

[72] Inventors **Martin Hebel;
Otto Krauss, Nuernberg; Hermann
Waldenburger, Wolkersdorf, Germany**
[21] Appl. No. **757,919**
[22] Filed **Sept. 6, 1968**
[45] Patented **Mar. 30, 1971**
[73] Assignee **Grundig E.M.V. Elektro-Mechanische
Versuchsanstalt
Fuerth, Bayern, Germany**
[32] Priority **Nov. 28, 1967**
[33] **Germany**
[31] **G38438**

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Primary Examiner—Edgar S. Burr
Attorney—Michael S. Striker

[54] **PNEUMATIC SETTING ARRANGEMENT FOR A
TYPE HEAD**
10 Claims, 4 Drawing Figs.

[52] U.S. Cl..... **197/15,
197/18, 178/34, 197/55**
[51] Int. Cl..... **B41j 23/20**
[50] Field of Search..... **178/34;
197/15, 18, 49, 55**

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ABSTRACT: A series of pairs of interconnected cylinders and pistons is provided for setting a type head between different printing positions. The cylinder and piston of each pair are movable between a contracted position and an expanded position, and the cylinders and pistons of different pairs are spaced in the expanded position different distances selected in accordance with a code. Pneumatic operating means including valves controlled by keys, move the cylinders and pistons of selected pairs to the expanded position so that the piston at one end of the series is displaced relative to the cylinder at the other end of the series a distance which is the total of the distances of expansion of the selected pairs, and sets the type head accordingly to different printing positions.

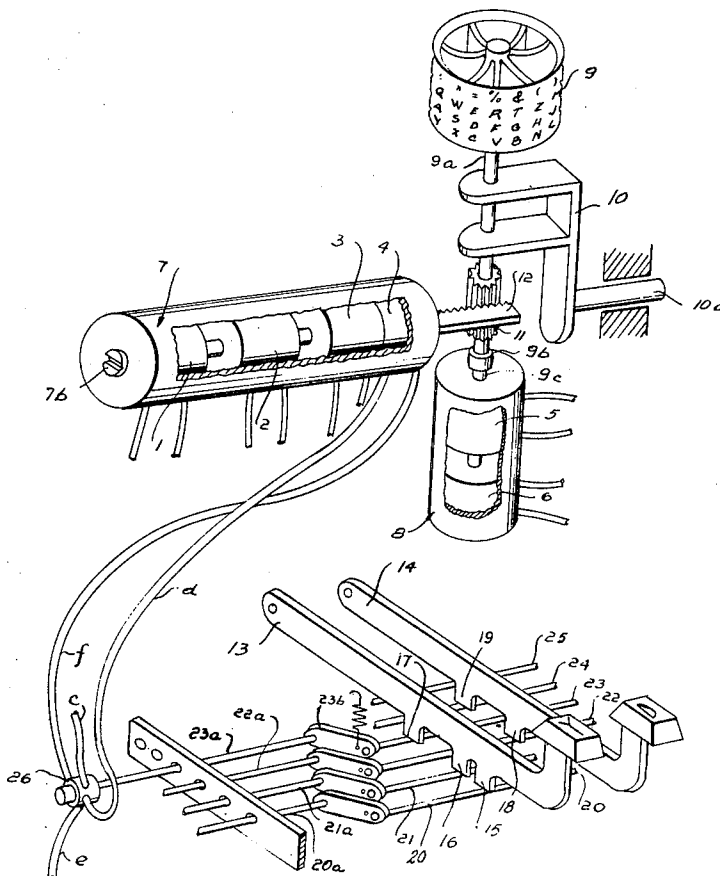
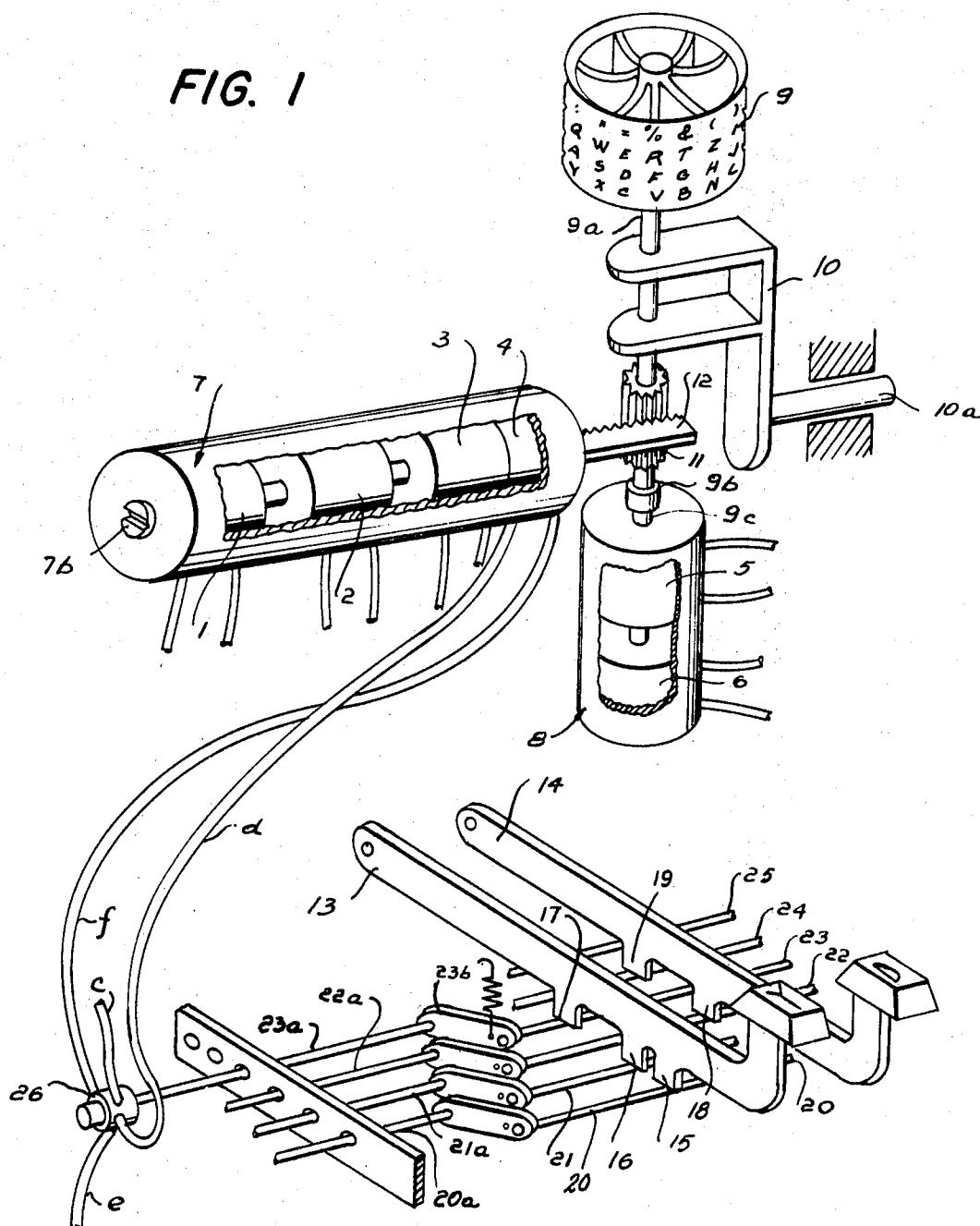


FIG. 1



INVENTORS:
 MARTIN HEDEL
 OTTO KRAUSS
 BY HERRMANN HAUENBURGER
 Michael S. Stulpe
 ATTORNEY

FIG. 2

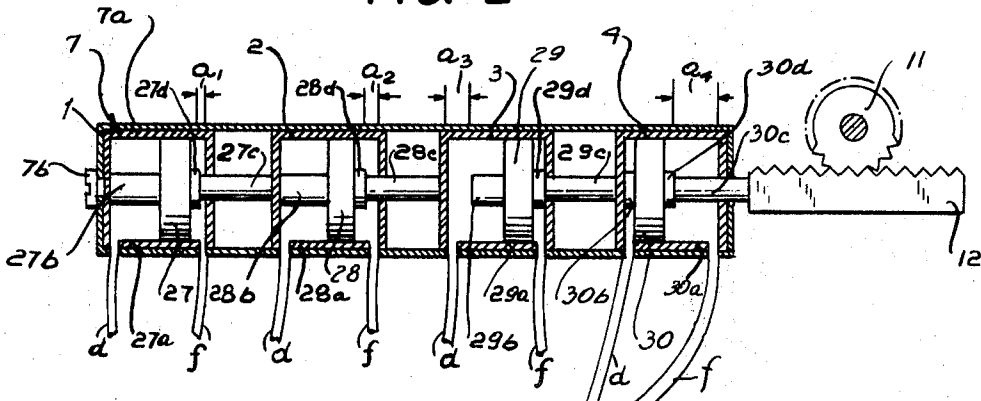
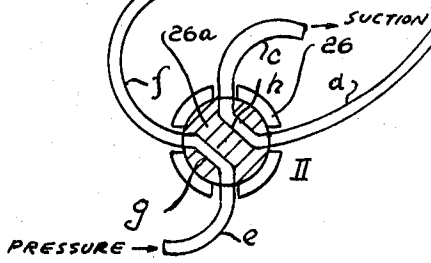
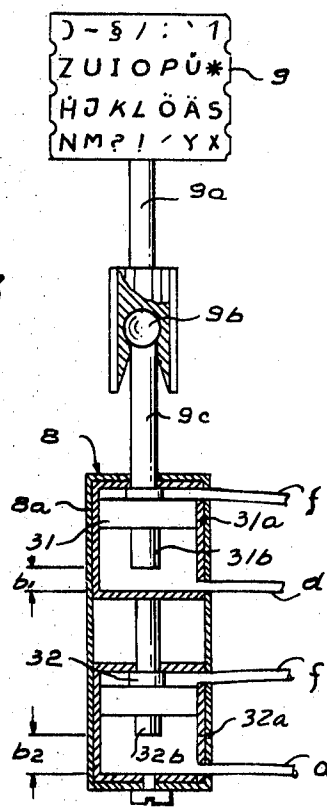


FIG. 2a

FIG. 3



INVENTORS
MARTIN HEBEL
OTTO KRAUSS
BY HERMANN WALDENBURGER
Michael S. Stecker
ATTORNEY

PNEUMATIC SETTING ARRANGEMENT FOR A TYPE HEAD

CROSS-REFERENCES TO RELATED APPLICATIONS

An application entitled "Type Head Arrangement" filed by H. Waldenburger in Jul. 1968 and an application simultaneously filed by H. Waldenburger and entitled "Setting Arrangement for a Type Head," are directed to related subject matter.

BACKGROUND OF THE INVENTION

The present invention relates to a setting arrangement for a type head which serves the purpose of setting a type head to different positions in which selected characters can be printed.

A setting arrangement for this purpose using wires is disclosed in the German Pat. No. 1,078,591.

SUMMARY OF THE INVENTION

It is one object of the invention to provide a simple, compact, and efficient setting arrangement for a type carrier.

It is another object of the invention to provide a fluid-operated setting arrangement for a controlled element.

Another object of the invention is to provide a pneumatic setting arrangement for setting a type head to different printing positions.

Another object of the invention is to provide two setting arrangements for turning, and axially shifting, respectively, a type head having typefaces arranged along circular lines and axially extending columns.

Another object of the invention is to provide a series of alternating cylinders and pistons which are selectively expanded and contracted by air pressure for setting a type carrier to different printing positions.

Another object of the invention is to control selected cylinders and pistons by valves selectively operated by keys.

With these objects in view, the present invention relates to a setting arrangement for a type carrier, such as a type head.

One embodiment of the invention comprises a series of pairs of alternate first and second setting means, such as cylinders and pistons, a series of operating means, preferably pneumatic operating conduit means respectively connected with said pairs; selector means for actuating selected operating means; control means movable in opposite directions and connected with the last setting means of the series; and a type carrier controlled by the control means to move between printing positions.

The first and second setting means, a cylinder and a piston, of each pair are connected with each other for limited movement between a contracted position and an expanded position. The cylinders and pistons of pairs in the expanded position are spaced from each other different distances, respectively, selected in accordance with a code.

For example, if four pairs of cylinders and pistons are provided, the four distances of expansion are in a ratio of 1:2:4:8.

The operating conduit means supply pressure air to one side of a piston, and exhaust air from the other side of the same. Selector valves operated by keys are provided for reversing the flow in selected pairs of cylinders and pistons, so that selected pairs of cylinders and pistons are expanded, and other pairs contracted. The distances of expansion of expanded pairs of cylinders and pistons are added so that the last piston at one end of the series is displaced relative to the cylinder at the other end of the series a distance which is the total of the distances of expansion of the selected pairs. The type carrier is connected by control means to the last piston of the series, and set by the same.

It is an advantage of the invention that the apparatus can be inexpensively manufactured, that no rotation of pistons or cylinders is required, and that the moved and accelerated masses are very small so that the setting of the type carrier can be accomplished in a very short time whereby the writing speed of a typewriter is increased.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a fragmentary perspective view illustrating first and second pneumatic setting arrangements for angularly and axially, respectively, displacing and setting the type head of a typewriter;

FIG. 2 is a fragmentary schematic sectional view illustrating the first setting arrangement for angularly setting the type head, and including a fragmentary sectional view of a valve in a first operational position;

FIG. 2a is a fragmentary sectional view illustrating the valve of FIG. 2 in another operational position; and

FIG. 3 is a fragmentary schematic sectional view illustrating the second setting arrangement for axially displacing and setting the type head.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first to FIG. 1, a type head 9 is provided with circular peripheral lines of typefaces representing characters, and groups of type-faces are arranged in axially extending columns. Type head 9 has a shaft 9a mounted in a carrier frame 10 for rotary and axial movement. Carrier frame 10 is tiltable with shaft 9a and type head 9 about a shaft 10a mounted in a stationary bearing 10b. A joint 9b, see also FIG. 3, connects shaft 9a with a rod 9c which can be axially displaced by the setting arrangement 8. Shaft 9a carries an elongated pinion 11 meshing with a rack bar element 12 controlled by setting arrangement 7. The teeth of meshing parts 11 and 12 are selected so that they remain in meshing engagement when shaft 9a is tilted by frame 10 to move the type head 9 from a position spaced from a printing surface to a position engaging the same. Since pinion 11 is elongated, shaft 9a can be displaced in axial direction by the setting arrangement 8 while the rack bar 12 remains in meshing engagement with pinion 11.

Setting arrangement 7 is best seen in FIG. 2 and includes a tubular casing 7a having end plates. Four pairs 1, 2, 3, 4 of first setting means are mounted in the guideway formed by casing 7a, each pair including a piston 27, 28, 29, 30 and a cylinder 27a, 28a, 29a, 30a, respectively. The first cylinder 27a is secured by a screw 7b to an end plate of casing 7a.

As shown in FIG. 2, pistons 27—30 have abutment portions 27b, 28b, 29b, 30b projecting to the left within the respective cylinder, and piston rod portions 27c, 28c, 29c, 30c projecting to the right through an opening in the respective cylinder toward and into abutment with the left end wall of the next-following adjacent cylinder.

Each piston has a second abutment portion 27d, 28d, 29d, 30d at the base of the respective piston rod 27c to 30c, cooperating with the right end wall of the respective cylinder.

While the left and right end walls of the four cylinders are spaced the same distance so that all cylinders have the same axial length, abutments 37b, 28b, 29b, 30b have different lengths selected in accordance with a code so that when an end face of an abutment portion 27b, 28b, 29b, 30b abuts the left end wall of the respective cylinder, the respective abutment 27d, 28d, 29d, 30d is spaced from the right cylinder wall a predetermined different distance, as shown for the pairs of cylinder and pistons 1, 2, 4 where the respective distances are designated a_1 , a_2 , a_4 . When the right abutment portion 27d—30d abuts the right wall of the respective cylinder, the respective left abutment portion is spaced a predetermined distance from the left wall of the respective cylinder. The cylinder and piston pair 3 is shown in this position in which the first abutment portion 29b is spaced from the left wall of piston 29 the distance a_3 .

The distances a_1, a_2, a_3, a_4 are selected in accordance with a code, and are in the illustrated embodiment in a ratio 1:2:4:8.

The piston rod 30c of the last piston 30 passes through openings in the last cylinder 30a and in the end plate of casing 7a, and is secured to rack bar 12 which meshes with pinion 11, as described above.

Each cylinder 27a—30a has two openings respectively adjacent the end walls thereof and two conduits or hoses d and f are respectively connected to the two openings of each cylinder. As shown for cylinder 30a only, conduits d and f are connected with a valve 26 whose turnable inner valve member 26a has two ducts g and h for connecting conduits d and f selectively with a pressure conduit e and a suction conduit c which are connected with an air compressor, not shown, or other pump for pumping a fluid.

In the position II shown in FIG. 2, pressure air is supplied through conduit f to the chamber on the right of piston 30, and suction is applied to the chamber on the left of the same. When the inner valve member 26a is angularly displaced to the position I shown in FIG. 2a, pressure fluid is supplied through conduit d , and suction is applied to conduit f of the cylinder and piston pair 4.

Only valve means 26, 26a associated with cylinder 30a is shown, but a valve means as described with reference to FIGS. 2 and 2a is provided for each pair of conduits d and f associated with cylinders 27a, 28a, 29a. Consequently, by turning of the respective valves, pressure can be applied to the right side or to the left side of any piston, while suction is applied to the other side of the respective piston.

In the position of FIG. 2, the valves 26, 26a connected with the first, second and fourth pair of cylinders and pistons are in the position II, while the valve, not shown, associated with the third cylinder 29 and piston 29a is assumed to be in the position I.

Pressure is applied to the chamber on the right side of pistons 27, 28 and 30, and suction is applied to the chambers on the left side of the same. Pressure is applied by conduit d to the chamber on the left of piston 29, and suction is applied by conduit f to the chamber on the right side of piston 29.

Consequently, abutments 27d, 28d, 30d are spaced from the right cylinder walls the distances a_1, a_2, a_4 , while abutment 29d abuts the right end wall of cylinder 29a. Abutment portions 27b, 28b, 30b abut the left end walls of the respective cylinders and urge the same to move to the left as viewed in FIG. 2 into a position abutting piston rods 27c of the preceding piston.

Abutment portion 29b is spaced from the left end wall of the respective cylinder 29a, but the high pressure in the chamber on the left of piston 29 urges cylinder 29a toward the left into abutment with the preceding piston rod 28c.

The distances a_1, a_2, a_4 add up so that piston 30 is displaced the total of these distances, and displaces control element 12 the same distance. The total displacement is 11 units which is the sum of 1, 2 and 8 units corresponding to the distances a_1, a_2, a_4 . If the valve, not shown, of the third cylinder and piston pair 3 would be reversed to the position II, four units would be added, and the total displacement would be 15 units which corresponds to 16 different positions of the control element 12. Referring again to FIG. 1, only one valve 26 is shown to be connected to the cylinder and piston pair 4 and mounted on a shaft portion 23a of a bail 23 which is connected with shaft portion 23a by a crank arm 23b. Four bails 20—23 are provided, each of which has a shaft portion 20a—23a which are respectively connected with the inner members 26a of four valves 26, of which only one is shown.

Additional bails 24 and 25, only partly shown, are constructed in the same manner and have shaft portions, not shown, connected to two valves 26, not shown, which serve for operating the second-setting arrangement 8, as will be explained hereinafter.

A row of keys and key levers 13 and 14 is mounted for pivotal movement directly above the bails 20—25. As shown for the key "Y," projections 15, 16 and 17 respectively cooperate with bails 20, 21, 23 to turn the same, and thereby

the respective valves 26 to the position II described with reference to FIG. 2 so that upon depression of key means 13, the pistons and cylinders assume the position shown in FIG. 2. Between portions 16 and 17 a greater space is provided in which another projection cooperating with bail 22 may be placed. Evidently, different keys may have only one projection, two projections arranged in different relative positions, three projections arranged in different positions, and even four projections for obtaining maximum displacement of control element 12 and type head 9. Key means 14, associated with the character "D," has one projection 18 cooperating with bail 22 which is associated with the third cylinder and piston pair so that operation of key means 14 would cause displacement of control element 12 a distance of four units.

The second setting arrangement shown in FIG. 3, by which the type head 9 is raised and lowered between four positions in which different circular rows of characters are located opposite the printing area in a printing position, has only two cylinder and piston pairs disposed in a tubular housing 8a. Pistons 31 and 32 are respectively located in cylinders 31a and 32a. When pressure is applied through conduits d into the chambers below pistons 31 and 32, the same are urged upward to the position shown in FIG. 3 in which abutment portions 31b and 32b are spaced distances b_1 and b_2 from the bottom walls of the respective cylinders 31 and 32 while type head 9 is raised to its highest position in which the lowest circular line of characters is located opposite the printing area. The ratio of distances b_1 and b_2 is 1:2. When pressure fluid is supplied to conduits f , pistons 31 and 32 are moved down until abutment portion 32b abuts the bottom end wall of cylinder 32a, and abutment portion 31b abuts the bottom end wall of cylinder 31. Since the control rod 9c makes three unit steps downward, the uppermost circular line of characters of the type head 9 is located opposite the printing area. If only piston 31 is shifted by reversal of the pressure and suction lines, the type head is lowered one step and the second line from the bottom is operative. If only piston 32 is shifted, the type head is moved two steps downward out of the illustrated position, and the second line from the top of the type head is operative.

Since every character is associated with a circular line and a vertical column of the type head, it is necessary to axially displace the type head at the same time as the same is angularly displaced to place a particular selected character opposite the printing surface. Key means 14 shown in FIG. 1 has in addition to the projection 18 which obtains turning of the type head by the setting arrangement 7, also a projection 19 cooperating with the bail 24, which is only partly shown, but operates one of the valves connected with the conduits d and f in FIG. 3. The other pair of conduits d and f in FIG. 3 is connected to a valve supported by the bail 25. The valves operated by bails 24 and 25 are not illustrated, but it will be understood that they are operated in the same manner as valve 26 is operated by the bail 23. Consequently, upon depression of key means 14, projection 19 will operate the bail 24 to shift the inner member 26a of the respective valve to the position II.

During the angular and axial displacement of the type head 9, the same is spaced from the printing surface. When the selected character and typeface is in the printing position, an electromagnet, or other device, operates shaft 10a to tilt shaft 9a with the type head to effect an imprint on the printing surface.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of setting arrangements for type carriers differing from the types described above.

While the invention has been illustrated and described as embodied in a pneumatic setting arrangement for axially and angularly displacing a type head, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying

current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims.

We claim:

1. Setting arrangement for a type carrier, comprising, in combination, casing means forming a guideway; a series of pairs of alternate cylinders and pistons, the first cylinder of said series being secured to one end of said guideway, and the other cylinders being slidably guided in said guideway and having end walls, said pistons being slidably guided in said cylinders, respectively, for movement between a contracted position abutting one end wall of the respective cylinder for placing the respective pair in a contracted position, and an expanded position abutting the other end wall of the respective cylinder for placing the respective pair in an expanded position, each piston having a piston portion projecting out of the other end wall of the respective cylinder and cooperating with said one end wall of the adjacent cylinder, said pistons and cylinders of said pairs in said expanded positions being spaced from each other different distances selected in accordance with a code; a series of fluid-operating means respectively connected with said cylinders for moving selected pistons to said expanded position and other selected pistons to said contracted position, and for moving said cylinders into abutment with said piston portions of adjacent pairs so that the last piston of said series is displaced relative to said first cylinder of said series a distance which is the total of the distances of expansion of selected pairs; selector means for actuating selected fluid-operating means; control means movable in opposite directions and connected with said last piston to be moved by the same between a series of control positions; and a type carrier operated by said control means to move between printing positions when said control means moves between said control positions.

2. Setting arrangement as claimed in claim 1 wherein each piston forms in the respective cylinder two chambers on opposite sides thereof; and wherein said series of fluid operating means includes a series of reversible fluid supply and discharge means respectively connected with said chambers of the respective cylinder and piston pair for moving the pistons therein between said contracted and expanded position and for urging the respective cylinder into abutment with said piston portion of the adjacent piston of the preceding cylinder and piston pair.

3. Setting arrangement as claimed in claim 1 wherein each cylinder and piston defines an expansible and contractable chamber; wherein each operating means includes conduit means for supplying pressure air to, and for exhausting air from the respective associated chamber; and wherein said selector means include valve means in said conduit means.

4. Setting arrangement as claimed in claim 1 wherein said control means include a control element connected with said last piston, and transmission means for transforming the movement of said control element into a rotary motion of said type carrier so that the same is turned between angularly displaced printing positions.

5. Setting arrangement as claimed in claim 1 wherein said control means include a control element connected with said last piston and means connecting said control element with said type carrier for up and down movement so that said type head is raised and lowered between printing positions.

6. Setting arrangement as claimed in claim 1 wherein each piston forms in the respective cylinder two chambers on opposite sides thereof; and wherein said series of fluid-operating means includes a series of reversible fluid supply and discharge means respectively connected with said chambers of the respective cylinder and piston pair for moving the pistons

therein between said contracted and expanded position and for urging the respective cylinder into abutment with said piston portion of the adjacent piston of the preceding cylinder and piston pair; wherein said series of operating means includes a series of pairs of conduits connected with the respective cylinders on opposite sides of the respective piston; and wherein said selector means include a series of valve means, and pressure and suction lines connected with each valve means, each valve means controlling a pair of said conduits and having a first position for supplying pressure fluid through one conduit and for exhausting fluid through the other conduit of selected pairs, and a second position for supplying pressure fluid to said other conduit and for exhausting fluid through said one conduit of other pairs of cylinders and pistons.

7. Setting arrangement as claimed in claim 6 wherein said pressure lines supply compressed air so that said piston and cylinders are pneumatically operated.

8. Setting arrangement as claimed in claim 6 wherein said printing positions are associated with different characters; wherein said selector means comprise a plurality of key means associated with said characters, each key means having actuating projections spaced in accordance with a code; a series of turnable bails selectively cooperating with said projections of said key means and having shaft portions; and wherein each said valve means has a turnable valve member controlling said conduits and being turnable between said first and second positions; and wherein said shaft portions of said bails are connected with said turnable valve members of said series of valve means, respectively.

9. Setting arrangement for a type carrier, comprising, in combination, a first setting device for moving said type carrier between angular positions; and a second setting device for moving said type carrier between axially displaced positions; each of said setting devices including a series of setting means interconnected with each other for limited movement, each setting means having an expansible and contractable chamber so that each setting means is movable between a first position abutting the preceding setting means and a second position spaced from the preceding setting means the distances which adjacent setting means are spaced in said second positions being different and selected in accordance with a code, a series of operating means including conduit means connected with said chambers, respectively, for respectively moving said setting means between said first and second positions, selector means including a valve means in each of said conduit means for selectively supplying pressure fluid to said chambers for selectively expanding and contracting the same so that selected setting means are moved to said second position and the last setting means of said series is displaced relative to the first setting means of said series a distance which is the total of said distance between setting means in said second positions, and control means connected with said last setting means so as to be moved by the same between a number of control positions; a type head connected with said control means of said first setting device to be turned by the same between angular positions, and connected with said control means of said second setting device to be moved by the same between axially displaced positions; and actuating means including key means for controlling said valve means of both said first and second setting devices so that said type head is simultaneously angularly and axially displaced.

10. Setting arrangement as claimed in claim 9 wherein said actuating means include actuating projections on said key means spaced in accordance with a code, and a series of turnable bails selectively cooperating with said actuating projections and having supported shaft portions; wherein each valve means includes a turnable valve member controlling one of said conduit means, and connected with said shaft portion of one of said bails so that selected valve members are turned by operation of selected key means.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,572,486 Dated March 30, 1971

Inventor(s) Martin Hebel et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

On the cover sheet [73] "Grundig E.M.V. Elektro-Mechanische Versuchsanstalt" should read -- Triumph Werke Nurnberg Aktiengesellschaft, Nurnberg, Germany --.

Signed and sealed this 19th day of December 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Pat