Aug. 30, 1932. H. E. HALE ET'AL 1,874,512

PNEUMATIC REPRODUCING TYPEWRITING MECHANISMS

Filed July 16, 1931 2 Sheets-Sheet 1

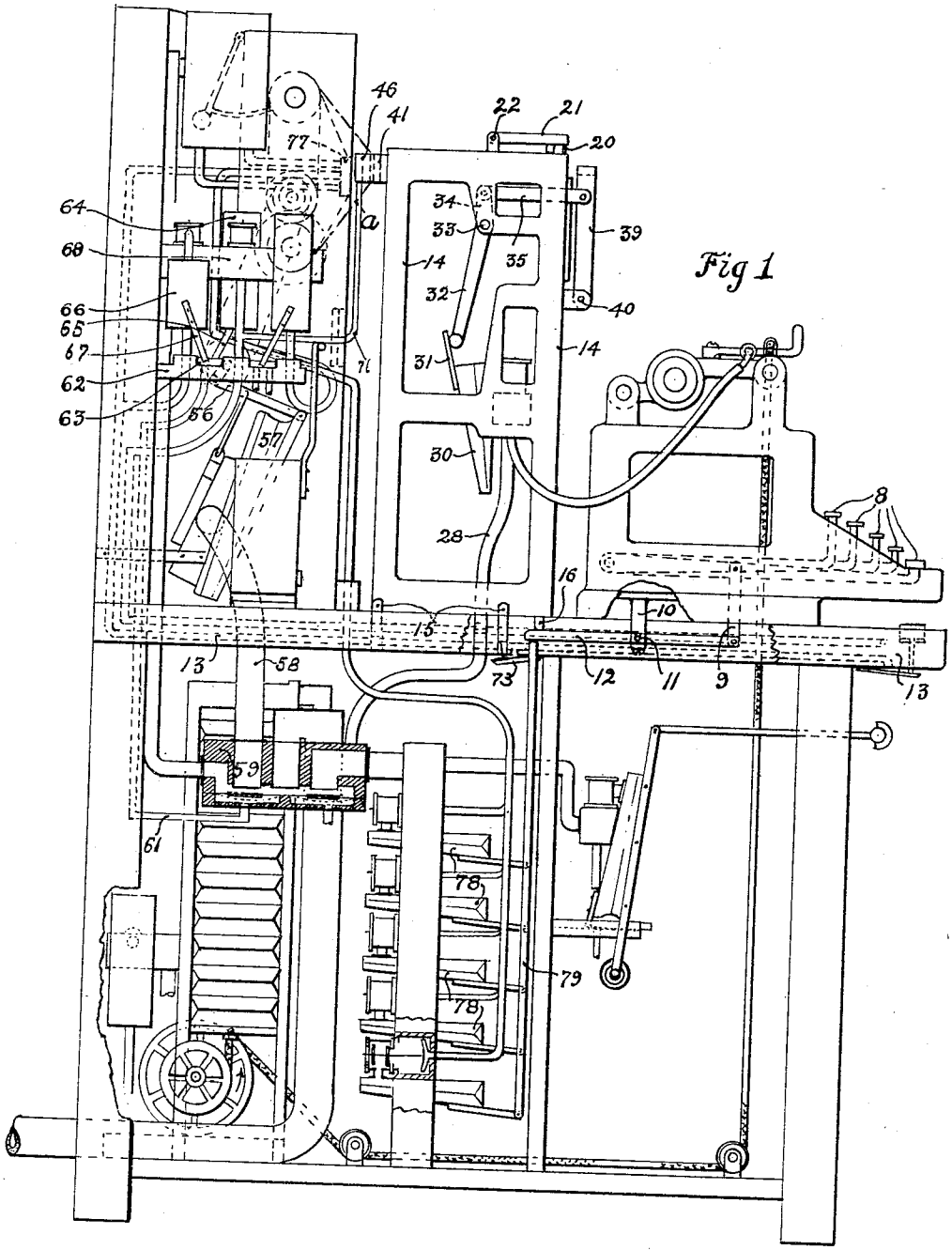


Fig 1

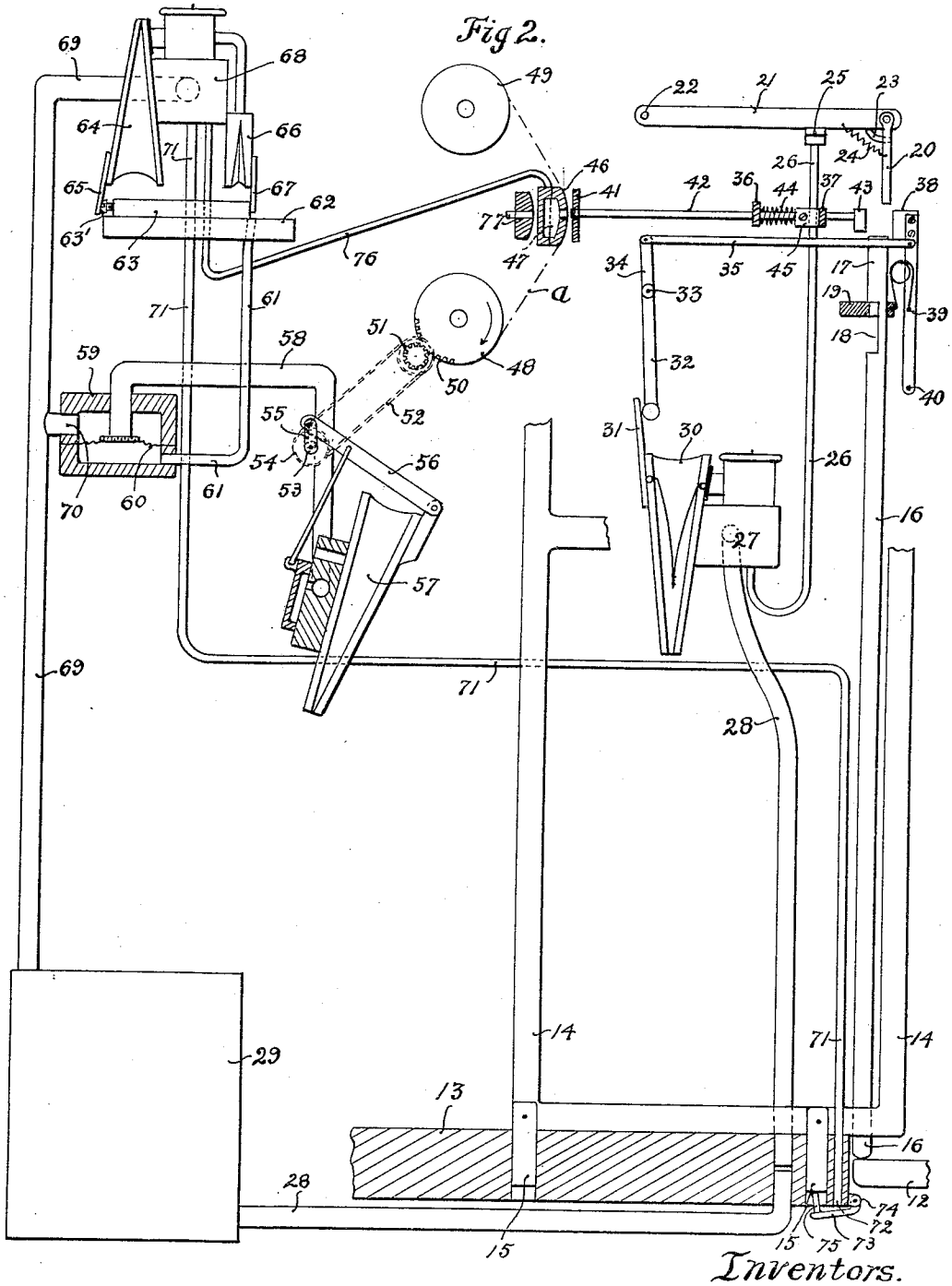
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PNEUMATIC REPRODUCING TYPEWRITING MECHANISMS

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Fig 2.



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UNITED STATES PATENT OFFICE

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PNEUMATIC REPRODUCING TYPEWRITING MECHANISMS

Application filed July 16, 1931. Serial No. 551,144.

This invention relates to typewriting machines for producing record sheets, and has particular reference to machines capable of reproducing any quantity of letters or other typed matter, each of which, either wholly or in part, is a typewritten duplicate of the original letter.

One of the objects of the invention is to provide a machine by which what may be termed circular letters, may be prepared automatically after typing an original letter and making a corresponding record sheet, each and every one of the automatically typed letters being identical with one which is manually typed.

Another object is to provide a machine by which the manual operation of a typewriter will produce a record sheet, which record sheet can then be repeatedly used to effect automatic complete operation of the same typewriting machine that was used primarily, or the operation of a similar typewriting machine.

Another object is to provide mechanism by which a manually typewritten letter, or a portion of a letter, can be produced simultaneously with the production of a record or master sheet, whereby the operator can determine, by reading the typed letter, if the record sheet is correct.

Another object is to provide mechanism of the character described, in which a unitized portion thereof which effects the making of the record sheet is portably removable, whereby when it is in place a letter can be typed and a record sheet simultaneously produced, and whereby the simple removal of said unitized portion will enable the remaining mechanism to be employed for automatically producing as many typed duplicates of the original letter as may be wanted.

With the above-stated objects in view, and others that will be explained, our invention consists in the construction and combinations of parts substantially as hereinafter described and claimed.

Of the accompanying drawings:—

Figure 1 is a side elevation of a complete apparatus or mechanism which embodies the present invention, and

Figure 2 is a somewhat diagrammatic view of the parts forming the subject matter of the claims herein, some of the parts being in section.

Similar reference characters designate similar parts or features in both of the views.

The particular kind of typewriting machine chosen for illustration is of the well-known Underwood type, but the invention is not limited thereto.

Referring first to Figure 1, each typewriter lever or key 8 is connected by a link 9 to a lever 12 pivotally supported at 11 by a suitable bracket 10, and the rear or inner end of each lever 12 extends under the lower end of a vertically movable rod 16, so that whenever a key lever 8 or any other manual of the typewriting machine is actuated to imprint a character on a sheet mounted as usual on the platen of the typewritting machine, or to effect any other operation, a corresponding rod 16 will be lifted.

Removably mounted on the table portion 13 of a suitable cabinet which contains many of the power and other pneumatics of the complete mechanism, is a frame 14 (Figs. 1 and 2) having pendent pins or legs 15 which fit holes in the support 13 when said frame and the parts carried thereby are in place for the making of a record sheet by an operator manually using the typewriter and typing a letter in the usual way.

Mounted to reciprocate vertically in the frame 14 are the slender rods 16 (Fig 2), one for each key lever 12.

The upper end of each rod 16 is shaped to provide a relatively thin finger 17. Each rod is also recessed as at 18 to provide a shoulder, said recessed portion fitting a slot in a fixed guide bar 19. The slots in said guide bar are of sufficient length to permit each rod 16 to vibrate slightly when actuated as hereinafter described.

A strip 20, hereinafter referred to as a curtain strip, extends along over and normally in line with the tips 17 of the entire row of lifter rods 16. Said strip 20 is pivoted to and depends from a frame 21 pivotally connected at 22 to the top of the frame 14. By means of a stop lug 23 and spring 24, the curtain

strip normally remains in the position illustrated in Figure 2 but may be swung aside as hereinafter described.

The frame 21 carries a pad 25 which normally bears on the open upper end of a conduit 26 in which a partial vacuum is normally maintained, said pad 25 acting as a valve to prevent the admission of air to said conduit. Said conduit 26 is connected to a wind chest 27 from which air is exhausted through a main conduit 28 by means of a suitable power-driven vacuum producer in a casing 29.

The vacuum chamber or wind chest 27 communicates through a valved port with a pneumatic 30 the structure of which and of the valved port may be of the type illustrated in Letters Patent No. 1,142,863 issued June 15, 1915, to W. A. Watson. The movable side of said pneumatic has an arm 31 to act on the lower end of an arm 32 of a rock shaft 33 which has two arms 34 that are connected by links 35 to a bar 38 carried by the upper ends of two arms 39 pivoted to the frame at 40, so that whenever the pneumatic 30 is collapsed the bar 38 is pulled quickly to the left in Figures 1 and 2 so as to act as a striker against the upper end of any rod 16 that is lifted as hereinafter described.

Reciprocally mounted in guide strips 37, 36, and also in a guide strip 41 are slender punches 42 the heads 43 of which are opposite to and in line with the upper ends of the lifter rods 16. There is one punch for each lifter rod. Each punch 42 is normally held in the position shown in Figure 2 by a spring 44 confined between the guide strip 36 and a collar 45 secured to the punch.

Whenever a key lever 12 raises its associated rod 16, the tip of the finger 17 of the latter contacts with the curtain strip 20 and lifts the latter, resulting in opening the valve 25 so that the pneumatic 30 may act. But such lifting of the selected rod 16 also brings its upper end between the striker bar 38 and the head 43 of the proper punch so that the result of the action of the pneumatic 30 is to cause the bar 38 to move quickly in or to the left in Figure 2, and act through the finger of the lifted rod 16 and cause the selected punch to act on the record sheet *a*, which is backed by the die bar 46 presently described. This movement of the striker bar 38 dislodges the finger 17 from the edge of the curtain strip 20 to permit said strip to drop to normal inactive position, and results in a re-closing of the pad valve 25.

Suitably supported by the frame 14 is a member 46 hereinafter referred to as the die bar. It is preferably made in two parts shaped to provide an internal chamber which is divided into front and rear portions by a screen 47 of wire mesh or other suitable material. The curved front of the die bar has holes into which the operated punches move far enough to form the requisite apertures in the record sheet.

Behind the frame 14 are suitably mounted other parts of the machine, including a take-up spool 48 and a spool 49 for the sheet which is to be perforated, such sheet being indicated at *a*.

The spindle of the spool 48 has a toothed member 50 engaged by a pinion 51 the shaft of which has a sprocket that is engaged by a chain 52, said chain also engaging a sprocket 54 of a shaft 53. The said shaft 53 has a crank arm 55 to which one end of a link 56 is connected. The other end of said link is connected to a pneumatic motor 57 of any well-known type such as illustrated in Letters Patent 809,919, the purpose of said motor being to provide or effect intermittent travel of the sheet *a* from the spool 49 to the spool 48 when the machine is being operated as hereinafter described.

A vacuum tube 58 connects the motor 57 with the control box 59 in which is a diaphragm 60 to cooperate with the usual padded end of the tube 58. A conduit 61 which is normally open, connects the space below the diaphragm 60 with a port in the bed plate 62, which port is intermittently opened and closed by the slide valve 63. One end of the slide valve has an adjustable screw 63′ which is engaged by a finger 65 of a pneumatic 64, and the other end of the slide is engaged by a finger 67 of a pneumatic 66 which is smaller than the pneumatic 64. The purpose of this difference in size of the pneumatics 64, 66, is to effect a quick return of the slide valve to the left (Fig. 2) after the pneumatic 64 has actuated the slide valve and then returned to its normal position.

The wind chest or vacuum chamber 68 of the two pneumatics 64, 66, is connected by a conduit 69 with the vacuum producer 29 and said conduit 69 has an open port connection 70 with the control box 59 above its diaphragm 60.

One end of a long conduit 71 is connected to the wind chest 68, and its lower end 72, which is illustrated as extending through the table 13 adjacent to one of the pins 15, is normally open but is adapted to be closed by a spring valve 73 pivoted at 74 and having a pin 75 extending up into the adjacent hole in the table, so that when the frame 14, which is removable, is in place as illustrated, one of its pins or legs 15 will hold the valve 73 open. But when said frame and the parts carried thereby are removed, the suction in the conduit 71 and the spring of the valve will cause the valve to automatically close, thereby ensuring that when the frame 14 and its parts are removed, there will be no such passage of air into and through the conduit 71 as would interfere with the proper operation of the mechanism.

A conduit 76 connects the chamber of the

die bar 46 behind the screen partition 47 with the wind chest 68.

Behind the die bar 46 is a tracker bar 77, and a brief description of the utility of said tracker bar will be given hereinafter although not a feature of the mechanism that is claimed herein.

The operation of the described mechanism will now be explained.

Usually a sheet of paper is first inserted in the typewriter around the usual platen of the latter, so that a letter can be manually typed, which letter can, later, be compared with duplicates effected by the use of the record sheet in which perforations are made by the punches 42 at the same time that the above-mentioned letter is being typed.

Operation of either typewriter key 8 effects, through its associated link 9 and lever 12, the lifting of its associated rod 16 so that the upper end of the latter will be interposed between the striker bar 38 and the head 43 of the punch 42 that is in line with such lifted rod 16. The key 8 moves downward and the corresponding rod 16 moves upward to an extent or distance limited by contact of the shoulder at the lower end of the recess 18 with the fixed bar 19. As the rod 16 rises, its upper end 17 contacts with the lower edge of the curtain 20, causing the latter to rise with it and lift the frame 21 so that the valve pad 25 of the latter opens the conduit 26. The resulting admission of air through said conduit to the vacuum chamber 27 effects the collapsing of the pneumatic 30 in a well known manner such as explained in the Patent No. 1,142,863 hereinbefore referred to. Such collapsing of the pneumatic 30 causes, through the members 32, 33, 34, 35, a quick movement of the striker bar 38 so that the latter will act, through the finger 17 of the lifted rod 16, to impart a blow to the selected punch 42 to cause the other or inner end thereof to cut a small hole in the record sheet *a*. This operation shifts the tip of the lifted rod 16 away from the edge of the curtain strip 20 so that gravity causes said strip and the frame 21 and the valve pad 25 to fall, said pad then closing the conduit 26 and allowing the pneumatic 30 and the striker bar 38 to return to their inactive position illustrated. Of course the moment that the operator releases the key 8 that was depressed, the lifted bar 16 is freed so that it drops to its normal position.

As soon as any punch has perforated the sheet *a* in the manner described, air at atmospheric pressure can pass through such perforation into the chamber in the die bar 46 and from there through the conduit 76 so that the usual valve in the wind chest 68 will be shifted and result in collapsing the pneumatic 64 and the shifting of the slide valve 63 over the port in the bed plate 62. This cuts off atmospheric supply through the conduit 61 to the diaphragm 60 in the control box 59 so that it falls from the position illustrated and results in the admission of vacuum tension from said box 59 through the tube 58 to the wind motor 57. The operation of the latter then causes the sheet *a* to travel to position for receiving the next perforation. The proper spacing can be regulated by means of the screw 63′ in one end of the valve 63 against which the finger 65 bears. By adjusting the screw 63′ the length of time during which the port in the bed plate 62 will be open, can be varied so as to vary the length of time that the motor will operate to cause advance of the sheet *a*. Therefore said sheet can be caused to travel a greater or lesser distance according to the distance desired between successive punchings.

The screen partition 47 in the die bar 46 prevents the little waste paper punchings from being drawn into the conduit 76, and any undue accumulation thereof can be removed either through suitable normally plugged apertures in the bar, or by temporarily separating the two members of the bar.

The object of providing the frame 14 with the pendent pins 15 fitting holes in the table top 13 is because of said frame and the parts carried thereby being removable; and it is important that when it is in place for use the row of lifter rods 16 shall be in accurate alinement with the row of levers 12 which are actuated by the typewriter key levers, it being understood that the typewriter and the members 9, 10, 12 are usually mounted in fixed positions on the table top. When the frame 14 is in position, the valve 73 is held open, as has been described, to permit passage of air into and through the conduit 71 to the wind chest 68 to hold the pneumatic 66 collapsed.

After a record sheet has been completed, and it is desired to use that sheet for controlling the automatic repeating operation of the typewriter to effect the production of duplicate letters, the record sheet is rewound on the spool 49, the frame and its parts including the die bar 46 are removed, and the record sheet again connected to the lower spool 48, with said sheet then in contact with the tracker bar 77. Said tracker bar is similar to those used in player pianos, and its apertures are connected by conduits with pneumatics 78 such as indicated in the lower portion of Figure 1, and which pneumatics actuate rods 79 the upper ends of which engage the levers 12, and the latter, through the links 9, will then operate the typewriter key levers. This description is given to explain the reason for the frame 14 and its parts being removable. The various pneumatics and the connections thereof illustrated below the table 13, and some of the other parts illustrated in Figure 1 but not described, are not claimed herein but will be more fully illus-

trated and described in a separate application.

Although we have illustrated and described the present invention as especially for the making of record sheets that are afterwards to be employed for controlling the automatic operation of a typewriting machine, it is to be understood that we do not limit ourselves to so employing the record sheets, because record sheets produced by the mechanism herein described and claimed could be employed for other purposes such as controlling the setting of type, or the distribution of type, or for any selective control of a series of operations.

Having now described our invention, we claim:—

1. In a machine for making a record sheet, an apertured die bar, punches to cooperate with said die bar, pneumatic means for effecting travel of a sheet between said die bar and punches, and vacuum tension connections between said die bar and pneumatic means.

2. In a machine for making a record sheet, an apertured die bar, pneumatics, conduits between said die bar and pneumatics, punches to cooperate with said die bar in perforating a sheet, and manually operable keys for selectively controlling the operation of the punches.

3. In a machine for making a record sheet, a chambered die bar, means for exhausting air therefrom, punches cooperating with said die bar to perforate a sheet, and pneumatic mechanism for effecting travel of the record sheet, said pneumatic mechanism having conduit connections with said die bar.

4. In a machine for making a record sheet, a chambered die bar, means for exhausting air therefrom, punches cooperating with said die bar to perforate a sheet, and means whereby, when a perforation is made in the sheet, the sheet is caused to travel a pre-determined distance.

5. In a machine for making a record sheet, rolls for supporting a sheet, a die bar over which the sheet passes, punches to cooperate with the die bar in perforating the sheet, pneumatically operated means for actuating the punches and effecting travel of the sheet from one roll to the other, and means for varying the degree of successive steps of movement of the sheet to vary the spacing of the perforations lengthwise of the sheet.

6. In a machine for making a record sheet, a series of punches, a striker bar movable toward and from the punches, a series of fingers movable to and from position between said striker bar and punches, pneumatic mechanism for actuating said striker bar, and manually operable means for selectively moving said fingers to operative position.

7. In a machine for making a record sheet, a series of punches, a striker bar movable toward and from the punches, a series of fingers movable to and from position between said striker bar and punches, pneumatic mechanism for actuating said striker bar, and manually operable means for selectively moving said fingers to operative position and to also simultaneously effect actuation of the striker bar by its pneumatic mechanism.

8. In a machine for making a record sheet, a series of punches, a striker bar movable toward and from the punches, a series of fingers movable to and from position between said striker bar and punches, a movable frame having a curtain member above the fingers, pneumatic mechanism for actuating said striker bar, manually operable means for selectively moving said fingers between the striker bar and punches and to contact with and raise said curtain member, and a valve member carried by said curtain frame to control said pneumatic mechanism.

9. In a machine for making a record sheet, a chambered die bar having apertures in one side, means for exhausting air from the other side, punches cooperating with said apertures, and a screen traversing the chamber of the die bar to prevent material punched from the sheet from being drawn away by the said air-exhausting means.

10. In mechanism for making a record sheet, a frame carrying punches and pneumatic mechanism for operating them, a table supporting said frame, said frame being removable from the table, means being provided for accurately positioning said frame when in place on the table, a wind-chest and means connected therewith to effect travel of a record sheet, a conduit connected at one end to said wind-chest and having its other end adjacent to the lower portion of said removable frame, and a valve for automatically closing said conduit when the said frame is removed from the table.

In testimony whereof we have affixed our signatures.

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