

Sept. 9, 1969

E. HÄNNI

3,465,561

PLATE-WORKING MACHINE

Filed March 3, 1967

5 Sheets-Sheet 1

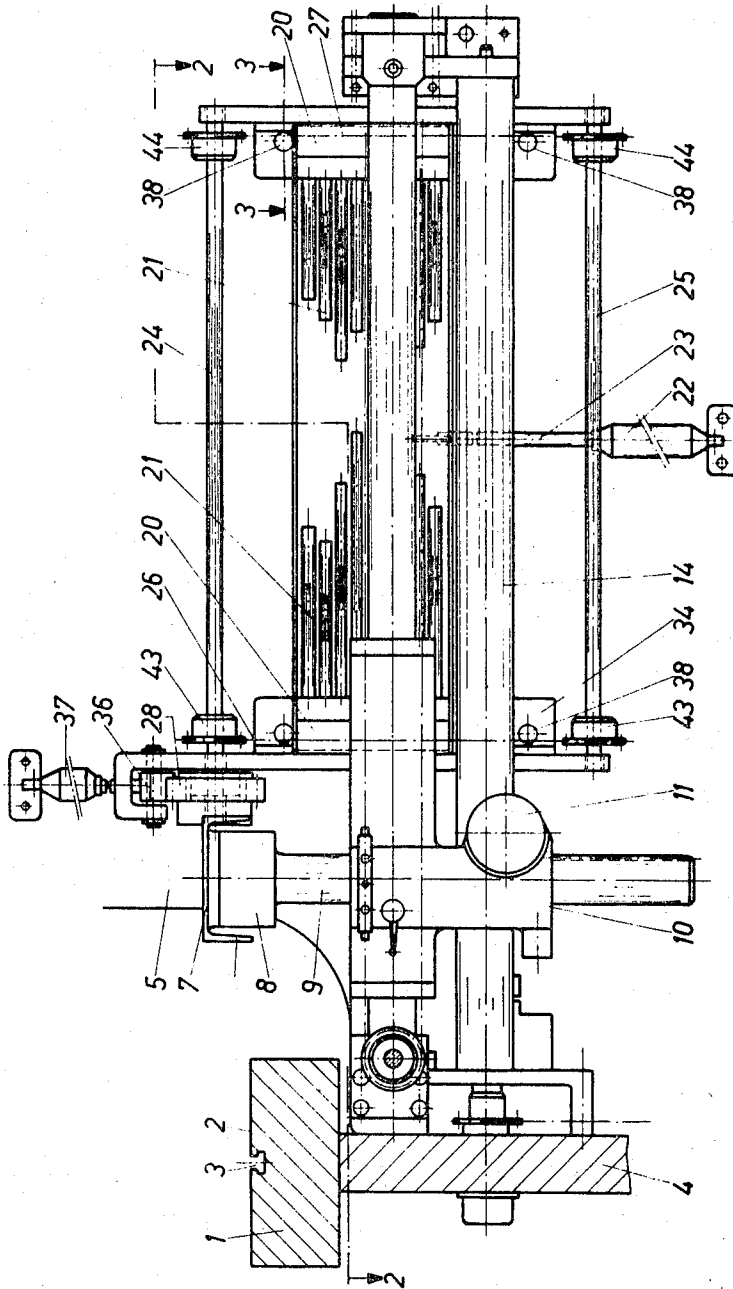


Fig. 1

INVENTOR
EDUARD HÄNNI

34 *Müller and Toren*
Attorneys

Sept. 9, 1969

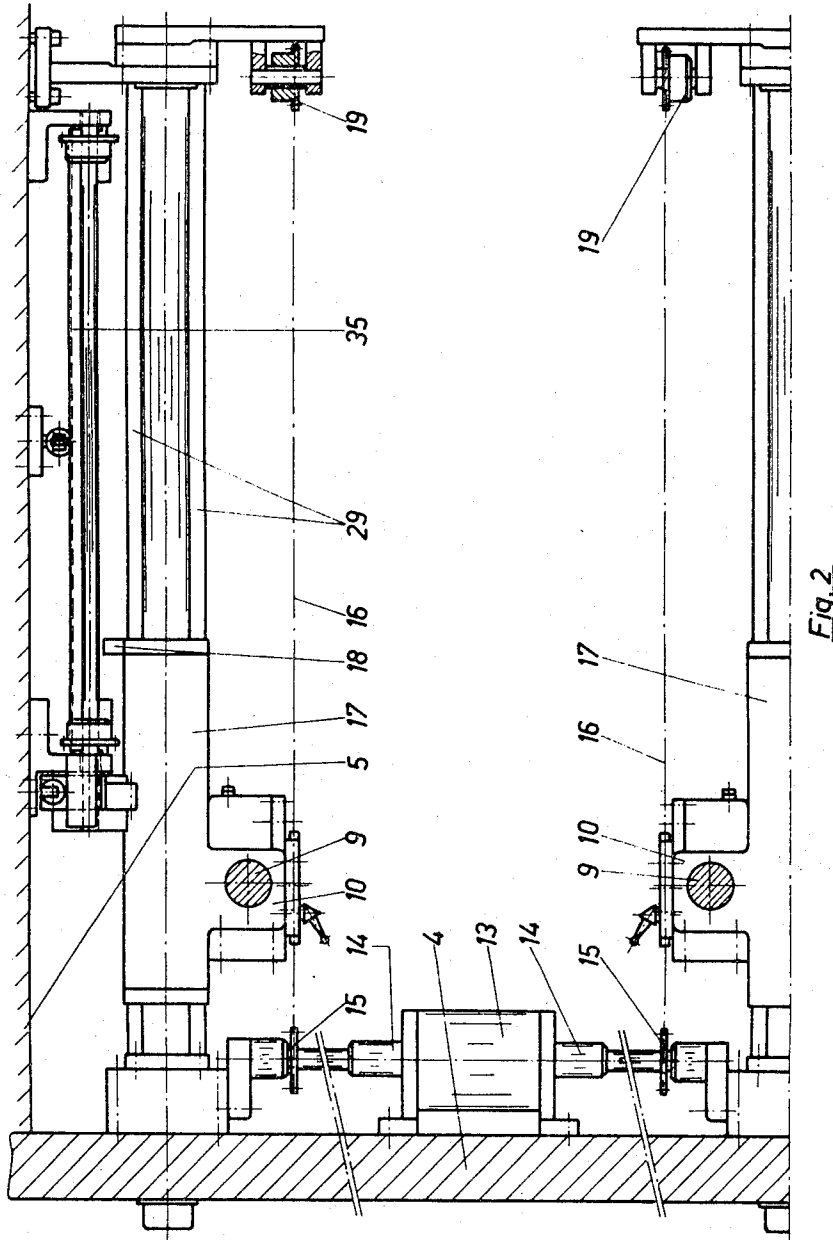
E. HÄNNI

3,465,561

PLATE-WORKING MACHINE

Filed March 3, 1967

5 Sheets-Sheet 2



INVENTOR

EDUARD HÄNNI

By *Maier and Tarn*
Attorneys

Sept. 9, 1969

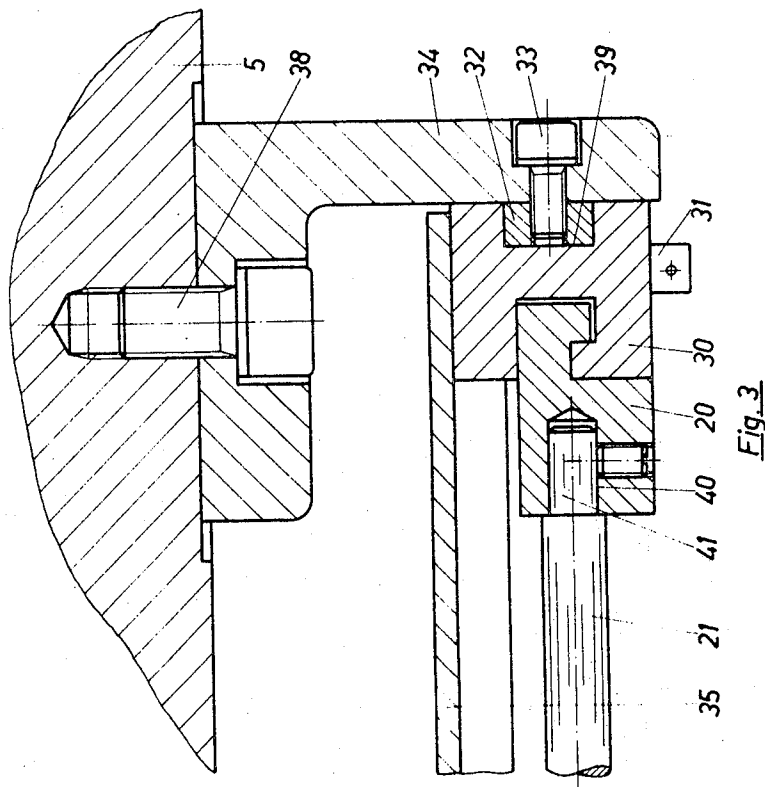
E. HÄNNI

3,465,561

PLATE-WORKING MACHINE

Filed March 3, 1967

5 Sheets-Sheet 3



INVENTOR

EDUARD HÄNNI

39 *Maugliar and Lorenz*
Attorneys

Sept. 9, 1969

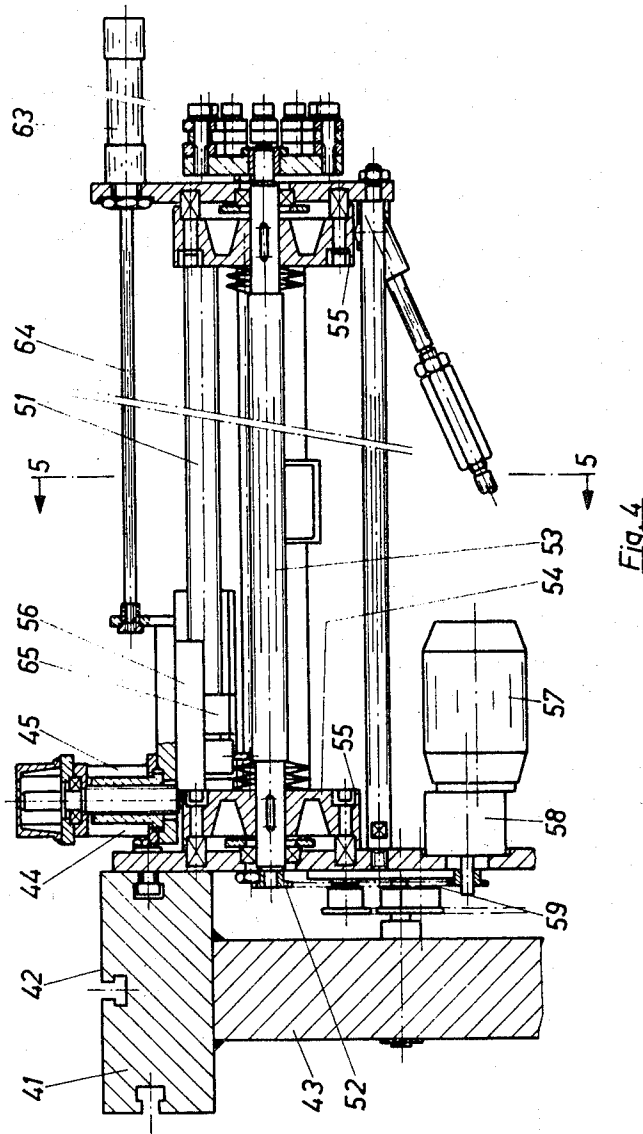
E. HÄNNI

3,465,561

PLATE-WORKING MACHINE

Filed March 3, 1967

5 Sheets-Sheet 4



INVENTOR
EDUARD HÄNNI
BY *MacGraw and Torrey*
attorneys

Sept. 9, 1969

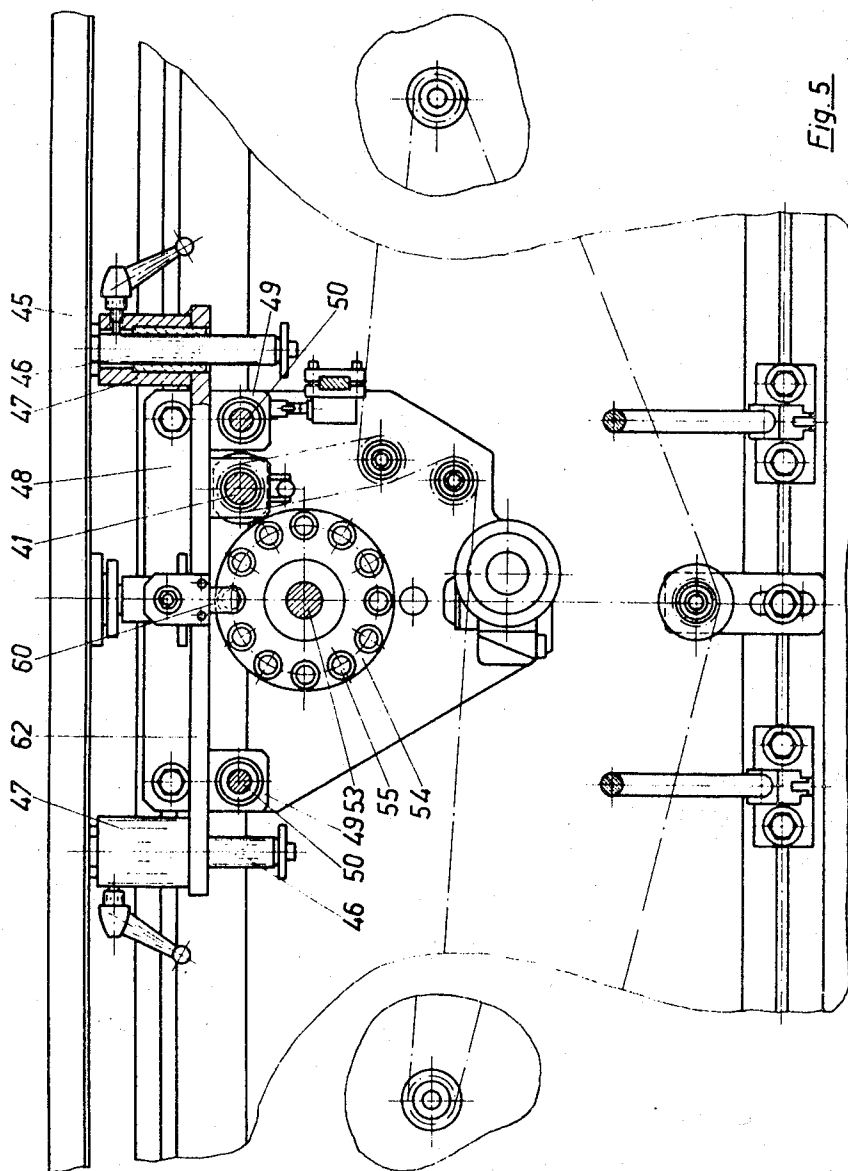
E. HÄNNI

3,465,561

PLATE-WORKING MACHINE

Filed March 3, 1967

5 Sheets-Sheet 5



INVENTOR
EDUARD HÄNNI
By Marklar and Toru
Attorneys

1

3,465,561

PLATE-WORKING MACHINE

Eduard Hänni, 10 Rosengartenstrasse,

4800 Zofingen, Switzerland

Filed Mar. 3, 1967, Ser. No. 620,405

Claims priority, application Austria, Aug. 19, 1966,

A 7,913/66

Int. Cl. B21b 31/34; B21d 37/02, 43/16

U.S. Cl. 72—36

11 Claims

ABSTRACT OF THE DISCLOSURE

A plate working machine includes a table which is disposed between spaced vertical side walls and which includes a working space and a cross-bar which is horizontally adjustable at the height of the table surface to permit control of the position of the workpiece in relation to the working space. The crossbar carries a lateral stroke limiting cam at each end. A vertically adjustable stop means is arranged for adjustment in respect to the horizontal plane of the stroke limiting cam and it extends parallel to the table surface. The stop means are located so that the horizontal distance of each stop from the working space is selected so that a stop always comes into the path of travel of the stroke limiting cam which is associated therewith.

SUMMARY OF THE INVENTION

This invention relates to a plate-working machine which has a work table arranged between vertical side walls and having a working-place and a crossbar which is horizontally adjustable at the height of the table surface to control the position of the workpiece in relation to the working-place, this crossbar having at each end a lateral stroke limiting cam. The plate-working machine can preferably be a folding press, plate-shears or the like and is used for the production of profiles with multiple bends or of plate sections of predetermined variable widths.

In manufacturing profiles with multiple bends or plate sections of predetermined variable widths by means of a folding press having a stop bar, the stop bar must be repeatedly adjusted according to the bend or widths to be produced. The applicants have already proposed to provide automatic adjustment of the stop bar for series production, stops being used which are mounted vertically one above the other and can be arranged at various horizontal distances from the working-place, a counter-stop is displaceable in a horizontal plane and at the same time vertically adjustable for level, so that on every horizontal movement of the stop bar the stroke and thus the end position of this latter is limited by a stop arranged at the corresponding level.

The aim for the current invention is to provide a further development for the above-mentioned plate-working machine, a particularly simple programme control being obtained in the production of profiled with multiple bends or in the production of plate sections of predetermined variable widths.

As mentioned at the outset, the plate-working machine has a work table arranged between vertical side walls and having a working place and a crossbar which is horizontally adjustable at the height of the table surface to control the position of the workpiece in relative to the working place, the crossbar having at each end a lateral stroke limiting cam.

According to the invention there are stops vertically adjustable in relation to the horizontal plane of the stroke limiting cam, these stops extending parallel to the table

2

surface, the horizontal distance of each stop from the working place being different so that by adjusting the stops alternatively another stop always comes into the path of travel of the stroke limiting cam belonging thereto.

In the enclosed drawings are shown the embodiments of the object of the invention:

FIG. 1 a diagrammatic side view or vertical section according to the first embodiment, of the plate-working machine,

FIG. 2 a horizontal section taken at the line 2—2 in FIG. 1,

FIG. 3 a section taken at the line 3—3 in FIG. 1,

FIG. 4 a vertical section of a second embodiment of a plate-working machine and

FIG. 5 is a cross section taken at the line 5—5 in FIG. 4.

The plate-working machine shown in FIGS. 1 to 3 has a work table 1 which has a horizontal surface 2 for the piece to be worked. The working place is symbolically indicated by 3. The work table 1 is fixed on a support 4 which has two side supports 5, only one of these side supports being shown in the drawings. Perpendicular to the horizontal plane of the table surface is the stop face 6 of a crossbar 7 which is attached at each end to a holder 8.

Each holder 8 is connected to the upper end of a corresponding holder-shaft 9, each of which extend vertically upwards through the bearing 10. The holders 8 are adjustable for height by means of the holder-shafts 9, a driving wheel 11 being provided for driving the shaft. In addition the holders 8 together with the cross-bar 7 and bearing 10 are horizontally adjustable. This adjustment takes place by means of two adjusting shafts 12 by hand activation or by means of a common oil motor 13. The motor shaft 14 has at each end a chain-wheel 15, each of which operates a chain drive 16 to which the bearing 10 are connected. Each bearing 10 has a stop holder 17 which is displaceable in a horizontal guide 29 and carries a stroke limiting cam 18. By operation of the oil motor 13 the chain drive 16 between the chain wheels 15 and 19 are activated and the stop holders 17 displaced in a horizontal direction in the guides 29.

On each side support 5 an L-shaped guide holder 34 is fastened by means of bolts 38 in the front and rear on the inner side, these guide holders 34 extending vertically downwards and each one having a rail 32 fastened by bolts 33, these rails also extending vertically downwards. In the two rails 32 arranged in the same vertical plane is held a frame comprising two vertical side members 30 and a back wall 35. The side members 30 have grooves 39 into which the rails 32 engage. In each side member 30 a magazine 20 is removably mounted so that in each frame 30, 35 are two magazines 20 lying opposite to each other and extending rod-shaped downwards and which have holes 40 in opposite directions lying in pairs coaxially on the same level. Into these holes 40 are inserted the tapered end 41 of stop bars 21 which extend parallel to each other and lie in pairs coaxially in the same horizontal plane, as can be seen from FIGS. 1 and 3.

Each frame 30, 35 together with the two magazines 20 mounted therein is vertically displaceable along the rails 32, this vertical adjustment taking place progressively. The alteration of the vertical position effected by a single step thus corresponds to the vertical distance of the bars 21 from each other, so that on progressive adjustment all pairs of bars successively come to that level in which the stroke limiting cams 18 are arranged.

The progressive vertical adjustment is effected by means of a step-by-step feed control which has two shafts 24, 25 extending parallel to the bars 21, a ratchet wheel 28 and

pawl 36 as well as an air-cylinder 37 to activate the pawl 36. In addition the piston rod 23 of a piston in a cylinder 22 is joined to the frame 30, 35 its function being to draw the frame downwards. The two ends for the shafts 24 and 25 each have a chain wheel 43 or 44, the wheels lying one below the other being connected by a chain 26 or 27. To these chains are joined connections 31 which are fixed to the two side members 30 of the frame. The step-by-step feed control described brings about the progressive vertical adjustment of the bars. The pawl 36 is operated by the air-cylinder 37 resulting in a periodic release of the ratchet wheel 28. This periodic release can take place according to a programme control. Instead of the ratchet wheel there can be an oil motor on each side. If the ratchet control is used, the sequence of stop bars 21 coming into action cannot be altered, while if oil motors are used the sequence of the bars can be chosen at will.

In operation prepared magazines are used according to the programme of production, each level having two stop bars which come into operation on the forward and backward movement of the stop holder. Operation of the oil motor 13 as well as the vertical adjustment of the magazines can be effected automatically. Upon each backward and forward movement of the stop-holder 17 the stroke limiting cam 18 strikes first against the one and subsequently against the other of the two coaxially arranged stop bars 21, whereby two different positions of the stop face 6 in relation to the working place 3 are consecutively defined. The next pair of stop bars 21 comes into action through the step-by-step feed control, whereby the stop face 6 will again take up other spacings.

A further embodiment of the plate-working machine can be seen in FIGS. 4 and 5. It has a work table 41 which has a horizontal surface 42 for the piece to be worked. The work table 41 is fixed on a support 43 which has two side supports which are not shown in any greater detail in the drawing. Perpendicular to the horizontal plane of the table surface 42 is the stop face 44 of a crossbar 45 which extends horizontally over the whole width of the table surface and is adjustable for height by means of two vertical bars 46. These bars 46 are supported in guides 47 of a slider 48, locking devices 49 serving to fix the crossbar at various heights.

The slider 48 has guides 49 and is adjustable in the length of the guide bars 50. The slider is moved by an air-cylinder 63, while a piston rod connects the piston (not shown) to the slider. Adjustment or manual displacement of the slider is effected by means of an adjusting shaft 51 with carrier nut 65; the shaft extends parallel to the guide bar 50 and can be rotated by means of a drive 52. In addition, in the centre between the two side walls is a shaft 53 which runs parallel to the adjusting spindle and carries at both ends a turret head 54. On the circumference of each turret head are distributed holes 55 which receive stop bars 56 of different lengths. To drive the turret heads there is a motor 57 with drive 58, by means of a transmission gear 59 drives the shaft 53 as a step-by-step feed control. It is also possible however to provide each turret head with a separate drive. According to the position of the turret head the stop bars 56 come successively into the highest position in which they project into the path of travel of a stop 60 on the slider 48. The exact position of the crossbar 45 can be controlled by the stop bars which are already in action.

In operation prepared stop bars are used according to the programme of production, to stop bars always coming into operation at the same time and this upon the backward and forward movement of the slider. The turret heads can be controlled by the operator or automatically. Upon each backward and forward movement of the slider the stop 60 of this latter first strikes against the one and subsequently against the other of the two coaxially arranged stop-bars, whereby two different positions of

the stop-face 44 in relation to the working place on the work table 41 are consecutively defined. By operation of the step-by-step feed control the next pair of stop bars 55 of the turret heads come into action, whereby the crossbar 45 can again take up other spacings in relation to the working place.

Changes in the programme of production can quickly and simply be allowed for because of the easy exchangeability of the stop bars.

I claim:

1. Plate-working machine which has a work table arranged between vertical side walls and having a working-place and a crossbar which is horizontally adjustable at the height of the table surface to control the position of the workpiece in relation to the working place, this crossbar having at each end a lateral stroke-limiting cam in which stop means being arranged vertically adjustable in relation to the horizontal plane of the stroke limiting cam, these stop means extending parallel to the table surface, the horizontal distance of each stop means from the working place being different so that by adjusting the stop means alternately another stop means always comes into the path of travel of the stroke limiting cam belonging thereto.

2. Plate-working machine according to claim 1, in which said stop means combined in two groups are displaceable at a height along the two side walls.

3. Plate-working machine which has a work table arranged between vertical side walls and having a working-place and a crossbar which is horizontally adjustable at the height of the table surface to control the position of the workpiece in relation to the working-place, this crossbar having at each end a lateral stroke-limiting cam, in which stop bars of different lengths are vertically adjustable in relation to the horizontal plane of the stroke limiting cam, said stop bars being combined in magazines and inserted on each side in a common frame which is vertically displaceable along said side walls, these stop bars extending parallel to the table surface, the horizontal distance of each stop bar from the working place being different so that by adjusting the stop bars alternately another stop bar always comes into the path of travel of the stroke limiting cam belonging thereto.

4. Plate working machine according to claim 3, in which each frame has two parallel side members which are arranged on a common back wall at a distance one from the other, the side members having guide grooves (39) into each of which engages a guide rail (32) of guide holders (34) mounted on the side wall (5).

5. Plate working machine according to claim 3 in which each magazine has parallel holes to receive the tapered ends of said stop bars, the central axes of the holes lying in a plane parallel to the side wall.

6. Plate-working machine according to claim 3 in which the frame (30, 35) is connected to an operating device of a hydraulically or pneumatically operated piston and to a step-by-step switch gear.

7. Plate-working machine according to claim 3 in which said frame is connected to an endless chain which is connected to a step-by-step switch gear, said switch gear has a ratchet wheel with pawl which is operated by a switching member which brings about the periodic release of the ratchet wheel.

8. Plate-working machine which has a work table arranged between vertical side walls and having a working-place and a crossbar which is horizontally adjustable at the height of the table surface to control the position of the workpiece in relation to the working place, this crossbar is arranged on a horizontally movable slider and having at each end a lateral stroke-limiting cam, said stops being vertically adjustable in relation to the horizontal plane of the stroke limiting cam, these stops extending parallel to the table surface, the horizontal distance of each stop from the working place being different so that

5

by adjusting the stops alternately another stop always comes into the path of travel of the stroke limiting cam belonging thereto, said stops are rod-shaped and removably mounted in at least one turret head, so that according to the turning position of the turret head there is always a given stop bar projecting into the path of travel of the slider.

9. Plate working machine according to claim 8 in which two turret heads are arranged at a spacing on a common shaft, each turret head having holes distributed on its circumference, these holes serving to receive stop bars of different length.

10. Plate-working machine according to claim 9 in which at least one motor with step-by-step switch is provided to drive the turret heads.

6

11. Plate-working machine according to claim 9 in which a stop is connected to the cross-bar into the path of travel of which the stop projects the stop bar of each turret head, the stop bar being in its top-most position.

References Cited

UNITED STATES PATENTS

2,669,276	2/1954	Humphrey	72—428
3,057,394	10/1962	Vuillien	72—413
3,260,087	7/1966	Guarino	72—36

RONALD D. GREFE, Primary Examiner

U.S. Cl. X.R.

15 72—413, 428