Jan. 10, 1950 A. THOMAS 2,494,014

PRINTING ELEMENT FOR TYPEWRITER PRINTING MACHINES

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FIG. 1.

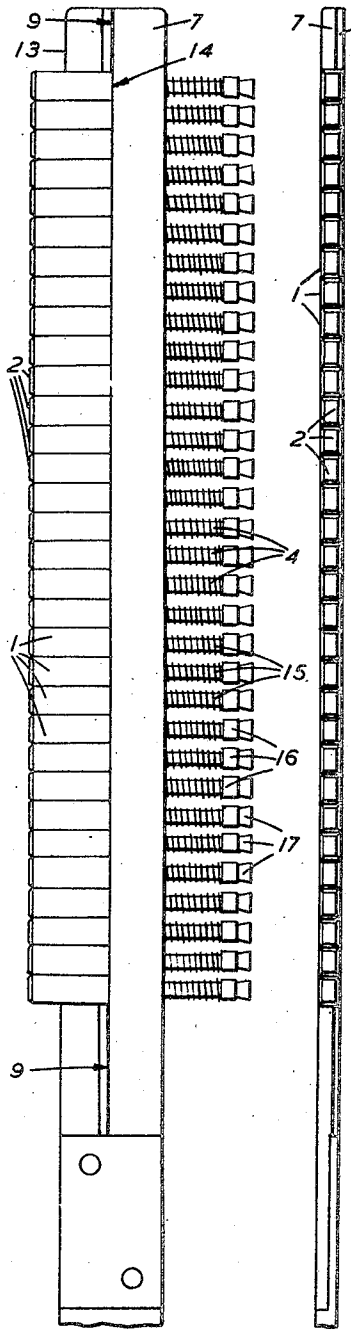


FIG. 2.

FIG. 3.

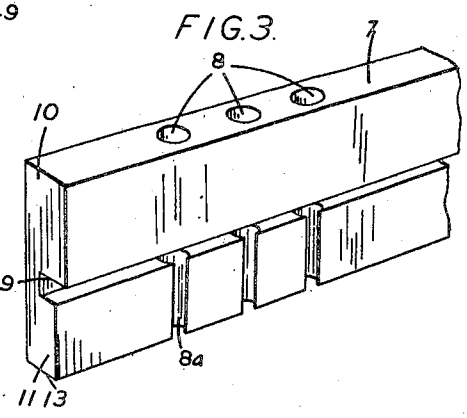


FIG. 4.

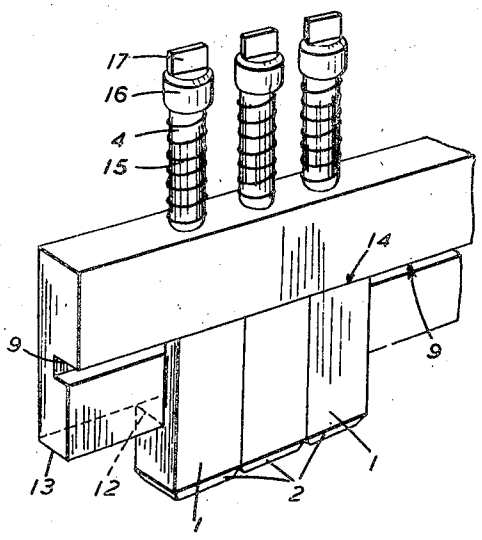
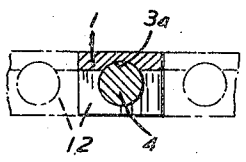


FIG. 6.



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FIG. 5.

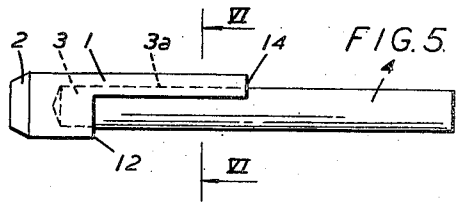


FIG. 7.

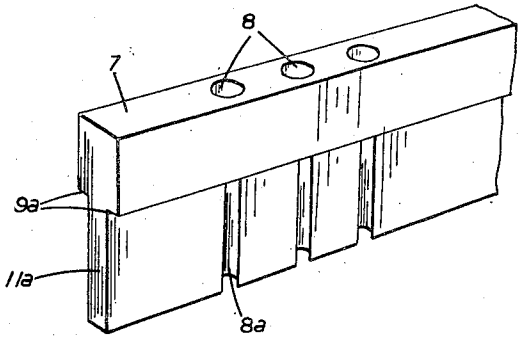


FIG. 8.

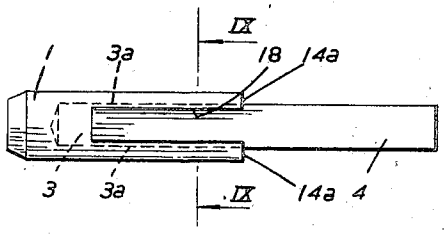


FIG. 9.

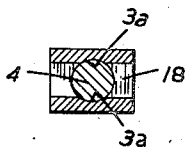
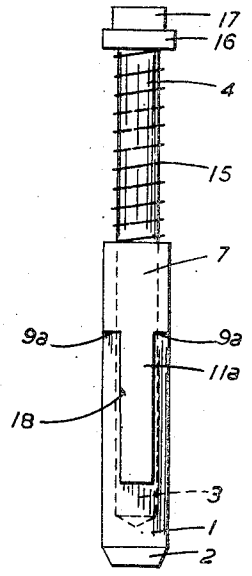


FIG. 10.



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UNITED STATES PATENT OFFICE

2,494,014

PRINTING ELEMENT FOR TYPEWRITER PRINTING MACHINES

Arthur Thomas, Wallington, England, assignor to Powers-Samas Accounting Machines Limited, a British company

Application March 16, 1944, Serial No. 526,743
In Great Britain March 27, 1943

8 Claims. (Cl. 101—109)

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This invention relates to typewriter printing machines of the kind in which each printing element carries a plurality of type elements and the type elements are positioned in a rigid solid holder for printing by slidably moving the printing elements longitudinally, printing being effected by a type hammer which is actuated to strike the positioned type element.

One object of the invention is to provide a construction of printing element which will provide slide and limiting seat portions for the type and enable a reduced lateral pitch of the printed characters to be achieved thereby facilitating the feeding of the paper and the manipulation of the ink ribbon and effecting an economy in printing.

A further object is to reduce the pitch of the type elements along the printing element whereby a higher speed of operation than hitherto can be attained for a given number of type elements or a larger number of type elements than heretofore can be provided on one printing element for a given speed of operation.

The invention also has for its objects to simplify the construction of the printing elements in machines of the above kind by reducing the number of parts of which the printing elements are composed, provide for each element striking the paper with substantially the same force to give an even printing impression, to provide for the individual removal of any type element or its spring without removing the type bar and to provide an arrangement of type elements that are flush with the sides of the type bars so that the latter can be arranged alongside each other in sliding relation as shown in Fig. 19 of Patent 2,323,816.

According to the present invention a printing element for a typewriter printing machine of the above kind comprises in combination a type holder in the form of a rigid one piece bar of rectangular cross section cut away to form a longitudinal step or limiting shoulder and a slide seat portion extending along one of the wider faces of the bar and parallel to the narrower faces thereof, and a plurality of type elements, each in the form of a rectangular block having a thickness equal to the thickness of the holder bar and having a type face at one end, the other end of each block being cut away complementally to the longitudinal step or shoulder formed on the bar and the complementary faces of the holder and blocks engaging one another, when the device is assembled, to prevent turning of the blocks relatively to the holder, each block being

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provided with an axial shank passing through a hole formed in the bar parallel to the longer axis of its cross section.

In a modified embodiment of the invention the type holder may be in the form of a single piece bar of rectangular cross section cut away on both sides to form two longitudinal shoulders, one at each side of a rib formed by the material of the bar which remains after the cutting operation and presents slide seats, and each type element may be in the form of a rectangular block having a thickness equal to the thickness of the holder bar and having a type face at one end, the other end of each block being formed with a slot complementary to the rib on the bar so that said rib will fit into said slot to provide a sliding fit and prevent turning of the type element relatively to the holder, each block being, as before, provided with an axial shank passing through a hole formed in the bar parallel to the longer axis of its cross section.

The shank projects beyond the plane edge of the bar and preferably there is provided a spring surrounding the shank between said edge and an abutment on the shank .

With such a construction the type element is free to move relatively to the bar when struck by a hammer and the interengagement of the step formed by the cutting away of the holder bar with the correspondingly formed step on the type element, or in the modification referred to above, the engagement of the slot in the type element with the rib on the holder effectively prevents rotation of the type element, while avoiding the use of guide members such as slotted type caps, which increase the pitch of the type and the weight of the type carrier as a whole.

In order to reduce the pitch of the type holders laterally and thereby obtain closely spaced printed characters, the type holder bar is made equal only to the width of the actual type face on the type element and the shank on the type element passing through the hole in the holder bar serves to retain the type element and to guide it without involving any projections beyond the side faces of the type holder. Accordingly the pitch of the latter can be equal to the width of the type face with a small addition for clearance between the type holders to permit them to move.

In order to permit rapid operation the inertia of the type bars must be kept low and their length of travel must be kept relatively short. In constructions according to the present invention the shank portion of the type element permits the

type to be positioned in abutting relation along the bar so that the pitch of the type along the bar is only equal to the height of the type element together with a small additional amount required to give the necessary clearance to permit easy movement.

Accordingly the present invention permits a lateral pitch of the type as small as 0.1 inch and a longitudinal pitch along the type bar also as small as 0.1 inch. Consequently in a type holder capable of printing 40 characters the length occupied by the actual type elements is only about 4 inches and as many as 65 type holders may be arranged side by side over a width of as little as 6.5 inches so that a line of 65 characters may be printed in a length of 6.5 inches on the paper.

In order that the invention may be more completely understood two embodiments thereof will now be described by way of example with reference to the accompanying diagrammatic drawings in which—

Figure 1 shows one form of complete type holder in a side elevation with the type elements in position therein;

Figure 2 illustrates the type holder in front elevation;

Figure 3 is a view to a larger scale of the type holder bar drilled with holes to receive the shanks of the type elements and cut away to form the shoulder above referred to;

Figure 4 is a view to a larger scale of the type holder with type elements in position;

Figure 5 shows one of the type elements of Figure 4 to a larger scale;

Figure 6 is a cross section on the line VI—VI of Fig. 5;

Figure 7 illustrates a modified form of holder bar;

Figure 8 illustrates a type element for use with the holder shown in Fig. 7;

Figure 9 is a cross section on the line IX—IX of Fig. 8 and

Figure 10 shows in end elevation the holder of Fig. 7 with a type element according to Fig. 8 in the assembled condition.

In the embodiment shown in Figures 1 to 6 the type element is made from a short length of rectangular steel bar of which the cross section has the same dimensions as the required type face.

The type element 1 first has the type character formed on one end constituting the type face 2, and is then drilled centrally at the other end with a hole 3 (see Figure 5) to take a cylindrical shank member 4 constituted by a length of plain steel rod.

The shank member 4 not only has to guide the type element 1 but also has to receive the hammer blow and therefore must be of a considerable thickness in relation to the pitch of the type.

Accordingly the diameter of the shank member 4 may be approximately five-eighths of the width of the narrower face of the steel bar used for the type element, that is to say about five-eighths of the lateral pitch of the type.

The bar 7 forming the type holder is a single piece of stock drilled with a number of holes 8 (Figure 3), each to receive a shank of a type element, these holes being drilled centrally through the type holder bar. The bar is then undercut to form a longitudinal step or shoulder 9 by milling away the material thereof, the cut-away portion breaking into the holes already drilled in the bar (see Fig. 3).

The cut-away portion of the type holder bar is rectangular in cross section so that, after the cut-away portion has been removed, if the bar is held horizontal with the cut-away or slide seat portion underneath it will, in cross section, present an overhung shoulder 9 or limiting seat portion, the thickness of the portion 10 above the shoulder being equal to the original thickness, while the thickness of the portion 11 below the shoulder is reduced and in this lower portion below the shoulder the side walls of the holes to receive the shanks are broken into, exposing the interior of the passages formed by the holes.

The portion 8a of each hole which remains, when viewed in cross section, is greater than a semi-circle so that the hole can still embrace and guide the shank of a type element inserted into it.

After each type element 1 has been drilled to receive the shank 4 a portion thereof is milled away commencing from the end remote from the type face, this cutting away operation resulting in the removal of a portion of the type element 1 which is complementary to the portion of the type holder 7 which is cut away to provide the slide and limit seat portions.

This cutting away of the type element also exposes the hole 3 drilled therein for a part of the length of said hole, the cross section of the exposed part 3a of the hole being less than a semi-circle and constituting a channel (see Fig. 6).

The shank 4 is then inserted in the remainder of the hole 3 which is still of full diameter and on emerging from that hole lies in the channel formed by the exposed part 3a of the hole.

The shank 4 and type element 1 are then united in a copper brazing electric furnace which makes a secure joint without distorting the material or leaving surplus material round the joint.

The shank 4 is then inserted in the hole 8 in the type holder 7 and pushed up through the hole until the shoulder 12 on the type element 1 formed by the cut-away portion abuts against the lower face 13 of the holder 7, at which time the upper face 14 of the type element 1 will abut on the overhung face 9 of the shoulder formed by the cutting away of the type holder 7.

The type element 1 with its shank 4 thus forms a slider which can move transversely of the type bar 7.

The spring 15 is then threaded over the shank 4 and a collar 16 is passed over the shank above the spring and the free end 17 of the shank is then pressed into a rectangular shape to retain the collar in place. This rectangular end of the shank also forms a convenient member on which the hammer may strike. Each element having its own spring 15 will yield with the same resistance under the force of the hammer blow and all type impressions will be uniform.

By thus milling the holder and type element, rotation of the type is prevented without weakening any of the elements or reducing the main guiding length of the hole 8 in the holder, since although part of the guide hole in the holder is removed, the remaining part 8a is greater than a semi-circle and therefore is still able to embrace and guide the shank 4.

In the modified form of the invention shown in Figs. 7–10 the single piece type holder bar 7 is cut away on both sides to form two shoulders 9a constituting limiting seat portions, one at each side of a rib 11a formed by the material of the bar which remains after the cutting operation.

As before the bar is drilled with a number of holes 8 disposed centrally of the bar, the cut away portions of the bar constituting slide seats and breaking into the holes on each side, thereby leaving pairs of channels 3a (Fig. 7).

Each type element 1 is, as before, drilled centrally at 3 to receive a shank 4 and is formed with a central slot 18 in its end remote from the type face 2, this slot being co-axial with the hole 3 but of a width less than the diameter of the hole, so that each wall of the slot has a channel 3a of arcuate cross section extending down its length. The depth of the slot is less than the depth of the hole so that, below the bottom of the slot the hole remains of full diameter.

The slot 18 is complementary to the rib 11a on the type holder 7 so that the rib on the type holder will fit into this slot in the type element and prevent turning of the latter.

After the slot 18 has been formed the shank 4 is pushed down the slot into the full diameter portion of the hole 3 which extends below the bottom of the slot, the surface of the shank engaging in the channels 3a formed in the walls of the slot by those portions of the hole 3 which remain after the slot has been formed. The shank and type element are then united as before in a copper brazing electric furnace.

The shank is then inserted in the hole 8 in the type holder and pushed up through the hole until the faces 14a of the type element at each side of the slot 18 abut against the shoulders 9a on the type holder, the slot engaging over the rib 11a formed by the cutting away of the type holder, and the shank 4 being guided by the pair of channels 8a in the rib 11a.

As before a spring 15 is then threaded over the shank 4 and a collar 16 is passed over the shank above the spring and the free end of the shank is then pressed into a rectangular shape 17 to retain the collar in place.

It will be understood that in this modified construction the cutting away of the type holder bar leaves the type holder completely symmetrical in cross section.

By constructions according to the invention a correct guiding of the type is obtained while avoiding the use of solid type caps or any fitting of rectangular members.

Moreover, since the guiding shank 4 is of substantial diameter and as it is central with respect to the type, it receives the hammer blow in direct line with the type so that there are no bending stresses set up by the hammer blow. Also, by pinching the edge of the flattened end 17 of the shank, the collar 16 and spring 15 may be removed and any type element can be pulled out of the bar for replacement without disturbing or moving the other bars.

Further since the type elements 1 are of the same thickness as the holder bar 7 and the guide shank 4 is central of the type elements there are no portions projecting beyond the type bar, the faces of which are quite flat and smooth so that when a number of these bars are operating together they can slide smoothly.

If desired the springs on the type elements may be omitted where the type holders according to the invention are used in those types of machine in which the platen or the type holders are mechanically retracted between printing strokes to bring the type clear of the paper or of the ink ribbon.

I claim:

1. In a type carrier, in combination, a bar having guide bores extending therethrough and spaced longitudinally thereof, said bar being reduced in thickness in a portion of its width to provide a slide seat, the sides of the bores opening into said seat, contiguously mounted type elements each presenting a block and a guide shank, the block having a portion reduced in thickness complementally to the reduced portion of said bar and engaging the said seat thereof for sliding movement when the shank is in a bore.

2. In a type carrier, in combination, a bar having guide bores extending therethrough and spaced longitudinally thereof, part of said bar being reduced in thickness to provide a limit seat, the sides of the bores opening into said reduced part, contiguously mounted type elements each presenting a block and a guide shank, the block having a portion of reduced thickness arranged to fit and be held in said reduced part when the shank is in a bore, and a spring on said shank for yieldably maintaining the block against said limit seat.

3. In a type carrier, in combination, a bar having bores spaced longitudinally thereof, a part of the bar being reduced in thickness to present slide seat and limiting seat portions, contiguously supported type elements each presenting a block and a guide shank, the block being slotted complementally to the reduced part of the bar and being arranged to engage the slide seat and limit seat portions when the guide shank is engaging in a bore, and means on the shank for yieldably maintaining the block against said limit seat portions.

4. In a type carrier, in combination, a bar having bores spaced longitudinally thereof, a part of the bar being reduced in thickness to present a flat slide seat into which the side of said bores open, type elements each presenting a block having a portion of reduced thickness and a guide shank fixed to said block, said block providing a bearing face for an adjacently mounted block said shank engaging in a bore to hold a face of the block in contact with the slide seat to prevent turning of the block relatively to the bar, and means on said shank for yieldably resisting sliding movement of the block relatively to said slide seat.

5. In a type carrier, in combination, a bar having spaced guide bores extending therethrough, part of the bar being reduced in thickness to present slide and limit faces, into which said bores open, type elements each presenting a block providing bearing surfaces for adjacently mounted blocks, a guide shank on the block, a slot in the block complementary to the bar for receiving the reduced part of the bar when the guide shank is positioned in a bore, and means associated with the shank for yieldably resisting movement of the block with respect to said slide and limit faces.

6. In a type carrier, in combination, a bar having spaced guide bores extending therethrough, contiguously mounted type elements each presenting a block of substantially the same thickness as said bar, the bar and the block each having portions reduced in thickness to present interfitting sections whereby the type elements and the bar have an assembled thickness substantially equal to the thickness of the bar, a guide shank on the block for engagement with a bore to hold the block and bar in assembled relation, and means for yieldably resisting a printing movement of said type element relatively to said bar.

7. In a type arrangement, in combination, a series of bars arranged in close sliding relation alongside each other, each bar having spaced bores extending widthwise therethrough, and being reduced in thickness to provide slide and limit seat portions, a plurality of type elements on each bar each presenting a block and a guide shank, the block providing bearing surfaces for adjacently supported blocks and having a portion of reduced thickness arranged to engage the said seat portions when the guide shank rests in a bore and projects therebeyond, and a spring carried by said projecting portion of the shank for yieldably resisting printing movement of said type element.

8. In a type carrier, in combination, a bar having spaced guide bores extending therethrough, part of the bar being reduced in thickness to present slide and limit faces into which said bores open, a plurality of contiguously supported type

elements each presenting a block, a guide shank in the block, slidably engaging with a bore a slot in the block complementary to said bar for receiving the reduced part of the bar when the guide shank is passed through a bore to project exteriorly of the bar, and a spring on the projecting portion of the shank for yieldably resisting movement of the type element in printing action.

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