

July 1, 1969

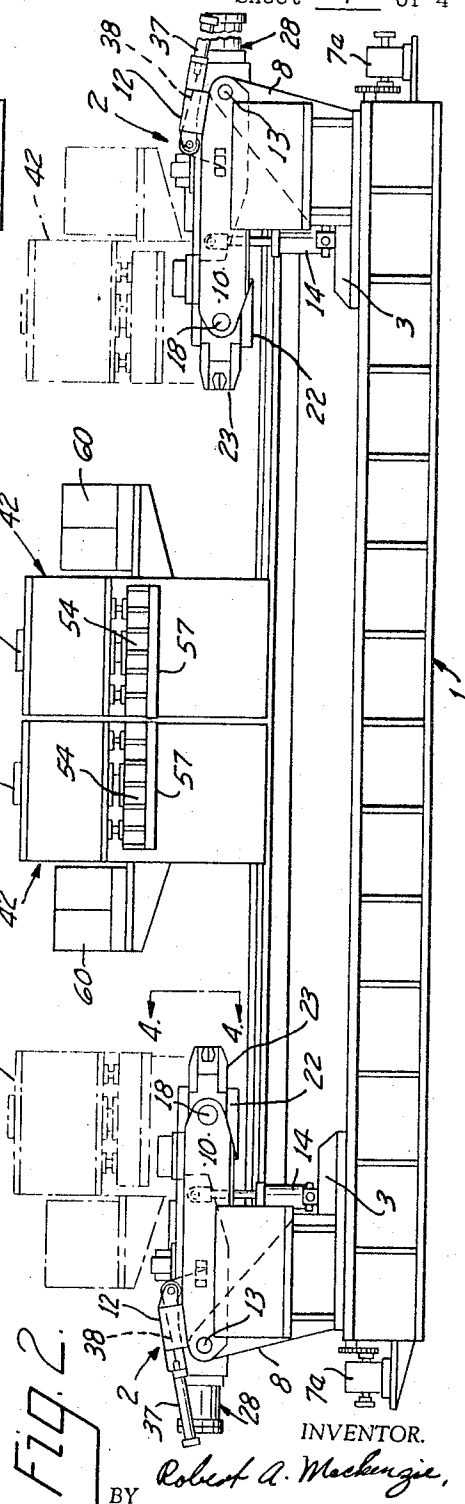
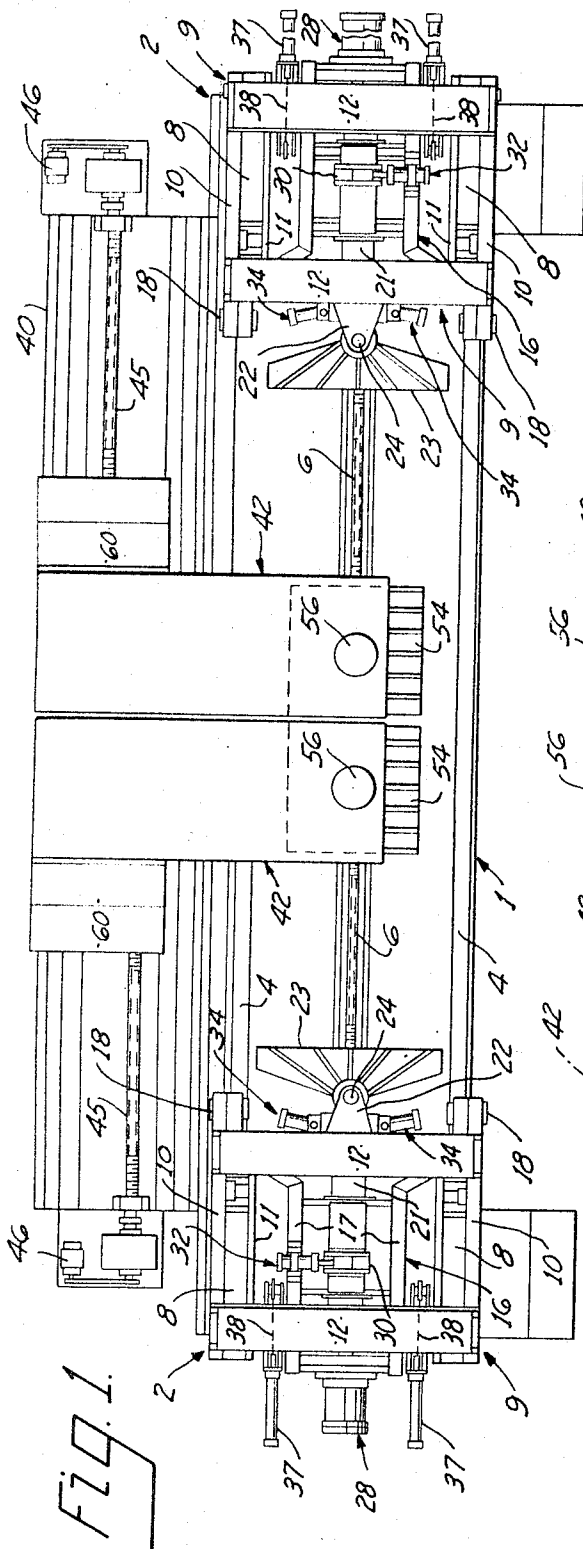
R. A. MACKENZIE

3,452,574

STRETCH-DRAW MULTI-PRESS MACHINE

Filed June 29, 1967

Sheet 1 of 4



INVENTOR.

BY Robert A. Mackenzie,

John H. Remond, Esq. ATTORNEY.

July 1, 1969

R. A. MACKENZIE

3,452,574

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Fig. 3

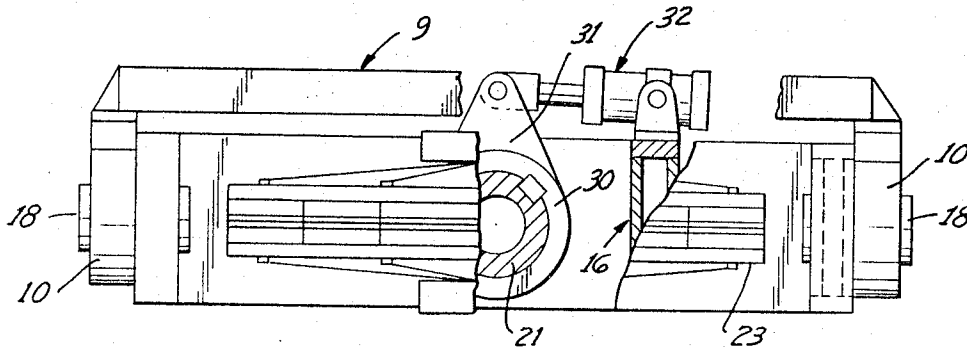
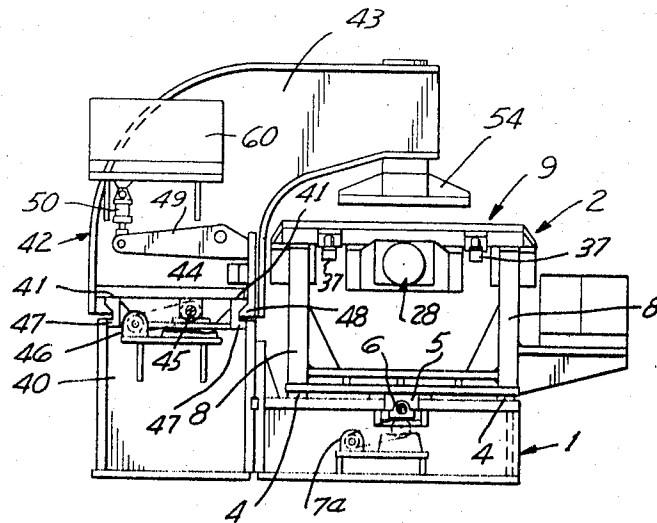


Fig. 4

INVENTOR.
Robert A. Mackenzie,
BY
John H. Leonard,
ATTORNEY.

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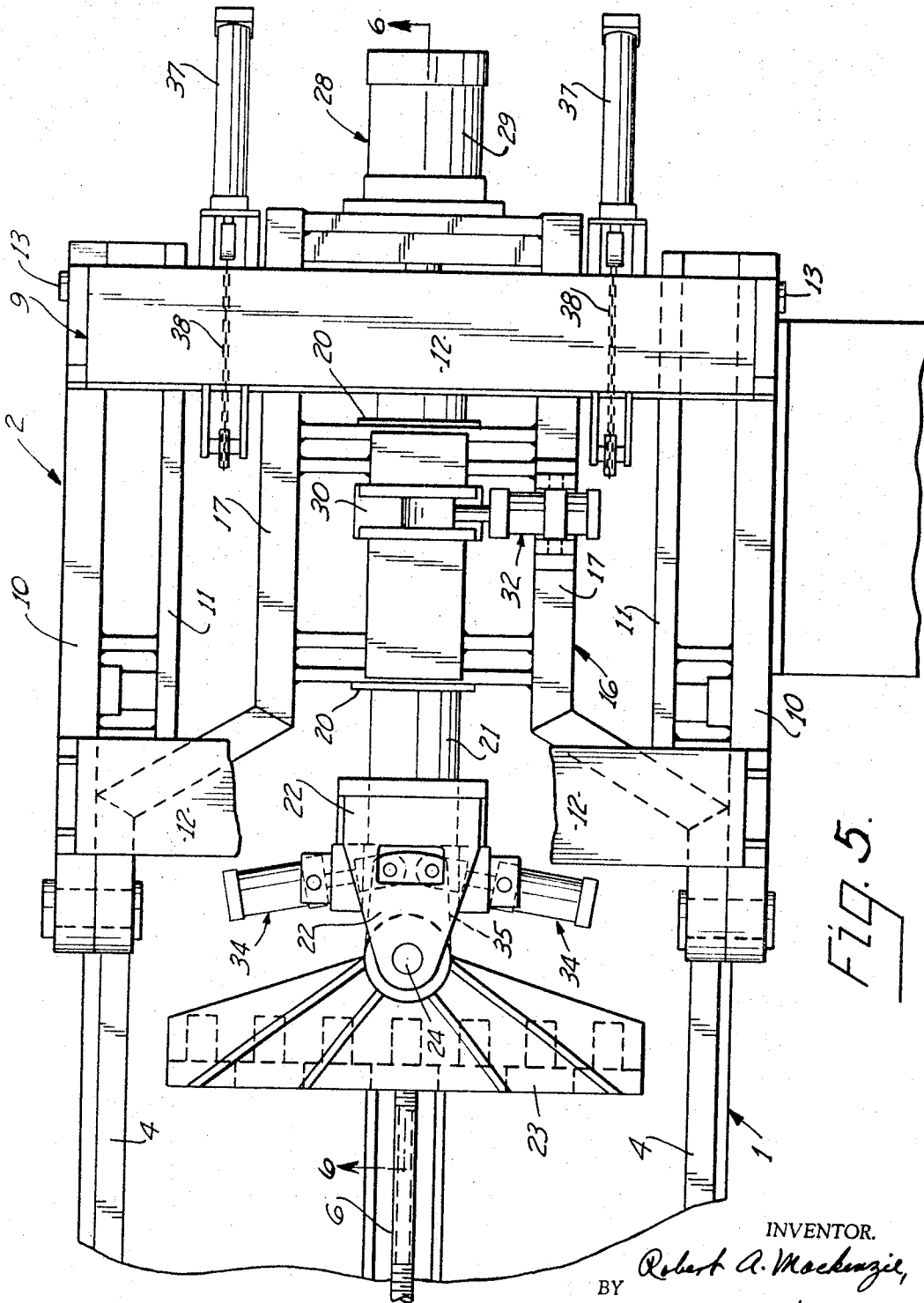


FIG. 5.

INVENTOR.
Robert A. Mackenzie,
BY *John A. Leonard,*
Attorney.

July 1, 1969

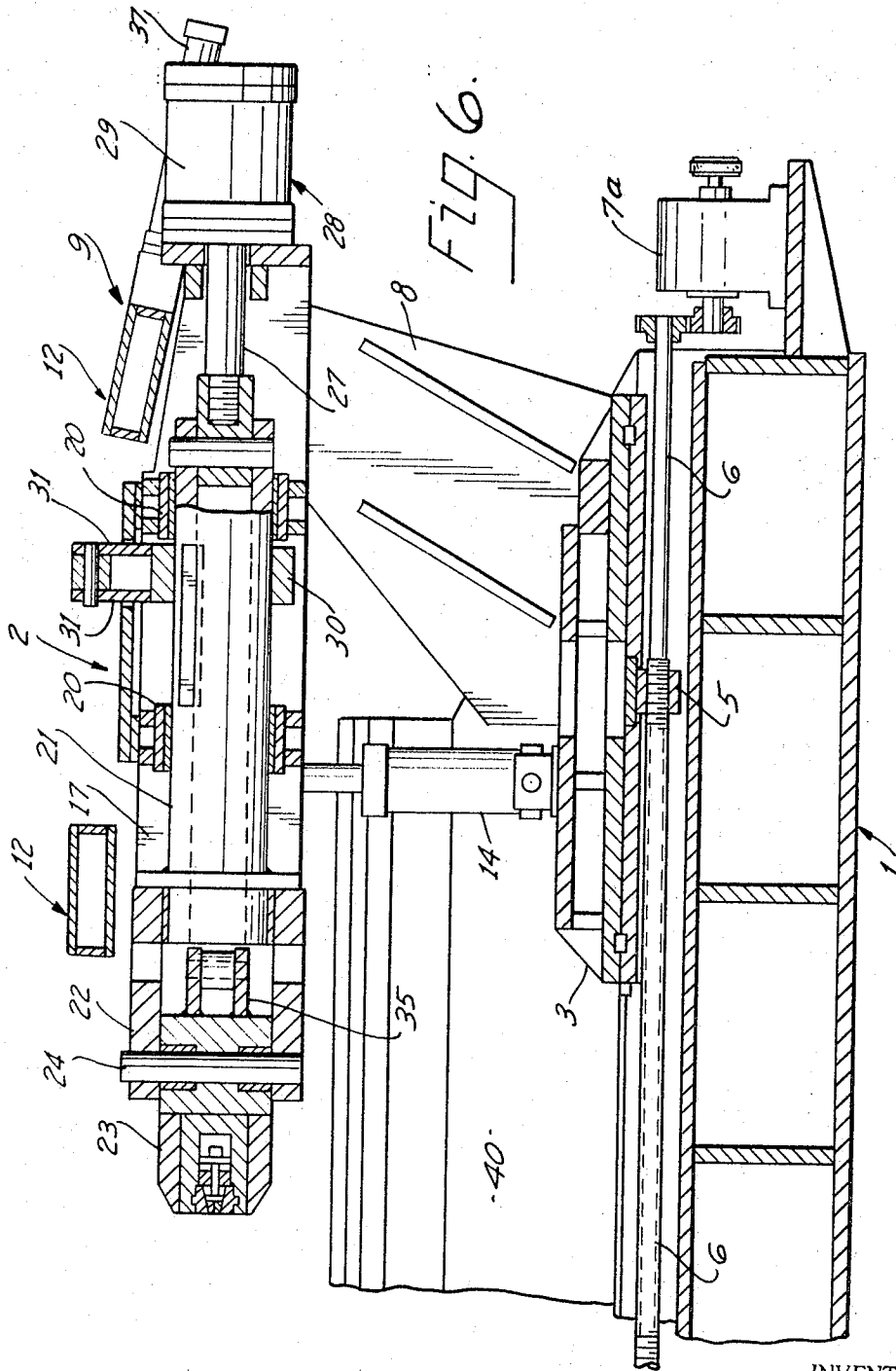
R. A. MACKENZIE

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Sheet 4 of 4



INVENTOR.

Robert A. Mackenzie,
BY John H. Leonard,
his ATTORNEY.

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3,452,574

STRETCH-DRAW MULTI-PRESS MACHINE

Robert A. Mackenzie, Chagrin Falls, Ohio, assignor to
The Cyril Bath Company, Cleveland, Ohio, a corporation of Ohio

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U.S. Cl. 72—297

9 Claims

ABSTRACT OF THE DISCLOSURE

The present stretch draw multi-press machine employs two stretching units 2 on a bed 1 at opposite ends of the die supporting space thereof, for gripping two opposite margins of a length of sheet stock and stretching the stock unidimensionally while the stock is drawn between companion drawing dies, and is characterized in that, instead of a single drawing die being arranged at the die space, each a plurality drawing die of presses 42, having a frame fully open at the front for the full length in the tensioning dimension, are arranged for movement to adjusted positions on tracks alongside the die space relative to the stretch units 2 and relative to each other and are operable (a) each with its own set of dies, independently or concurrently selectively, relative to the other, or (b) all together as a single unit with a single set of dies common to all presses.

A specific improvement resides in the rocking frames 9 and 16 of each stretching unit 2.

This invention relates to a stretch draw multi-press machine and particularly which is adapted for stretch drawing parts throughout a wide range of sizes and shapes that cannot readily be formed by the conventional stretch draw presses, and which affords wide latitude as to the drawn.

More specifically, the invention relates to a stretch draw multi-press machine having a bed at the ends of which are stretching units for stretching the stock unidimensionally, and along one side of which are trackways on which a plurality of individual drawing die presses are mounted for movement independently relative to the units and relative to each other, and which overhang the die space of the bed so as to draw the metal at the selected locations while in the tensioned condition.

In the present stretch draw multi-press, the frames of the presses are open forwardly for their full length in the stretching dimension for ease in loading, and the rams of the presses may be moved into juxtaposition endwise of the stretching dimension to form, in effect, a single ram connectable to a common die, or may be spaced at different distances from each other and connected for operation together by connecting them to a common platen which carries one or more drawing dies, or may be operated independently, each with its own die.

Various other objects and advantages of the invention will become apparent from the following description wherein reference is made to the drawings illustrating a preferred embodiment of the invention, wherein:

FIG. 1 is a top plan view of a stretch draw multipress machine embodying the principles of the present invention;

FIG. 2 is a front elevation of the structure in FIG. 1;

FIG. 3 is a left end elevation of the structures in FIGS. 1 and 2;

FIG. 4 is a fragmentary elevation as viewed from line 4—4 in FIG. 2, part thereof being shown in section;

FIG. 5 is an enlarged fragmentary top plan view of the right end portion of the structure illustrated in FIG. 1; and

FIG. 6 is a vertical sectional longitudinal view of the

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structure illustrated in FIG. 5 and is taken on the line 6—6 thereof.

Referring to the drawings, the machine comprises a rigid frame or bed 1 on which are mounted two stretching units 2, arranged one unit at each end of the bed. The bed is arranged to support one of a set of matching drawing dies in a position between the units 2. The stretching units are the same in function, one only is described in detail.

In the form illustrated, each stretching unit 2 comprises a base 3 which may be moved to selected adjusted positions endwise of the bed 1 and secured in said positions. For this purpose, the bed 1 is provided with suitable longitudinal slideways 4 which slidably support the base 3 for movement longitudinally of the bed 1. The base 3 is driven along the slideways by a depending follower 5 which is in engagement with a feed screw 6 which, in turn, is driven through suitable gearing 7 by an electric motor 7a.

Mounted in fixed position on the base 3 are upright brackets 8 spaced apart from each other forwardly and rearwardly of the bed 1. Pivotaly mounted on the upper ends of the brackets 8 is a rock frame 9 which comprises outer arms 10, inner arms 11 secured in fixed position to the outer arms 10, and transverse braces 12 connecting the outboard arms fixedly in position with respect to each other. The frame 9 is rockable about coaxial pivots 13 which connect the arms to the brackets 8 so that the frame can be rocked upwardly and downwardly about the axis of the pivots 13 toward and away from the bed.

Reversible piston and cylinder assemblies 14 are connected to the opposite arms 10 for rocking the frame 9 about the axis of the pivot 13. Carried by the frame 9 is a supplemental frame 16 comprising laterally spaced arms 17 which are pivotally connected at the ends nearest the die space by suitable pivots 18 to the corresponding or inner end of the frame 9 for rocking toward and away from the bed 1 about the axis of the coaxial pivots 18.

Mounted in fixed position on the supplemental frame 16, midway between the arms 17 and extending forwardly and rearwardly thereof, are two coaxial stationary bearings 20. Mounted in the bearings 20 for rocking about the axis thereof is a quill 21 on the outer end of which is provided a yoke 22. A stretch head 23 is connected by a pivot 24 to the yoke 22. The axis of the pivot 24 intersects the axis of the quill at a right angle thereto.

The quill 21 is slidable axially in the bearings 20 and is connected fixedly to a piston rod 27 of a reversible hydraulic tensioning piston and cylinder assembly 28, the cylinder 29 of which is fixedly secured to the inner frame 16. Thus the quill can be driven axially in the bearings 20 by the assemblage 27.

A collar 30 is secured in fixed position on the quill 21 for rocking therewith about the axis thereof. The collar 30 is provided with a radial arm 31. A suitable reversible piston and cylinder assemblage 32 is connected to the frame 16 and to the arm 31 for rocking the quill 21 about its axis, and thereby the stretch head 23 about the axis of the quill.

For rocking the head 23 about the axis of the pivot 24, suitable reversible piston and cylinder assemblies 34 are provided and are connected to a suitable tongue 35 on the head 23 and to the yoke 22, respectively. Since the weight of the frame 16, quill, and head are considerable, suitable counter-balancing piston and cylinder assemblage 37 are provided on the head 23 and to the yoke 22, respectively. Since the weight of the frame 16, quill, and head are considerable, suitable counter-balancing piston and cylinder assemblies 37 are provided on the frame 16 and the piston rods thereof are connected by chains

38 to the frame 9. Instead of such cylinders, the cylinders 37 may contain counter-balancing springs which operate in like fashion.

Disposed alongside the frame or bed 1 is a supplemental frame 40 extending parallel to the bed 1. The frame 40 is provided at the top with guideways 41 which extend endwise thereof parallel to each other. Mounted on the guideways 41 is a press 42, having a frame 43 which extends upwardly from the guideways and forwardly and rearwardly of the bed 1 into partially overhanging relation thereto. The frame 43 is provided with a depending follower 44 which is engaged by a feed screw 45 driven by a motor 46 for moving the press 42 to selected positions lengthwise of the supplemental frame 40.

The trackways of the frame 40 are provided with longitudinally extending clamping surfaces 47 cooperable with clamps 48 on the frame 43, so the press 42 can be moved to selected positions along the frame 40 and then, by operation of the clamp 48, locked securely in the position selected. Each clamp 48 is operable by locker arm 49 driven by a reversible hydraulic piston and cylinder assemblage 50, of which the cylinder is connected to the frame 43 and the piston rod is connected to the end of the rocker 49 at the opposite side of the rocking axis from the clamp 48.

Mounted on the frame 43 in a position overhanging the die space is a ram 54, which may be driven by a suitable reversible hydraulic piston and cylinder assemblage 56 or other means. The ram 54 has a downwardly facing platen 57 adapted for connection to one of a pair of companion drawing dies. The other drawing die of the pair is supported on the bed 1 between the stretch forming units 2 so that the die can draw the stretched stock. A plurality of frames 43, each with its ram 54, are provided. In the form illustrated, two such frames 43 are shown. Each includes also a hydraulic power pack 60 for driving its associated press. The presses 42 may be operated independently of each other or concurrently. They are so arranged that they can be brought into side by side juxtaposition endwise of the trackway, as illustrated in FIGS. 1 and 2, so that both can be secured to the same die. On the other hand, they can be moved into spaced relation to each other, endwise of the trackways, and operated independently, each carrying its own separate die. Again, the presses 42 may be spaced apart from each other and a common bolster block connected to the platens and bridging from one to the other, again providing, in effect, a single press of much greater length in the tensioning dimension. Again, either press may be moved to an idle position, or to any preselected offset position with respect to the transverse midportion of the bed 1. All of the frames 43 are open forwardly for their full width so as to present an unobstructed feed passage to the space between the companion dies.

The platens 57 are extended forwardly and rearwardly of the bed 1 so that they can form the support die for forming the sheet being stretched for the full width of the sheet or forward and rearward dimensions of the bed 1, so that a sheet can be drawn throughout its full width forwardly and rearwardly of the bed 1 while it is being stretched, as distinguished from joggling small localized areas of the sheet.

While the invention has been shown with two presses 42, more may be used if desired.

Having thus described my invention, I claim:

1. In a stretch drawing machine including a generally horizontal bed having an upwardly facing die supporting portion open and accessible from the front of the bed;

stretching units at opposite ends of the die supporting portion, each unit including a stretch head movable toward and away from said portion in paths having vertical components and horizontal components; and power means for moving the head along said paths for tensioning stock endwise of the bed;

the improvement wherein:

a horizontal trackway is disposed alongside the rear of said portion of the bed and extends endwise of the bed;

a drawing die press is mounted on the trackway for movement therealong to preselected positions and includes an open front frame, a power driven ram in overhanging relation, forward and rearwardly to said portion of the bed, adapted to support a die for engaging a sheet the full fore and aft dimension of the die supporting portion of the bed, and means to clamp the press frame in its preselected positions.

2. The structure according to claim 1 wherein power means are connected to the press frame for driving it to preselected positions along the trackway.

3. The structure according to claim 1 wherein a set of concavo-convex complementary drawing dies are provided, and one die of the set is mounted on said bed portion and one on the ram.

4. The structure according to claim 1 wherein a plurality of said presses are mounted on said trackway for movement therealong to selected positions independently of each other.

5. The structure according to claim 4 wherein said presses are operable independently and together as a unit, selectively.

6. The structure according to claim 4 wherein said presses are shaped and arranged so that they can be disposed with their ram platens in alignment endwise of the die supporting portion and said platens can be connected together for acting as a unit in supporting and driving one of the complementary dies.

7. A stretching unit comprising a pair of upright frame members, a first frame having a rear end pivotally connected to said members for rocking about a horizontal axis, said first frame extending forwardly from the pivotal axis;

a second frame having a forward end pivotally connected to the forward end of the first frame for rocking about a horizontal axis, said second frame extending rearwardly from its pivotal axis;

a power driven stretching device mounted on the second frame including a stretch head support movable forwardly and rearwardly of the second frame, and a stretch head carried by said support.

8. The structure according to claim 7 wherein the stretch head support comprises a sleeve fixedly secured to the second frame with its axis extending forwardly and rearwardly thereof;

a quill mounted in said sleeve in coaxial relation therewith for sliding axially of the sleeve and rocking about the common axis of the sleeve and quill; and yoke means on the forward end of the quill pivotally connected to the head and supporting the head for rocking relative to the yoke means about an axis at a right angle to, and intersecting, the quill axis.

9. The structure according to claim 8 wherein power means are provided for rocking the quill about its axis, and additional power means are provided for rocking the head relative to the yoke.

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RONALD D. GREFE, *Primary Examiner*.

U.S. Cl. X.R.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,452,574

July 1, 1969

Robert A. Mackenzie

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

Column 1, line 19, cancel "each"; line 19, before "having" insert -- each --; line 36, after "the" insert -- length of the stock and the portions thereof to be stretch --. Column 2, lines 65 to 69, cancel "Since the weight of the frame 16, quill, and head are considerable, suitable counter-balancing piston and cylinder assemblage 37 are provided on the head 23 and to the yoke 22, respectively. --. Column 3, line 53, "onobstructed" should read -- unobstructed --; line 58, "worward" should read -- forward --. Column 4, line 9, "nad" should read -- and --.

Signed and sealed this 24th day of November 1970.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents