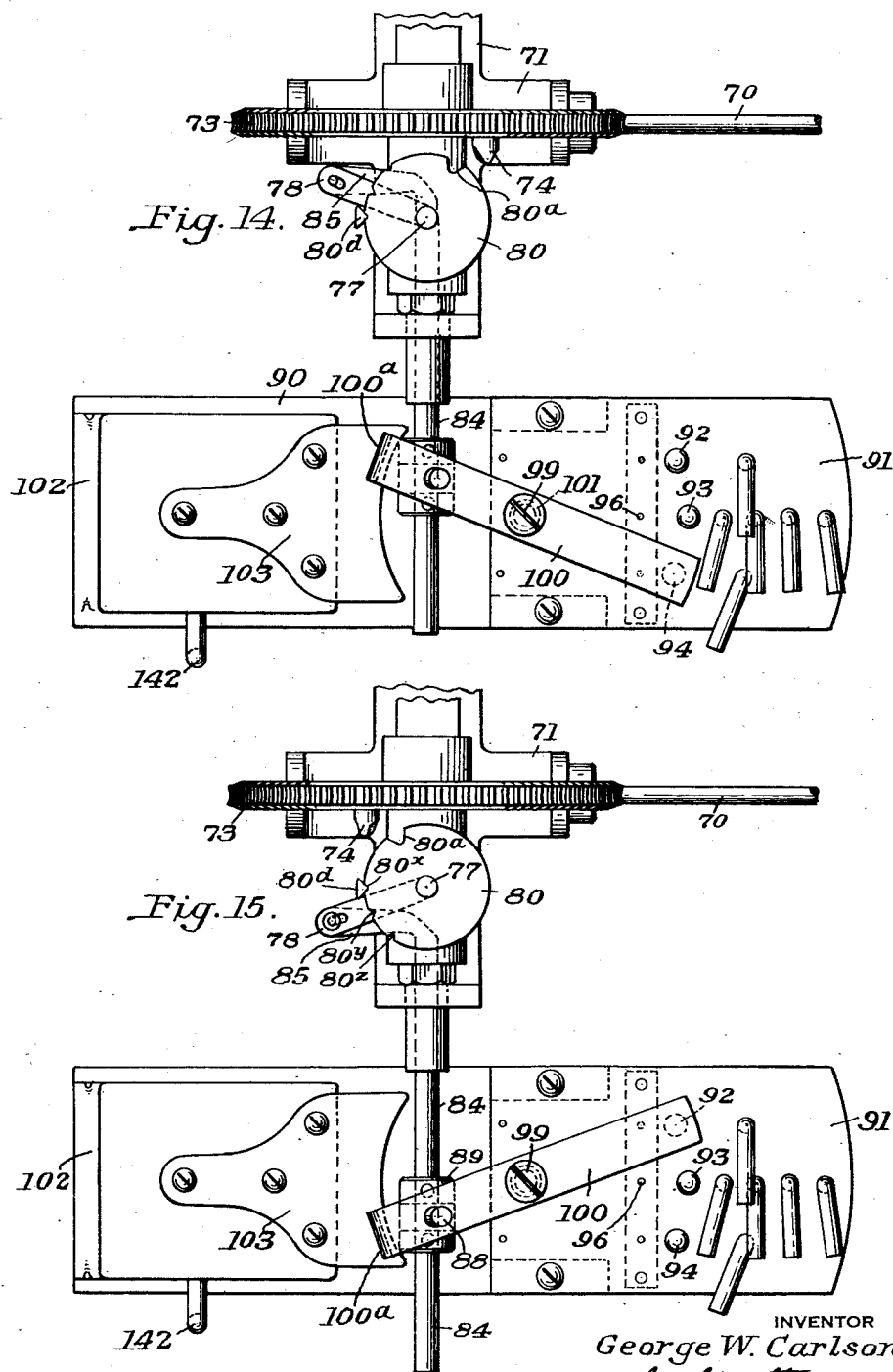
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RECORD DRIVING MECHANISM FOR PNEUMATIC ACTIONS

Filed April 25, 1940

7 Sheets-Sheet 6



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RECORD DRIVING MECHANISM FOR PNEUMATIC ACTIONS

Filed April 25, 1940

7 Sheets-Sheet 7

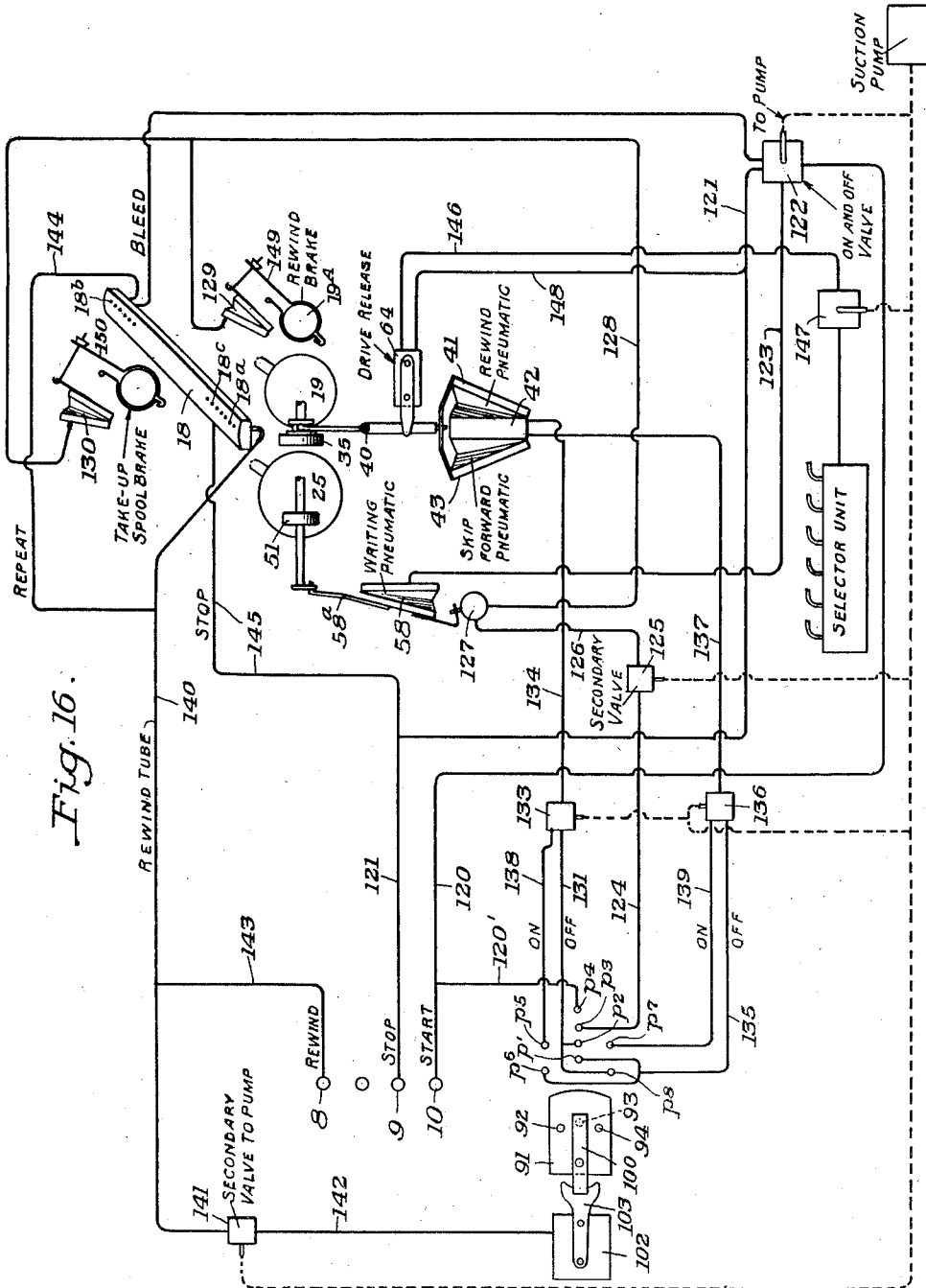


Fig. 16.

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UNITED STATES PATENT OFFICE

2,377,323

RECORD DRIVING MECHANISM FOR
PNEUMATIC ACTIONSGeorge W. Carlson, Pittsburgh, Pa., assignor to
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Application April 25, 1940, Serial No. 331,564

14 Claims. (Cl. 242—55)

This invention relates to pneumatic actions of the type used for the operation of multiple key devices such as typewriters and player pianos and for similar mechanisms, including electrical display signs. The invention is particularly for a driving mechanism for the record, and the invention pertains especially to a driving mechanism which includes a record selector whereby a predetermined portion of a long record roll may be selected and used and whereby a selection from one portion of the record roll to another may be easily and quickly accomplished.

While the invention is applicable to various types of mechanisms, it will be particularly described in connection with the pneumatic typewriter action, but it will be understood that this is by way of illustration and not by way of limitation. Where a typewriter is operated pneumatically for the individual typing of standardized letters, it is often desirable, particularly where the letters are relatively short, to have several different letter records cut on a single record roll. This avoids the necessity for the changing of the record roll every time a different letter is to be written. Where such a multiple record is provided on a single roll, it is necessary to provide some selector action whereby a predetermined letter on the record may be selected out and written. It is further desirable that the selected record be repeated until some other selection is made.

For example, in the collection of accounts, different standardized letters are written to different customers depending upon the condition of their account. The operator of the pneumatic typewriter usually operates the machine with a file of account cards which is followed through in alphabetical order. Some of these accounts may require a letter written at the front of the record roll, others may require a letter that is cut near the end of the record roll, while still others may require letters cut at an intermediate point in the full length of the record. According to the present invention there is provided a record driving mechanism including a selector whereby the operator may initially select the first letter to be written and this letter will be repeated until the operator changes the selection. The invention further provides a selector mechanism where a selection may be made for a succeeding letter while the machine is writing one letter so that after finishing the letter which is being written, the record will automatically turn to the next succeeding portion of the record to be utilized.

The record, when it is playing or writing, is driven at a fairly slow speed forward, winding

from the record roll onto a take-up spool. Where a selector is used it is desirable that there be, in addition to the slow forward speed, a skip forward drive at which the record will be driven at a relatively high speed forward without writing or playing until it reaches the selected portion of the record when the skip forward speed is rendered inoperative and the conventional forward drive becomes operative. The present invention provides for such a forward operation of the record roll. In conventional pneumatic actions, the rewind is always at a relatively higher speed than the forward playing of the record. The present invention provides a selector wherein the rewind, instead of rewinding to the beginning of the record roll, as in many types of selector actions, rewinds only to the beginning of that portion of the record which is to be utilized in the next operation of the machine.

The present invention provides a selector action which is unique, positive and more easily and conveniently operated than selector mechanisms heretofore used for the same purpose and which is less complicated and expensive than previous mechanisms. The invention further provides a record driving mechanism of a new construction, together with pneumatic circuits of an improved character. The invention further provides a selector action which can be coupled into a conventional pneumatic circuit for mechanisms of this kind with very little change in the organization and assembly of such circuits.

My invention may be more fully understood by reference to the accompanying drawings in which

Figure 1 is a plan view of a pneumatic mechanism embodying my invention which mechanism is adapted for the operation of a typewriter, the typewriter however not being shown;

Figure 2 is a side elevation of the mechanism shown in Figure 1;

Figure 3 is a top plan view on a somewhat larger scale of the record spool mechanism and its drive;

Figure 4 is an end view of the double pneumatic for controlling the rewind and skip forward drive;

Figures 5, 6, 7 and 8 are details of a cut-off valve in the pneumatic brake-controlling line;

Figure 9 is a vertical section through the selector mechanism, the selector valve being shown in elevation;

Figure 10 is a section similar to Figure 9 but at right angles thereto;

Figure 11 is a horizontal section in the plane of line XI—XI of Figure 9, the view showing an

elevation of the record-driven selector-shifting mechanism;

Figure 12 is a view partly in plan elevation and partly in section showing the selector valve-operating pneumatic and showing one of the selector valves in section;

Figure 13 is a perspective view showing the mechanism for transmitting motion to the selector valve-operating mechanism;

Figure 14 is a side elevation of a part of the selector mechanism showing the position of the parts for a skip forward operation;

Figure 15 is a view similar to Figure 14 showing the position of the parts in effecting a rewinding operation;

Figure 16 is a diagram of the pneumatic circuit;

Figure 17 is a section through a conventional pneumatic on-and-off valve;

Figure 18 is a detail view of the double pneumatic as shown in Figure 4 and certain associated parts, including what is termed the "drive pneumatic release valve"; and

Figure 19 is a detail view in perspective of the drive pneumatic release valve shown in Figure 18.

General construction

The particular pneumatic mechanism illustrated is of the general construction disclosed in my copending application, Serial No. 313,415, filed January 11, 1940, now Patent No. 2,327,172, dated August 17, 1943. The mechanism comprises a base frame 2 having a record spool mechanism and drive at the back thereof. Forwardly of the spool mechanism and set into an opening in the platform 2 is a key-selecting unit designated generally as 3 having a plurality of tubes 4 leading to openings in a tracker bar. The key-selector mechanism selectively operates pull rods 5 which in turn serve to pull down a key-operating hook 6 more fully explained in the said copending application. The arrangement is such that when a given character opening in the tracker bar is uncovered by the record, an impulse of air is admitted to an appropriate unit of the key selector, operating one of the pull rods 5 and key-engaging hooks 6 to depress the corresponding key of the typewriter or other multiple key device. The typewriter, which is not shown, sets on the base 2 and covers the selector 3, the wires 5 and the keyboard extending over the hooks 6 so that these hooks may engage the key bars.

On the base 2 is a support 7 having a number of control buttons of which 8, 9 and 10 may be referred to in connection with the present application. Button number 10 is the "start" button. Depressing of this button admits air to a pneumatic circuit which initiates the forward driving of the record. Button number 9 is the "stop" button. When it is operated, atmospheric air is admitted to a pneumatic circuit to stop the record-driving mechanism. Button number 8 when depressed admits air to a pneumatic circuit to manually effect a rewinding of the record.

The record spool mechanism

Mounted on the base of the machine 2 near the back thereof is an electric motor 12 which drives a pneumatic or vacuum pump located on the base of the machine in the general vicinity of the reference character 13 in Figure 3, but this vacuum pump forms no part of the present invention and is not illustrated in detail. The motor also drives through a reducing gear a sprocket wheel 14 and it also drives through a reduc-

ing gear at a somewhat higher speed, a larger sprocket wheel 15.

The record spool mechanism comprises two side plates 16 and 17 which are supported on standards above the base 2. A tracker bar 18 has its opposite ends set in the two plates. This tracker bar has a number of openings as will be readily understood by those familiar with pneumatic actions, and all of the openings have not been shown. Carried on the plate 16 to the rear of the tracker bar and somewhat below the tracker bar is a record-holding disk 19 having a cone 20 at the center thereof adapted to project into the hollow interior of a record roll. This disk is freely rotatable. Carried on the plate 17 in alignment with the disk 19 is a second cooperating disk 21 for engaging the other end of a record roll, the disk 21 having a projection 22 to enter the center of a record roll. The disk 21 is carried on a spindle 23 which is propelled by a spring, not shown, toward the disk 19, the arrangement being such that the disk 21 may be moved to the left as shown in Figure 3 for the insertion and removal of a record roll from between the two disks 19 and 21.

Located forwardly of the tracker bar and below the top of the tracker bar is a take-up spool 24 having a flanged plate 25 at one end thereof and having a flanged plate 26 at the other end thereof. The shaft 27 for the take-up spool is provided with a drum 28 at its left-hand end. The right-hand end of the shaft 27 projects through the plate 16 and has a spur gear 29 (best shown in Figure 2) at its outer end.

The plate 16 has two horizontally projecting brackets 30 and 31 thereon which provide a bearing for a shaft 32. Secured to the shaft 32 is a sprocket 33. A chain 34 passing around the sprocket 15 and around the sprocket 33 serves to transmit power from the motor to the shaft 32. Splined to the end of the shaft 32 so that it may be shifted longitudinally on the shaft but remain keyed to the shaft is a friction disk 35 having a grooved hub portion 36 thereon. The periphery of the friction disk 35 projects through a window or opening 37 in the plate 16 and extends between the periphery of the disk 19 of the record holder and the periphery of the flange 25 of the record spool. When the friction disk 35 is thrust forwardly as viewed in Figure 3, it contacts the periphery of the flange 25 on the take-up spool to drive the take-up spool, and when it is thrust rearwardly as viewed in Figure 3, it frictionally engages the periphery of the disk 19 to rewind the record.

For moving the friction disk 35 back and forth to engage the periphery of one or the other of the two members, there is provided a yoke 38 which engages in the groove of the hub 36 of the friction wheel, said yoke being at the end of an arm 39 on a rock shaft 40 which rock shaft passes through the plate 16 and has its opposite end passing through the supporting plate 17 and which is located forwardly of and below the axis of the record roll.

The friction disk 35, when it is driving the take-up spool, drives the spool at a relatively high speed to effect what has been herein referred to as the "skip forward" operation of the record. In the skip forward of the record the record moves at relatively high speed forwardly over the tracker bar but the key selector mechanism is rendered unresponsive to this movement of the record. This friction disk 35 also rewinds the record at a relatively fast speed and of course in

the rewinding operation the key selecting action does not respond to the movement of the record.

For operating the rock shaft 40 to shift the friction disk 35 there is a double pneumatic unit on the machine under the spool box the location of which is best shown in Figure 3 and an end view of which is shown in Figure 4. This double pneumatic which sets in a horizontal position has one bellows-like pneumatic element 41 located at one side of a central member 42, and a similar pneumatic element 43 at the other side of the central member 42. The pneumatic element 41 is the rewinding pneumatic and the pneumatic element 43 is the skip forward pneumatic. A cross bar 44 connects the movable plates of the pneumatics 41 and 43 so that both pneumatics operate in unison and when one expands, the other collapses. A lever 45 clamped to the rock shaft 40 extends down from the rock shaft and has its lower end pivotally secured to the connecting bar 44 so that when the connecting rod 44 shifts back and forth, the lever 45 is rocked to rock the shaft 40 and thus shift the friction disk 35. The lever 45 may assume a neutral position in which neither of the pneumatics 41 or 43 is fully expanded or contracted and in this position the friction wheel 35 is out of contact with both of the elements 44 and 45 which it is designed to drive.

The plate 16 also carries two other horizontally extending brackets 46 and 47 (see Figure 3), the forward bracket 47 being in a plane above the bracket 46. A shaft 48 has a loose bearing in the bracket 46. The other end of the shaft 48 is received in a bearing 49 mounted in a link 50 pivotally hung from the bracket 47. Keyed to the shaft 48 is a friction wheel 51 and which also carries a sprocket 52. A chain 53 transmits motion from the motor-driven sprocket 14 to the shaft 48 and friction wheel 51. The friction wheel 51 is of smaller diameter than the friction wheel 35, and the sprocket 14 is driven at a lower speed than the sprocket 15. The periphery of the friction wheel 51 projects into an opening 54 in the side plate 16. The friction wheel 51 may be moved into and out of engagement with the end face of the disk 25 of the record spool 24. This is accomplished by swinging the link 50 toward and away from the plate 16, the loose bearing of the shaft 48 in the bracket 46 permitting this movement of the shaft and friction wheel. When the friction wheel 51 is held against the end face of the take-up spool, it serves to drive the spool forwardly at a relatively slow speed which is the proper speed for operating the typewriter or other multiple key device. When the friction wheel 51 is moved out of engagement with the end of the take-up spool, it of course has no driving connection with this spool.

For swinging the link 50 toward and away from the plate 16 to bring the friction wheel 51 into and out of driving engagement with the end of the take-up spool, the link 50 has a pull rod 55 attached to its lower end. This pull rod passes through the plate 16 and across the front of the spool bodies as shown in Figures 1 and 3 and through the other side plate 17. It is provided at its free end with a nut 56 that forms an abutment against which a lever 57 engages. The lever 57 projects from the movable element 58 of a pneumatic 59, the arrangement being such that when the bellows-like pneumatic 59 is collapsed, the lever 57 moves toward the left as viewed in Figure 3 tending to pull the rod 55 to the left thus bringing the friction wheel 51 into engagement

with the end of the take-up spool. When the pneumatic 59 is open, a compression spring 60 moves the rod 55 in the opposite direction.

The pneumatic 59, because it serves to operate the drive which drives the record forwardly at the normal speed, is termed the "drive pneumatic" as distinguished from the skip forward pneumatic 43 and rewind pneumatic 41. The record-driving mechanism as described, therefore, comprises the record spool holder in the form of the disks 19 and 21, the take-up spool 24, the skip forward and rewind drive, and the normal forward drive. The record designated X in Figure 1 is moved over the tracker bar from the record holder to the take-up spool or in the opposite direction. In order that the drive pneumatic 59 will always be released when the skip forward or rewind pneumatics are energized, the rock shaft 40 is provided with a second lever 61 (see Figure 13) similar in construction to the lever 45. The lower end of this arm is positioned between two spaced metal strips 62 and 63 at opposite sides of a valve box 64. The valve box 64 is mounted on a second valve box 65 which houses a complicated valve system forming no part of the present invention and through which various functions of the typewriter are controlled from the record and which corresponds generally to the valve unit C of my prior Patent No. 2,180,793. When the rock shaft 40 is moved in either direction out of a neutral position, the arm 61 presses one of the valve fingers or strips 62 or 63 as the case may be away from the valve box 64. This serves to open a vacuum circuit to atmosphere in such manner that the drive pneumatic 59 cannot be collapsed by suction as long as air is thus admitted. This may be understood by reference to the pneumatic circuit diagram of Figure 16, and will be hereinafter more fully described. The spring fingers 62 and 63 not only provide opposed valves, but they exert a pressure, when flexed to move the arm 61, and hence the friction wheel 35 to neutral position.

Record selector mechanism

The record spool mechanism which has been described has for its purpose to move the record roll backward or forward over the tracker bar, there being two forward speeds, one for playing and one for skipping forward to some subsequent part of the record. It is contemplated that a single record roll or record sheet shall have a plurality of separate records thereon, in the case of a typewriter each separate record being either a separate letter or a separate paragraph. The purpose of the record selector is to enable the operator to select that record on the record sheet which is to be next used and to cause the record spool mechanism to operate to either wind the record forward at high speed or rewind it as may be necessary to locate the record on the record sheet which is to be used and bring the starting portion of such record into position over the tracker bar so that upon operation of the drive pneumatic the selected record will move forwardly at slow speed over the tracker bar.

It has been previously pointed out that the right-hand end of the take-up record roll is provided with a spur gear 29. This spur gear meshes with a spur gear of larger diameter 29' which is also mounted on the side plate 16. Projecting outwardly from the hub of the spur gear 29' is a shaft 66 having a bevel gear 67 adjacent the outer end thereof, there being a bracket 68 providing a bearing for the outer end of the shaft 66. The

bevel gear 67 meshes with pinion 69 on a forwardly extending inclined shaft 70. The shaft 70 has its forward end supported in a bearing bracket 71 (see Figures 9 and 10), and the end of the shaft 70 is provided with a worm gear 72 which meshes with teeth on the periphery of a worm wheel 73. The train of gearing from the take-up spool to the worm wheel 73 is a reducing train so that for the longest record which the spool will accommodate the worm wheel 73 will preferably not be driven through a full circle although it may be driven almost through a full circle. The worm wheel 73 is provided on its underface with a pin 74 the terminal of which is wedge-shaped.

Immediately below the worm wheel 73 is a hollow sleeve-like member 75 having a laterally projecting arm 76 through which extends a rock shaft 77. The rock shaft 77 is provided at its inner end with a lever arm 78 which arm projects through a slot 79 in the sleeve 75. The outer end of the shaft 77 has a notched disk 80 attached thereto. The notched disk which is best shown in Figures 14 and 15 is provided with one deep notch 80a and with three secondary notches 80x, 80y and 80z in its periphery. The notch 80a is provided for cooperation with the wedge-shaped pin 74 on the worm wheel 73 as will hereinafter be more fully described. A resilient arm 80d has a terminal portion which engages in the notches 80x, 80y and 80z, depending upon the position of the disk 80, and forming a detent to properly position every movement of the disk 80 and hold it from free movement.

Projecting upwardly from the sleeve 75 from the hub of the gear wheel 73 is a shaft 81, the shaft 81 being pinned or keyed to the sleeve 75, and at the upper end of the shaft 81 there is secured a knurled operating knob 82. The arrangement is such that by turning the knob 82, the sleeve 75 may be rotated to change the location of the disk 80 with reference to the pin 74 on the worm wheel 73. Below the knob 82 and supported on the bracket 71 is a fixed indexing disk 83 which is illustrated as having a series of equally spaced holes 83a therethrough near the periphery thereof. The indexing disk 83 is fixed with reference to the knob 82 and with reference to the worm wheel 73, but the worm wheel 73 can rotate about the shaft 81 without turning it.

Extending downwardly through the sleeve 75 is a rod 84 having an offset arm 85 at the top thereof. This arm is provided with a pin 86 thereon that passes through a slot in the lever 78 on the rock shaft 77, and the arrangement is such that when the rock shaft 77 is rocked through a limited arc in one direction or the other, correspondingly moving the arm 78, the rod 84 will be caused to slide up and down. The rod 84 projects below the bracket 71. On the lower portion of the rod 84 there is a loose collar 87 having a pin 88 that projects therefrom. This collar is confined between two fixed collars 89 one above and one below it, the arrangement being such that the collar 87 with its pin 88 is caused to move up and down as the rod 84 is caused to move up and down, but at the same time the rod 84 can rotate with reference to the pin 88 when the whole assembly comprising the knob 82, the shaft 81, the sleeve 75 and the rod 84 is turned.

The lower part of the rod 84 with the collar 87 and its pin 88 extend in front of a supporting plate 90 (see Figures 9 and 10). At the right-hand end of this plate as viewed in Figure 9 there is a multiple valve unit, and at the left-hand end

there is an operating pneumatic. The valve unit, the construction of which may best be understood by reference to Figure 12, comprises a block 91 having three push buttons passing therethrough and arranged in an arc on the surface thereof, the uppermost of these push buttons being designated 92, the intermediate one 93, and the lower one 94 (see Figure 9). Push button 92 controls the rewind of the record; push button 93 controls the forward playing of the record; and push button 94 controls the skip forward drive of the record. The structure for the valve controlled by the buttons 92, 93 and 94 is the same in each case, and the one controlled by push button 93 is illustrated in detail in Figure 12. It comprises nothing more than a flexible strip 95 secured to the block 91 by a pin 96 and guided on a second pin 97. It is urged toward the face of the block by a spring 98. The end of this strip is wrapped with leather which when the valve is closed, covers the ports designated p^1 , p^2 , p^3 and p^4 . These ports pass through the block 91 and from them lead suitable tube nipples. In Figure 12 the valve is shown in the normal closed position but the depressing of the button 93 would uncover ports p^1 - p^4 to admit atmospheric air. The push buttons 92 and 94 operate similar valves, but in the case of the push buttons 92 and 94, a fewer number of ports are controlled and also, in the case of the valves controlled by the push pins 92 and 94, connecting passages are formed in the block 91 by which cross communication is established. This is most clearly shown in the diagram in Figure 16 where the various interconnecting air channels are shown. This figure will be hereinafter more fully described.

Mounted on the block 91 is a pin 99 which passes through a push button-operating finger 100 which is in the form of a strip of metal having a terminal portion 100' at its right-hand end as viewed in Figure 12 for engaging the push buttons 92, 93 and 94 and having at its opposite terminal an inwardly turned end or lug 100a. A spring 101 on the pin 99 serves to yieldably urge the finger 100 outwardly, the arrangement being such that the finger may be rocked in an arc about the pin 99 as a pivot and it can also be rocked about an axis perpendicular to the pin 99 in a see-saw fashion to depress the terminal 100' when the terminal 100a is pushed outwardly as viewed in Figure 12. The pin 88 on the collar 87 passes through the finger 100 so that the up and down movement of the rod 84 causes the finger to be swung in an arc about the pin 99 as a pivot. When the rod 84 is pushed down to its furthest limit, the terminal 100' of the finger is over the pin 92, as shown in Figure 9, and when the rod 84 is pulled up to its highest limit, the terminal 100' is over the push button 94, and of course at the intermediate position of the rod 84 the finger is in position to operate the intermediate push button 93.

For operating the finger 100 in a "see-saw" fashion to push the respective pins 92, 93 and 94, there is provided on the supporting plate 90 a pneumatic 102 having a widened extension 103 thereon over which the in-turned terminal 100a of the finger rides. The arrangement is such that when the pneumatic is in a normal expanded position, it being expanded by a spring 104, the finger 100 is in a normal position. When the pneumatic 102 is collapsed by connecting it to a suction pump, the extension 103 moves outwardly as viewed in Figure 12 applying pressure against the terminal 100a, thereby pushing the

terminal 100' of the finger inwardly so that the push button which is directly under the terminal when this action occurs will be depressed to open the corresponding valve.

Operation of the pneumatic 102 is always controlled from the record roll itself through an opening in the tracker bar and an appropriate pneumatic circuit. The movement of the rod 84 up and down to determine the position of the finger 100 on the other hand is determined by relative motion between the member 75 which carries the extension 76 with the notched disk 80 and the worm wheel 73 which has the notch-engaging projection 74. By reference to Figure 14 it will be seen that if the disk 80 is in the position shown in that figure and the worm wheel is rotated in a clockwise direction, the projection 74 will move into the notch 80a in the disk 80, and as the worm wheel continues to move, it will throw the disk 80 to the over-center position illustrated in Figure 15. This clockwise movement of the gear wheel 73 will thus serve to shift the valve-operating finger 100 from the position to engage the skip forward button 94 to a position to engage the rewind button 92. On the other hand, when the parts are in the position shown in Figure 15 and the worm wheel moves in a counterclockwise direction, the projection 74 engaging in the notch of the disk 80 will return the parts to the position shown in Figure 14. It will be apparent also that if the knob 82 is turned manually to rotate the member 75 which carries the disk 80 in one direction or the other, the disk 80 will move past the pin 74, and a corresponding shifting of the finger 100 will take place. Shifting of the finger 100 will, therefore, occur either by the manual turning of the knob 82 relative to the worm wheel 73 or by motion of the worm wheel 73 relative to the position to which the disk 80 is set by the turning of the knob 82.

The worm wheel 73 of course is driven through the train of gearing from the record roll. The gearing is such that when the record roll is driving forwardly, the worm wheel 73 initially turns in a clockwise direction. When the record is rewinding, the worm wheel 73 will turn always in a counterclockwise direction. When the parts are in the position shown in Figure 14, only clockwise motion of the gear 73 is possible because the valve finger 100 is over the skip forward valve button 94 and any operation of the pneumatic mechanism must therefore initiate the forward driving of the record roll. Likewise, when the parts are in the position shown in Figure 15, the valve-operating finger 100 is over the rewind button and any operation which is initiated must start to rewind the record and turn the gear 73 in a counterclockwise direction. It therefore follows that when the disk 80 is in advance of the pin 74 as viewed in Figure 14 so that the worm wheel 73 must turn in a clockwise direction for the two to engage, the record will only be driven forwardly when the next operation is initiated, and when the disk 80 is behind the pin as shown in Figure 15, any succeeding operation which is initiated will be a rewinding operation. It will further be seen that the relation between the disk 80 and the pin is manually adjustable by turning the knob 82 to change the position of the disk 80 with reference to the pin 74. If the knob 82 was turned so as to advance the disk 80 with respect to the pin 74, the succeeding movement of the record must always be a skip forward operation until the projection 74 has engaged the notch in the disk 80 and at least rotated the

disk to the intermediate position. On the other hand, if the knob 82 is manually operated in a counterclockwise direction to set the disk 80 behind the projection 74, the next operation to be initiated must always be a rewind operation, and by reason of this fact a manual adjustment of the knob 82 enables any part of the record which is to be next used to be selected in advance. This will be hereinafter more fully explained.

Close to the surface of the indexing disk 83 is a pointer 105 that is secured at its center to a sleeve shaft 106 that surrounds the shaft 81 (see Figures 9 and 10) and which is driven directly by the worm wheel 73 so that the operator of the machine may follow the forward or reverse travel of the record by following the position of the pointer around the indexing disk. The periphery of the indexing disk is provided with an annular series of closely spaced holes 83a. One stop pin is set into one of these holes 83a slightly in advance of the starting position of the record and another stop pin is spaced an appropriate distance around the periphery from the first one. Depending upon whether the record is a long one or a short one, the two stop pins will be separated a greater or lesser number of degrees. The stop pin near the starting point is to prevent the record from ever being completely run off the take-up spool after the record has been placed in the machine as long as it is desired to continue to use this one record. The other stop pin prevents the record from ever being completely run off the original spool on the forward drive. These two stop pins, which have a friction fit in the holes 83a, are designated 107 and 108. Having inserted a record in the machine, the operator starts the machine forward. When one section of the record has moved forward corresponding to one of several letters which the record will reproduce, the operator observes the position of the pointer and inserts an indexing pin generally similar to the stop pins in that hole 83a which is nearest the pointer. The operator then continues the record forward again, finds the end of the next letter or section on the record, inserts another indexing pin, and continues to insert an indexing pin at the end of each letter on the record and at the beginning of the next. These indexing pins are designated 109a, 109b, 109c and 109d in Figure 1. The number of indexing pins 109 will depend upon the number of letters which the single record will reproduce and their spacing about the periphery of the indexing disk will depend upon the length of the respective letters. The indexing pins are of slightly smaller diameter than the stop pins.

Slidable in the base of the knob 82 is a lock bar 110 having a notched outer end. As shown in Figure 9 it is provided with an upwardly extending lug 111 and a spring 112 pressing against the lock serves to push the lock bar outwardly in a radial direction. The notched terminal of the lock bar is adapted to engage the selected one of the indexing pins 109. For example, if the third letter on the record is the one next to be reproduced, the operator turns the knob 82 in a clockwise or counterclockwise direction as may be required until the end of the locking bar 110 is opposite the second indexing pin 109b. In order to turn the knob and permit the end of the locking arm to pass the indexing pins the operator grasps the lug 111 at the same time that he turns the knob retracting the locking bar. When the locking bar is opposite the indexing

pin 100b, the lug 111 is released and the locking bar springs out to engage the pin 100b and this then holds the knob 82 against accidental displacement and the knob 82 will remain in this position until a different portion of the record is to be selected and used. The locking bar cannot be retracted sufficiently to clear the stop pins. It has a window through it so that the position of the pointer in moving under the latch may be observed.

The pneumatic circuits

Coming now to the pneumatic circuits, the machine is illustrated as having three manually operable valves 8, 9 and 10 which are the rewind, stop, and start valves respectively. These valves are of the type shown in Figure 5 of my Patent No. 2,180,793 wherein therein is a push button, and depressing the button merely lets an impulse of atmospheric air into a system which is normally under vacuum. Beginning first with the start button 10, there is a suction line 120 which leads to one side of a pneumatic on-and-off valve. Communication is established through this valve to the suction pump. It might be noted in connection with Figure 16 that all of the dotted lines lead directly to the pump without any intervening valve so that they are constantly under suction while the machine is operated, whereas the solid lines represent tubes which are connected through intervening valves to the suction lines.

The stop button 9 connects through a line 121 to the other side of the on-and-off valve, the on-and-off valve being designated generally as 122. In order that the invention may be more fully understood, brief reference should be made to the construction of the on-and-off valve, Figure 17 showing a section through a typical pneumatic on-and-off valve. The valve 122 has a central chamber A. There is an opening through the upper wall of this chamber, and opening through the lower wall of this chamber and above the chamber A there is a pneumatic pouch chamber B, and below the chamber A there is a similar chamber C. A valve member designated E is positioned in the chamber A, and by reason of gravity it normally closes the port between the chamber A and the chamber C. The valve E has an upwardly extending valve stem *e* and a downwardly extending valve stem *e'*. The upper valve stem *e* is permanently attached to a flexible diaphragm F in the pouch chamber B. In the chamber C there is a similar diaphragm G which is positioned below the valve extension *e'*. A pipe nipple H, which in the case of the valve 122 communicates with the writing pneumatic 58 opens into the chamber B. Leading from the chamber C on that side of the chamber which is above the diaphragm G is a nipple I which communicates to the suction pump. Opening into the chamber B below the diaphragm F is a port J that communicates to atmosphere. The pipe 120 from the start button communicates through a suitable nipple to the chamber C under the diaphragm G and a similar nipple opening into the chamber B above the diaphragm F communicates with the stop button. There is a by-pass K from the underside of the diaphragm C to the suction nipple I which by-pass has only a very restricted bleed orifice therein at *k*. Around the diaphragm F there is a similar bleed passage L in which is a bleed orifice *l*.

When the suction pump is not operating, the valve E closes the communication between the

chamber A and the chamber C which in turn communicates with the suction pump through the outlet I. When the suction pump is started up, the valve remains in this position. Any air above the diaphragm F cannot be exhausted through the bleed passage L because of the valve E to the suction outlet I being closed at this time. Suction tends to hold the valve E closed and tends to hold the diaphragm G down when the pump is started and while the pump is operating. When an impulse of atmospheric air from the start button enters the tube 120, there is then atmospheric pressure under the diaphragm G and suction above it. This lifts the diaphragm G unseating the valve E and raising the diaphragm F. The valve E then seats against the port in the upper wall of the chamber A closing off any atmospheric air that might enter the chamber A from the port J and the suction nipple H leading from the writing pneumatic is then in direct communication with the pump causing the writing pneumatic to collapse. As soon as the chamber A is put under vacuum by the lifting of the valve E, any air above the diaphragm F is exhausted through the bleed passage L, and atmospheric air entering the port J tends to hold the diaphragm F up keeping the valve in this position. The parts remain in this position until something disturbs this condition of balance. If air is admitted to the stop line 121 as for example by pressing the button 9 atmospheric air enters the chamber B above the diaphragm F so that there is then atmospheric pressure on both sides of the diaphragm F and the valve E drops down to its original position, this cuts off the suction to the nipple H so that the writing pneumatic can expand. A bleed opening is normally provided to permit the restoration of atmospheric pressure to the interior of the writing pneumatic when this condition occurs as will be readily understood by those skilled in the art. The writing pneumatic is thus controlled by an on and off valve. The tube 123 in Figure 16 is the tube leading from the chamber A of the on and off valve to the writing pneumatic. Through the use of an on and off valve in this position the writing pneumatic will remain collapsed as long as the machine continues to operate and as long as no opposing impulses of air are admitted to the off side of the valve. As soon as air is admitted to the off side of the valve, the valve stays closed until there is a positive admission of air to the on or start side of the valve. This has numerous practical advantages one of which is that if the machine is stopped or shut down, as for example by the pulling out of the electric cord which connects the motor to the source of current, the restarting of the motor will not cause the writing pneumatic to continue the forward operation of the machine so that suction can be built up in the system before the record starts to move forward, and then the record starts to move forwardly only when the start button is manually operated. The on-and-off valve is also of convenience in correcting records and in connection with the making of fill-ins where part of a letter is to be manually written. The use of an on-and-off valve between the start and stop buttons and the writing pneumatic also simplifies the pneumatic circuit for automatic selection.

One of the ports *p'* controlled by the valve button 93 is connected by a tube 120' to the start line 120. With this arrangement, when the

valve-operating finger 100 is in the intermediate position and is rocked by operation of the pneumatic 102, an impulse of air is admitted to the start line in the same manner as if the button 10 were depressed. A second port p^3 is connected through line 124 to a secondary valve 125 to the suction pump, the secondary valve being a pneumatic relay which, when an impulse of air is admitted thereto, connects the line 126 with the suction pump. The line 126 leads through a cut-off valve 127 and tubes 128 to the pneumatic brake pneumatics 129 and 130. When suction is created in the line 128 collapsing pneumatic 129, a brake is applied to the record spool holder and at the same time pneumatic 130 is collapsed and applies a brake to the take-up spool. This brake mechanism will hereinafter be described. The valve 127 is a simple cut-off valve having a stationary movable disk shown in Figures 6, 7 and 8. The purpose of the valve 127 is to close off the suction between the brake line 128 and the secondary valve 125 so that the brake pneumatics 129 and 130 cannot be collapsed when the writing pneumatic 58 is collapsed as otherwise the brakes and the drive would be operating at the same time, and in opposition to each other.

The valve 127 has a movable cut-off disk 127a with an operating extension or pin 127b thereon. As shown in Figure 3, the writing pneumatic 58 is provided with an extension in the form of a strip metal finger 58a that is turned down at its end and through which the extension 127b of the valve passes, the arrangement being such that when the pneumatic 58 collapses, the valve disk 127a is rotated in one direction and when the pneumatic opens, it moves in the other direction. As shown in Figure 8, the movable disk 127a has a groove that cuts off and establishes communication with ports in the fixed member of the valve. The fixed member 127c has two nipples leading therefrom one going to each of the brake pneumatics whereas in the diagram this is illustrated as a single line 128 having two branches.

The port p^2 in the neutral position of the selector valve communicates with a tube 131 leading to the off side of an on-and-off pneumatic 133 which is similar in construction to the on-and-off pneumatic 122. The on-and-off pneumatic 133 controls a tube 134 leading to the rewind pneumatic 41. When the on-and-off pneumatic 133 is in the on position, suction to the rewind pneumatic is established to collapse this pneumatic. The fourth port p^1 of the neutral position controlled by a button 93 connects with a tube 135 leading to an on-and-off pneumatic 136 similar to 133 and which through tube 137 controls the skip forward pneumatic 43. By reason of the arrangement of the ports p^1 and p^2 , when the button 93 is depressed to operate the writing pneumatic, the rewind and skip forward pneumatics are both turned to the off position through their respective on-and-off valves 133 and 136.

The push button 92 of the selector valve controls two ports one of which designated p^5 in the diagram leads through tube 138 to the on side of the on-and-off pneumatic 133 for collapsing the rewind pneumatic. The other port p^6 in this position communicates to the tube 135 leading to the off side of pneumatic 136 so that when the rewind pneumatic 41 is operated by operation of the button 92, the skip forward pneumatic is sure to be turned to the off position through an impulse of air admitted to the on-and-off pneumatic 136.

The push button 94 of the selector valve controls two ports. Port p^7 connects through tube 139 to the on side of the on-and-off pneumatic 136 so that when button 94 is depressed, the on-and-off valve 136 is turned to the on position to energize the skip forward pneumatic 43. The push button 94 also controls port p^8 which connects to the tube 131 leading to the off side of the on-and-off valve 133 so that when valve 136 is in the on position, 133 is certain to be in the off position.

The tracker bar 18 has an opening 18a that connects to a tube 140 designated a rewind tube that leads to a secondary valve 141. As previously explained, a secondary valve is a pneumatic relay through which the small impulse of air entering the tracker bar opening 18a is utilized to connect the relatively large valve-actuating pneumatic 102 with the suction pump, the valve-operating pneumatic 102 communicating to the secondary valve 141 through a tube 142. Tube 140 has a branch 143 leading to the manually operated rewind button 8. The opening 18a is intended to be controlled by a perforation in the record roll passing over the tracker bar. The tracker bar has another opening at 18b that communicates with a tube 144, designated "repeat" which connects with the tube 140. The tracker bar has a third opening 18c that connects through a tube 145 that connects into the line 121 leading from the stop button so that the movement of the record over the tracker bar may serve to stop the drive in the same way that the manual operation of the stop button 9 will stop the drive.

The drive release valve 64 has two tubes leading therefrom. The first tube 146 leads to a primary valve 147 which renders the typewriter key-actuating selector inoperative when either the rewind pneumatic or the skip forward pneumatic is energized so that the typewriter keys will not operate when the record moves at high speed in a forward or a reverse direction over the tracker bar. The other tube 148 connects into the stop line 121 so that the writing pneumatic 58 will go to the off position when either the rewind or the skip forward pneumatic is energized.

The brake pneumatic 129 serves to contract a brake band which operates about a hub 19A (see Figure 2) on the outside of the plate 16 which is at the end of the stud shaft which carries the rewind and record-holding flange 19 (see Figure 3). The brake pneumatic 130 operates a similar brake band on the drum 28 (see Figure 3) at the left-hand end of the take-up spool shaft 27. The rewind brake is designated generally as 149, and the other brake mechanism on the take-up spool is indicated generally at 150.

Assuming that a record roll has been placed in the machine and that all of the indexing pins have been properly set and the first letter which the operator wants to write is the third letter on the record roll, the knob 82 is turned in the manner hereinbefore described to bring the lock or latch 110 opposite the proper indexing pin. This turning of the knob advances the disk 80 to the front of the pin 74 on the gear wheel 73 causing the valve finger 100 to be in the position shown in Figure 14 where it is in position to operate the valve button 94. The operator then presses the start button whereupon the writing pneumatic 58 is energized to start the record winding forward slowly. As the record moves forward slowly a hole in the record uncovers the port 18b in the

tracker bar letting an impulse of air into the line 144 labeled "repeat." This instantly causes the operation of the pneumatic 102 to operate the valve finger 100 and depress the valve 94. This in turn energizes the on-and-off valve 136 so that the skip forward pneumatic is actuated causing the high forward speed drive disk 35 to engage the flange 25 of the take-up spool and the record is driven forwardly at a high speed. At the same time the drive release valve 64 is operated to release the writing pneumatic 58 and render the key action of the typewriter inoperative. As the record drives forwardly at high speed the gear wheel 73 is turned in a clockwise direction. At the proper time it engages in the notch 80a of the disk 80, starts to rotate this disk causing the shaft 84 to move down. This in turn rocks the valve-operating finger 100 to the neutral position and if the index pins have been properly set, at the time the finger 100 is in the neutral or intermediate position, a second opening in the record, either in the rewind or repeat position on the record uncovers one of the openings 18a or 18b admitting an impulse of air to line 140 to again actuate the pneumatic 102 which rocks the valve-operating finger 100. At this time the valve finger is in the neutral position and the intermediate button 93 is depressed. Depressing this button causes an impulse of air to be admitted through port p³, immediately applying the brakes to check the forward high-speed travel of the record roll. Next it admits air to the start line 120 energizing the writing pneumatic 58. At the same time it operates the on-and-off valve 136 to the off position to restore the skip forward pneumatic to a neutral position and releases the high-speed drive. When the skip forward pneumatic returns to its neutral position, the drive release valve 64 is closed and as the record then moves forward at writing speed, the key action is made effective. As the record continues to drive forward at slow speed, the pin 74 on the worm wheel 73 rotates the disk 80 to an over-center position throwing the valve-operating finger 100 up to the position shown in Figure 15 where it is over the rewind button 92. When the end of the part of the record which is to be used is reached, an opening in the record again uncovers either the port 18c or 18b causing an impulse of air to enter the line 140 to again operate the pneumatic 102 and causing the valve finger 100 to press the button 92 in. This causes the rewind pneumatic to be energized so that the record will start to rewind at high speed. It causes the drive release valve to be opened rendering the key action inoperative. It admits air to the stop line of the writing pneumatic 58 rendering this pneumatic inoperative which in turn causes the brake valve 127 to be set to an open position. As the record rewinds, the worm wheel 73 is driven in a counterclockwise direction and the pin 74 engages the disk 80 to rotate it. When the valve finger 100 is again in the neutral position, an opening in the record roll will uncover the port 18b of the tracker bar, operate the pneumatic 102 and cause the valve-operating finger 100 to be pressed in to again engage the button 93 and the record will then start winding forwardly again at the normal writing speed. The selected portion of the record will thus continue to write forward at slow speed and rewind until the knob 82 is changed to a different position. The knob 82 can be changed to a different position during the writing of a letter and it will not affect the operation of the record; it will merely change the position of the valve-operating

finger 100 and the record drive will not be affected until one of the ports 18a or 18b on the tracker bar has been uncovered. Then the record will rewind or continue to travel ahead according to whether the disk 80 is in advance of or behind the pin 74. It should be explained that when the record is repeated and then started forward to write again, an opening is usually provided in the tracker bar to register with the opening 18c so as to automatically stop the machine just before the portion of the record to be used moves over the tracker bar, giving the operator of the typewriter time to remove the letter previously written and insert a new sheet of paper and make such manual fill-ins as she may have to make. After the machine is stopped in this way it is of course started by manually pushing the start button.

The selector mechanism providing as it does a relatively movable driven member and a manually adjustable member with the disk 80, together with the contacts whereby relative movement between the gear and the adjustable disk 80 is converted at the proper time to a reciprocating motion, is a unique mechanical movement in itself, and the use of such a movement as a selector mechanism is novel and provides a positive and easily operable selector. The arrangement whereby the valve finger 100 is shifted mechanically by relative movement between the gear 73 and the disk 80 and whereby the finger is depressed pneumatically under the control of the record itself is also a novel arrangement. It is very much more simple than mechanisms heretofore provided for this purpose. Moreover, the selector unit as a whole is one wherein the selection of the next portion of the record to be used may be made during the operation of the machine and while it is using a different portion of the record. The indexing is very easily accomplished through the use of the removable pins 109 in conjunction with the pointer which moves over the indexing disk as the record moves.

The drives for the record spools are of simple and unique construction. The pneumatic circuit, particularly in the employment of an on-and-off valve for the drive pneumatic and in the employment of separate on-and-off valves for the skip forward and rewind pneumatics, constitutes a unique and desirable arrangement and one which lends itself to use with the particular type of selector employed. The pneumatic circuit is further unique in the provision of the relief valve operated by movement of either the skip forward or rewind pneumatic and constitutes a simple way of rendering the forward drive pneumatic inoperable when either of the first two above-mentioned pneumatics are operated. The provision of the brakes on the rewind and take-up spools enables the spools to be free-running at all times except when the motion of the record is to be stopped, and the provision of the cut-off valve operated by the drive forward pneumatic renders the application of these brakes inoperative when the record is being driven forwardly slowly.

Numerous other features of novelty and other advantages will be apparent to those skilled in the art. It will be understood that while I have specifically described one preferred embodiment of my invention, the invention is not restricted to this particular construction and arrangement of the parts and various changes and modifications may be made in the parts within the contemplation of my invention and under the scope of the following claims.

I claim:

1. A pneumatic record mechanism of the class described comprising a flanged record spool holder and a flanged take-up spool, a friction wheel disposed between the peripheries of the two flanges, means for driving the friction wheel, means for reciprocating the friction wheel into contact with either one or the other of said flanges for driving one or the other of them, said means comprising opposed pneumatics connected together, a second forward drive for the take-up spool, pneumatically operated means for rendering said second forward drive operative, pneumatic circuits whereby said opposed pneumatics are in a neutral position when the second forward drive is operative, and a relief valve operated by the movement of either of said opposed pneumatics for rendering the forward drive inoperative when said friction wheel is engaging the periphery of one or the other of said flanges.

2. A pneumatic mechanism having opposed record spools, means for driving the record spools in a forward direction or in a rewind direction at relatively high speed, a slow speed forward drive for one of the spools, a pneumatic for rendering said slow speed forward drive operative, pneumatically operated brakes for the record spools, and valve means in circuit with said pneumatic for rendering the brakes inoperative when the slow speed forward drive is operating.

3. A pneumatic mechanism of the class described having a tracker bar over which a record is to be moved, a flanged record spool holding means at one side of the tracker bar, a flanged take-up spool means at the other side of the tracker bar, a friction wheel between the said two flanged means movable from a neutral position where it frictionally engages the flange of one or the other of said means, means for continuously driving said friction wheel, means for shifting the friction wheel from the neutral position into position to engage the periphery of the flange of one or the other of said means, said last-named means comprising opposed connected pneumatics and pneumatic circuits including an on-and-off valve for each pneumatic for operating said pneumatics, valve means for controlling the on-and-off valves in such manner that when one is in the on position, the other is in the off position, a second driving means for the take-up spool means, a pneumatic for rendering said second drive means operative, an on-and-off valve for controlling said last-named pneumatic, and a drive release valve operated by the opposed pneumatics for rendering said last-named pneumatic inoperative when either of said two on-and-off valves is in the on position.

4. A pneumatic mechanism of the class described having a record spool unit with a skip forward and rewind drive mechanism and having a normal forward drive mechanism, a pneumatic circuit for controlling said mechanisms, said circuit including a selector valve having three push buttons, one being a skip forward button, one a rewind button and one a forward drive button, a mechanical finger for selectively operating any one of said buttons, a combined manually adjustable and record spool driven means for moving said finger into position to engage a selected one of said buttons, and pneumatic means for operating the finger to depress the selected button.

5. A selector mechanism for pneumatic actions comprising a valve-operating finger selectively

movable in a plane to different operating stations, a push button valve at each station, and means for moving said finger in a direction normal to the first named plane of movement for depressing said push button valves, said last-named means comprising a single pneumatic effective at any position to which the finger is moved in said first plane.

6. A selector mechanism for pneumatic actions comprising a record and record spool mechanism, a valve-operating finger selectively movable in a plane to different operating stations, a push button valve at each station, means for moving said finger in a direction normal to the plane of the first movement for depressing said push button valves, said last-named means comprising a pneumatic, and a combined manually adjustable and record-spool driven mechanism for moving the finger to the different stations.

7. A mechanism of the class described comprising a carrier having a transverse shaft and an axially extending shaft mounted thereon, said shafts each having an offset arm thereon, the arms of the two shafts being in parallel planes and being pivotally connected to each other whereby rotary movement of the former shaft imparts a reciprocating movement to the latter, a relatively movable driven member adjacent the carrier, and cooperating means on said driven member and on said transverse shaft for imposing a limited rotational movement to the transverse shaft upon relative predetermined movement of the driven member past the center of said transverse shaft.

8. A mechanism of the class described comprising a carrier having a transverse shaft and an axially extending shaft mounted thereon, an adjusting knob for rotating the carrier, said transverse and axially extending shafts being pivotally connected to each other through offset arms extending radially from each shaft whereby rotary movement of the former imparts reciprocating movement to the latter, a relatively movable driven member concentric with said axial shaft adjacent the carrier, and cooperating means on the driven member and on said transverse shaft for imparting a limited rotational movement to the transverse shaft upon movement of a given point on the driven member past the center of the transverse shaft.

9. A mechanism of the class described comprising a carrier having a transverse shaft and an axially extending shaft mounted thereon, an adjusting knob for rotating the carrier, said transverse and axially extending shafts being pivotally connected to each other through offset arms extending radially from each shaft whereby rotary movement of the former imparts reciprocating movement to the latter, a relatively movable driven member concentric with said axial shaft adjacent the carrier, cooperating means on the driven member and on said transverse shaft for imparting a limited rotational movement to the transverse shaft upon movement of a given point on the driven member past the center of the transverse shaft, an indexing disk adjacent said knob, and a pointer operated by the driven member movable about the indexing disk.

10. A mechanism of the class described comprising a carrier having a transverse shaft and an axially extending shaft mounted thereon, an adjusting knob for rotating the carrier, said transverse and axially extending shafts being pivotally connected to each other through offset arms extending radially from each shaft where-

by rotary movement of the former imparts reciprocating movement to the latter, a relatively movable driven member concentric with said axial shaft adjacent the carrier, cooperating means on the driven member and on said transverse shaft for imparting a limited rotational movement to the transverse shaft upon movement of a given point on the driven member past the center of the transverse shaft, an indexing disk adjacent said knob, a pointer operated by the driven member movable about the indexing disk, and cooperating means on the indexing disk and the knob for releasably holding the knob in the position to which it is adjusted.

11. A mechanism of the class described comprising a carrier having a transverse shaft and an axially extending shaft mounted thereon, an adjusting knob for rotating the carrier, said transverse and axially extending shafts being pivotally connected to each other through offset arms extending radially from each shaft whereby rotary movement of the former imparts reciprocating movement to the latter, a relatively movable driven member concentric with said axial shaft adjacent the carrier, cooperating means on the driven member and on said transverse shaft for imparting a limited rotational movement to the transverse shaft upon movement of a given point on the driven member past the center of the transverse shaft, an indexing disk adjacent said knob, and a pointer operated by the driven member movable about the indexing disk, said means including shiftable indexing pins on the indexing disk and a reciprocable latch member on the knob.

12. A mechanism of the class described comprising a carrier having a transverse and an axial shaft carried thereby, each of said shafts having a radially extending arm thereon, the terminal portions of the two arms being pivoted together whereby a rotational movement of the transverse shaft will impart a reciprocating movement to the axially extending shaft, a notched member on the transverse shaft, a wheel-like member concentric with the axial shaft adjacent the carrier having means thereon to engage the notch

in said member whereby relative movement of the notched member past said means causes the transverse shaft to be rotated.

13. A mechanism of the class described comprising a carrier having a transverse and an axial shaft carried thereby, each of said shafts having a radially extending arm thereon, the terminal portions of the two arms being pivoted together whereby a rotational movement of the transverse shaft will impart a reciprocating movement to the axial shaft, a notched member on the transverse shaft, a wheel-like member concentric with the axial shaft adjacent the carrier having means thereon to engage the notch in said member whereby relative movement of the notched member past said means causes the transverse shaft to be rotated, a valve-operating finger movable in a plane by the axial shaft to any one of several different operating positions, push button valves at each position to which the finger is movable, a pneumatic cooperating with the finger for moving it in a direction normal to the said first plane of movement for depressing a selected push button, a record spool mechanism and drive controlled by the push button valves, means for driving the wheel-like member from the record spool mechanism, and record-controlled means for operating said pneumatic.

14. A pneumatic mechanism of the class described having a tracker bar and record spool driving means for moving a record over the tracker bar in forward and reverse directions at high speed, and other means for moving the record over the tracker bar at slow speed, a selector valve for determining the direction of movement of the record, said selector having three different valve elements, an operating finger movable to engage any one of said valve elements, a combined manually-adjustable and record-spool driven means for shifting said finger to determine which of said elements shall be operated, and record-controlled means for operating the finger after the finger has been shifted to a selected position.

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