

[54] PUNCHING MACHINE OR THE LIKE

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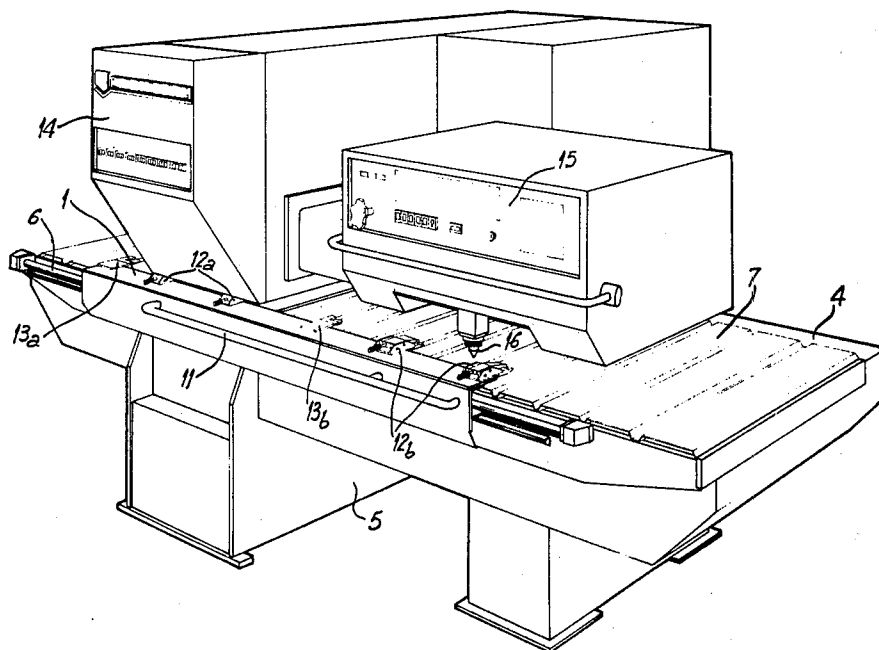
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[57] ABSTRACT

A punching machine with multiple fixed work stations, comprising a series of different punches disposed one after the other along common plane of alignment and opposite which the striking hammer can be displaced along this plane to be brought above the selected punch. This machine comprises a device for setting the position provided for the article to be punched, which comprises a setting templet and a control member, one of these members being fixed and the other associated with the movable support for the article to be punched, and the fixed member of this device is mounted on the frame of the machine in such a manner as to be able to be displaced parallel to the plane of alignment of the punches. This member is coupled to the movable striking hammer, or to the means for controlling the displacement of the same, along the plane of alignment of the punches, in such a manner that the displacement of this hammer in this direction causes an identical displacement of the fixed reference member of the setting device.

6 Claims, 6 Drawing Figures



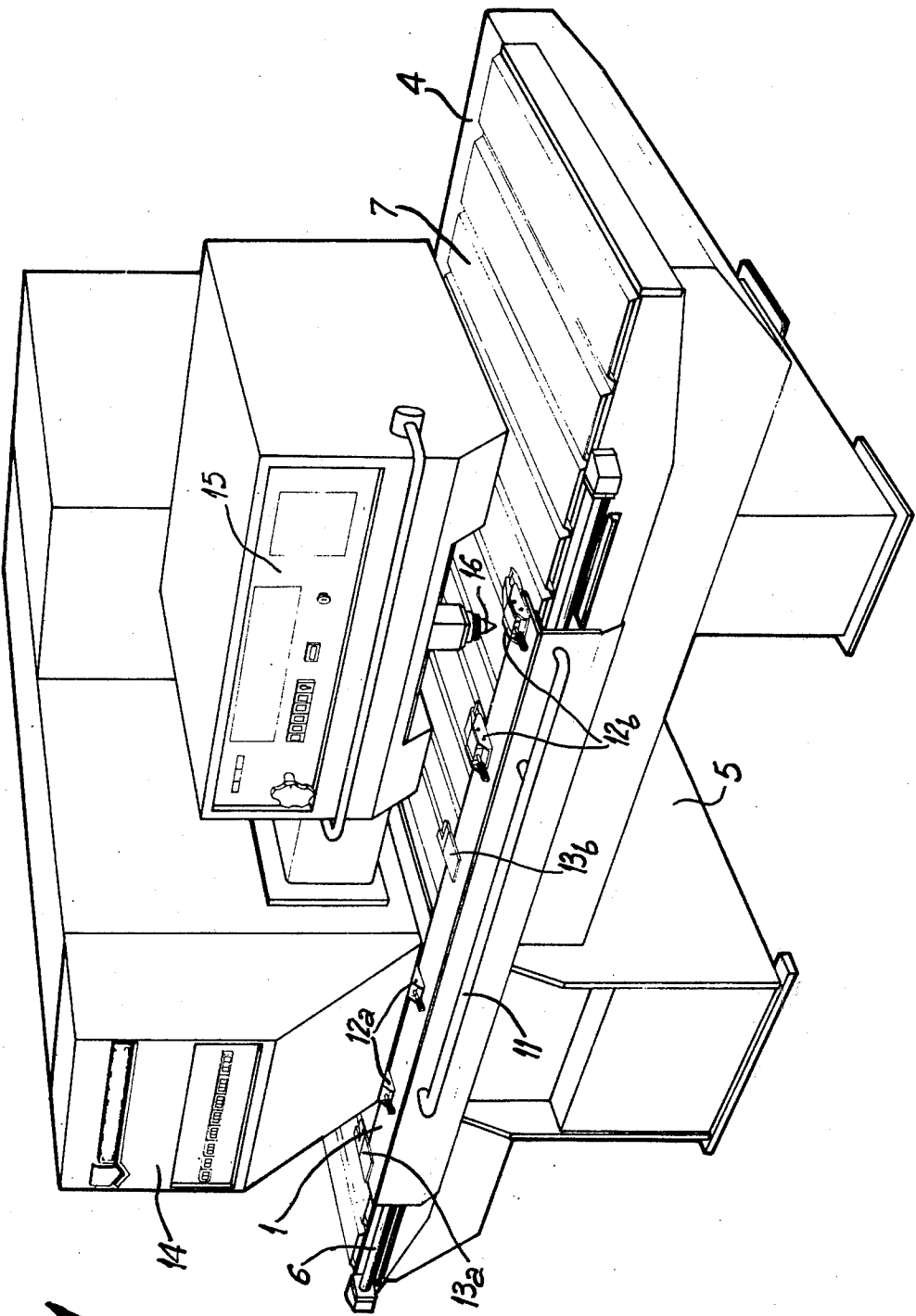
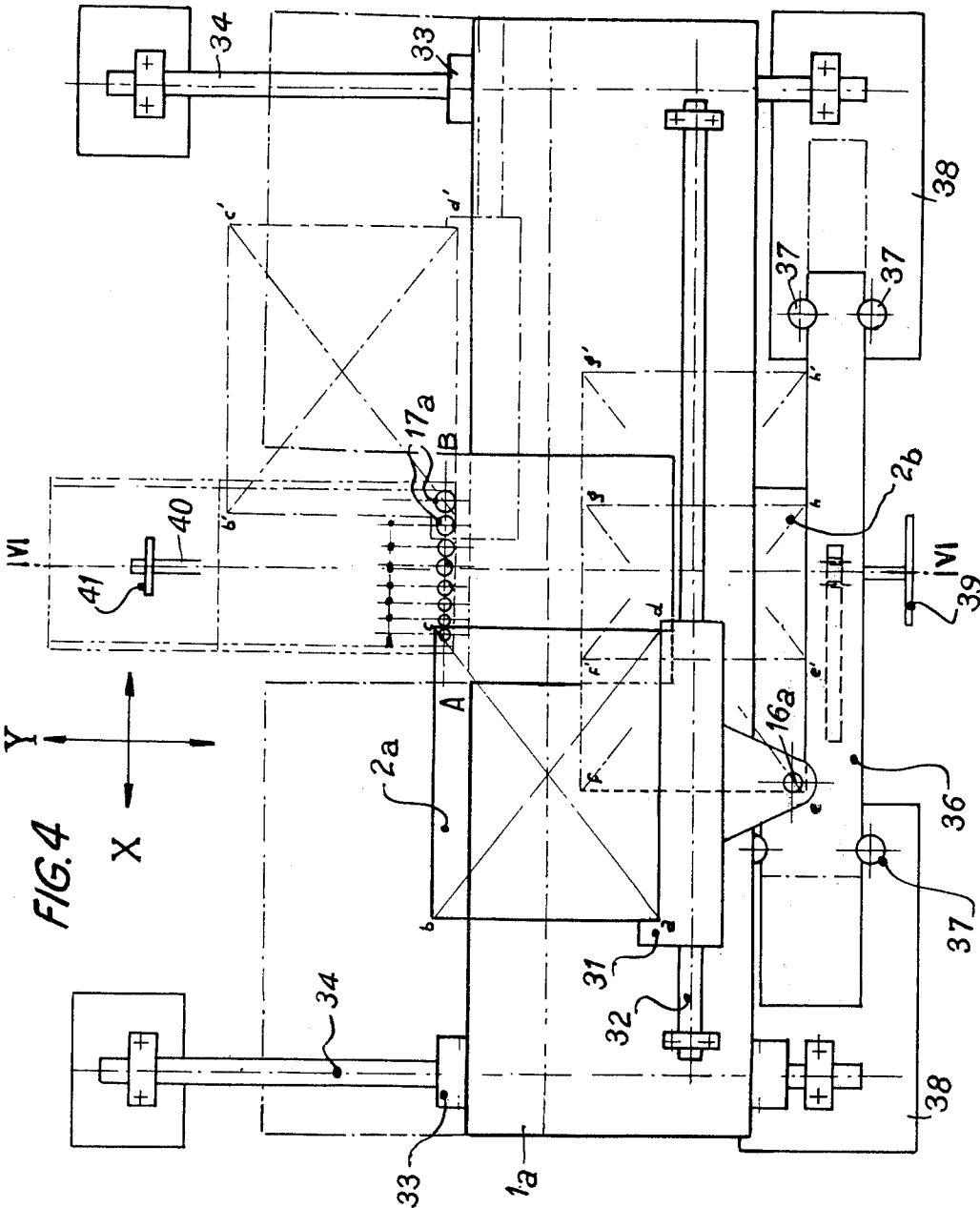
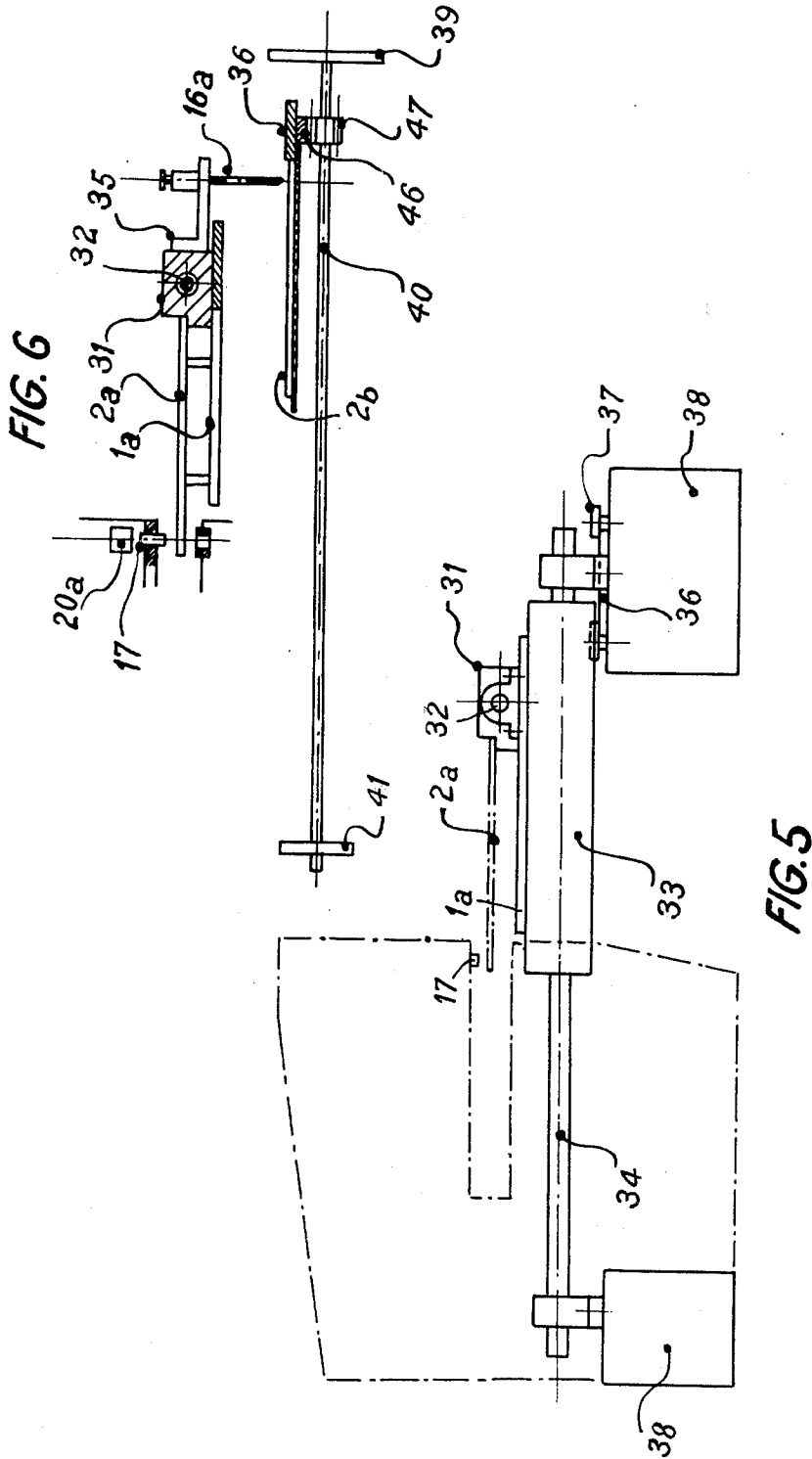


FIG. 1





PUNCHING MACHINE OR THE LIKE

The present invention relates to punching machines comprising a plurality of different working punches, each of which can be brought into service as required.

The machines of this kind are divided into two main categories. In the machines of the first category, the working punches are provided on a rotating turret so that the punch in service always occupies the same position.

On the other hand, in the machines of the second category, the punches are fixed in space but the striking hammer can be displaced above the punch to be brought into service. A machine of this second type forms the subject of the French Pat. No. 1,445,424.

Such a machine has indisputable advantages. Nevertheless the initial zero regulation is modified for each selection of punches. It is therefore necessary to effect a correction of dimensions to return to the new "zero" position. This renders it necessary to have identical distances between the axes of the punches and nevertheless it is necessary to make calculations liable to give rise to errors.

In order to effect the necessary correction, it is likewise known to dispose a tracing between two transparent sheets over a luminous source which corresponds to the punch selected. Nevertheless, this mode of procedure does not offer any precision and it is then necessary to adjust the position of the work table according to the coordinates of the proposed hole, by means of known measuring devices. Moreover, this solution does not permit the mass production of parts by means of a reproducer.

This is why the object of the present invention is to provide a punching machine which belongs to the second category but avoids all these disadvantages, by ensuring an automatic correction of the position of the work table depending on the selection of the punch, whatever the distance between the axes of the punches and the position of the selected punch may be.

For this purpose, the present machine comprises a device for adjusting the position given to the article to be punched, which comprises a setting templet and a stylus, or other control member, one of these members being fixed and the other associated with the movable support for the article to be punched.

According to an essential feature, the fixed reference member of this device is mounted on the frame of this machine in such a manner as to be able to be displaced parallel to the alignment plane of the punches, and this member is coupled to the movable striking hammer, or to the means for controlling the displacement of the latter along the plane of alignment of the punches. The arrangement is such that the displacement of this hammer in this direction, to bring a different punch into service, causes an identical displacement of the fixed reference member of the setting device. Under these conditions, the setting device is automatically subjected to the required correction to make allowance for the position of the punch freshly brought into service.

When the templet of the setting device is associated with the movable support for the article to be punched and the fixed member of this device consists of a stylus or other reference member, the latter is mounted in such a manner as to be displaced parallel to the plane of alignment of the various punches on each change of punch and this stylus is coupled to the movable striking

hammer, for example by means of a simple connecting rod.

Conversely, when the reference stylus is associated with the support for the article to be punched and the templet constitutes the fixed reference member of the setting device, this templet is mounted in such a manner as to be able to be displaced parallel to the axis of alignment of the punches. It may then be coupled to the control means adapted to ensure the displacement of the striking hammer opposite the punches in such a manner that the position of this templet is modified on each change of punch.

Moreover, two examples of embodiment of the present machine corresponding to each of these two forms of construction are described below with references to the drawing which is attached simply by way of indication and in which:

FIG. 1 is a perspective view of a first form of embodiment of a punching machine according to the invention;

FIG. 2 is a plan view from above of the work table of this embodiment;

FIG. 3 is a diagrammatic view in perspective of the device for controlling the punches;

FIG. 4 is a diagrammatic plan view from above of the work table of another machine according to the invention, corresponding to a second form of embodiment;

FIG. 5 is a partial view in side elevation of this machine;

FIG. 6 is a view thereof in partial section on the line VI—VI of FIG. 4.

The machine illustrated in FIGS. 1 to 3 comprises a movable table or platen 1 adapted to receive the article 2a to be punched and mounted above the platen 4 of a lower frame 5. This table 1 is adapted to be displaced in two perpendicular coordinates X—Y. For this purpose, it is mounted for sliding in the direction of the axis X on a horizontal rail 6 carried by the front edge of a platen 7 itself mounted for displacement above the platen along the axis Y. For this purpose, the platen 7, which may be in one or more parts, is itself mounted for displacement on two parallel horizontal rails 8 fixed to the frame (see FIG. 2).

The sliding of the table 1 on the rail 6 and that of the platen 7 on the two rails 8 is effected by means of bearings, 9 and 10 respectively, which may be provided with roller bearings.

At its front edge, the table 1 is equipped with an operating handle 11. Moreover it comprises a clamping member 12a adapted to ensure the fixing in position of the article to be punched 2a. In addition, a block 13a enables the initial position which should be given to this article to be determined.

The present machine comprises a work head designated by the general reference numeral 14, which is situated above the position provided for the article 2a to be punched. This work head contains a series of punches 17, of different diameters, and having parallel axes disposed and in a common plane A—B. In the example illustrated, these various punches are movably mounted in one of the arms of a tool-holder block 18 assuming the general shape of a reclining U, as illustrated in FIG. 3. The lower arm of this same block carries a series of dies 19 facing the various punches 17, the article to be punched 2a being adapted to be located in the gap between the arms.

Opposite the punches 17 there is provided a striking hammer 20 mounted for displacement along the plane A-B and adapted to be thus brought above one punch 17 or the other to bring the appropriate one into service.

In the example illustrated, the upper head of this hammer is mounted for sliding in a dovetail groove 21 extending parallel to the plane A-B and formed in a block 22 adapted to be displaced vertically to control the bringing into action of the selected punch.

According to the essential characteristic of the subject of the invention, the present machine comprises a device for setting the position of the article to be punched, which device is adapted to be subjected automatically to a correction when the punch brought into service is changed, in such a manner as to make allowance for the position of the respective punch.

This device is located in the control head of the present machine which is designated by the general reference numeral 15. This device comprises, in combination, a fixed reference stylus 16 and a movable setting templet 2b, that is to say a standard article already comprising the various holes which have to be formed in each of the articles or work pieces to be punched.

This templet is adapted to be fixed to the movable table 1 serving as a support for the article to be punched so as to be associated therewith. For this purpose, this table is provided with fixing pincers 12b as well as with a setting block 13b enabling the templet 2b to be fixed in a predetermined position on the table.

The placing in position of the article to be punched, before each punching, can thus be effected by bringing the work table 1 into such a position that the corresponding hole already existing in the templet 2b is exactly opposite the stylus 16. This operation therefore enables the article 2a to be punched precisely at the required point. Before each punching, it is sufficient for the operator to manoeuvre the table 1 in one direction and in the other to bring the templet 2b precisely into the required position opposite the stylus 16.

Now according to an essential feature of the subject of the invention, the stylus 16, constituting the fixed reference member of the setting device, can be displaced parallel to the plane A-B of alignment of the punches. Moreover, it is coupled to the striking hammer in such a manner as to accompany this in its displacements parallel to the plane A-B of the punches. As illustrated, this coupling may be effected by a simple connecting rod 23.

Thus any displacement of the striking hammer 20 in the direction A-B to change the punch which is to come into action results in an identical displacement of the stylus 16. Consequently, the position of hammer 20 is modified automatically to take into consideration the change in position of the punch which will come into action. This modification in position of the stylus therefore leads to an identical change in position of the article to be punched, during the setting operation, which therefore makes allowance for the change in punch.

An automatic correction is therefore obtained by extremely simple means and without this necessitating any particular operation on the part of the operator.

This is a very important advantage of the present machine in comparison with the machines at present in existence in which there is provided a movable striking hammer adapted to act on one of the punches in a series of punches of different diameter. Actually, as indi-

cated previously, the machines of this type necessitate a correction in the positions of the article to be machined, on each change of punch.

The striking hammer 20 may be actuated by any suitable means, for example by means of a sliding wedge 24 adapted to be displaced in a plane perpendicular to the axis of the displacements of this hammer. This wedge is mounted for sliding against an inclined plane 25 formed on the top of the block 22 carrying the striking hammer. Thus the displacement of this wedge in one direction and in the other along the axis Z, results in a vertical movement of this hammer.

FIGS. 4 to 6 represent a second form of embodiment of the present punching machine. This embodiment differs from the previous one by the fact that the fixed reference member of the setting device consists of the templet while the movable member associated with the support for the article to be punched consists of the stylus of this same device.

As before, this machine comprises a series of working punches 17a of different diameter, the axes of which are disposed along one and the same plane A-B. The article 2a to be punched, which may have an outline a, b, c, d, is adapted to be fixed by any appropriate means to a carriage 31 adapted to slide in the direction X on a rod 32 rigidly connected to the work table 1a of the present machine.

The carriage preferably consists of the body of a jack, the piston of which is carried by the guide rod 32. This jack therefore enables the displacement of the article to be punched 2a to be controlled in one direction or in the other along the plane X parallel to the axis A-B of alignment of the punches.

This table is fixed to the body 33 of two jacks provided close to each end and the fixed rods 34 of which extend parallel to the axis Y. Thus these jacks enable the table 1a to be displaced parallel to this axis.

The setting device provided in the present machine consists as before of a templet 2b and a reference stylus 16a. In the present case, however, the arrangement provided is the reverse of that existing in the previous form of embodiment. Actually, in the present machine, the stylus 16a is not fixed but, on the contrary, associated with the support for the article to be punched 2a. The support 35 for this stylus is actually rigidly connected to the carriage 31 serving as a support for this article. The setting templet 2b on the other hand is fixed instead of being associated with the support for the article to be punched.

As was the case in the previous form of embodiment for the fixed reference member of the corresponding setting device, however, this templet is mounted on the frame of the machine in such a manner as to be able to be displaced parallel to the plane A-B of alignment of the punches. For this purpose, this templet is fixed to a carriage 36 mounted for movement parallel to the axis X, between pairs of rollers 37 carried by fixed supports 38 forming part of the frame.

This carriage is coupled to the movable striking hammer 20a of the present machine, which is adapted to act on one or the other of the punches 17a. More precisely, this carriage is coupled to the control means enabling the displacement of this movable hammer to be effected in one direction and in the other along the axis A-B opposite the various punches.

These control means comprise a control hand-wheel 39 keyed onto a rotary shaft 40. The connecting mem-

bers between this shaft and the striking hammer are not illustrated on the accompanying drawing, however, because this is a question of a known arrangement which does not form part of the subject of the present invention. Means for immobilizing the shaft 40 in each of its effective positions are preferably provided.

The coupling between this shaft and the carriage 36 serving as a support for the templet 2b is afforded by means of a toothed rack 46 rigidly connected to this carriage and in mesh with a pinion 47 carried by the shaft 40. Thus the means for displacing the striking hammer are coupled to the means for driving this carriage in the longitudinal direction. Consequently, the displacement of the striking hammer opposite the selected punch is automatically accompanied by an appropriate correction of the position of the standard article or of the control templet.

Thus the same result is finally obtained as in the first form of embodiment illustrated in FIGS. 1 to 3. Actually, in both cases, the position of the fixed reference member of the setting device is automatically corrected on each change of position of the movable striking hammer when a different punch is brought into service.

I claim:

1. A punching machine comprising a frame; a platen above said frame movable in two directions which are normal to each other; means connected to said frame and said platen for guiding the latter movable in said directions; means on said platen for holding a workpiece to be punched and a templet in fixed position and laterally spaced from each other for movement with said platen in said directions; a series of punches of different cross-sections having parallel axes located spaced from each other in a common plane substantially normal to said platen; means fixed to said frame for guiding each of said punches movable from a rest to an operating position for punching a hole in a workpiece carried by said platen; striking means movable in said common plane for alignment with a respective one

of said punches and cooperating with a respective punch for moving the same from said rest to said working position; a stylus cooperating with said templet and mounted for movement in said common plane; and means for connecting said stylus with said striking means for adjusting the position of the latter in said plane in accordance with the position of said stylus, said connecting means maintaining said stylus and said striking means at a fixed distance from each other.

2. A punching machine as defined in claim 1, wherein said striking means comprise a striking hammer, a guide block for guiding said striking hammer in said plane for alignment with one of said punches, and means cooperating with said guide block for moving the same in the direction of the axis of said one punch for moving the latter from said rest to said operating position.

3. A punching machine as defined in claim 2 wherein said block has a surface inclined to the axes of said punches and wherein said means for moving said guide block comprises a wedge movable in a direction transverse to said axes and engaging said inclined surface.

4. A punching machine as defined in claim 1, and including a block having an upper and a lower arm substantially parallel to said platen and arranged to accommodate a workpiece held by said platen between said arms, said upper arm being provided with a plurality of guide bores for guiding said punches movable between said rest and said operating positions and said lower arm being provided with bores respectively aligned with said guide bores and constituting die openings for said punches.

5. A punching machine as defined in claim 2, wherein said connecting means extend between said stylus and said striking hammer and are constituted by a rod.

6. A punching machine as defined in claim 1, wherein said common plane is parallel to one of said directions.

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