March 19, 1963 R. B. TREER 3,081,725

PRESS

Filed Nov. 17, 1958 2 Sheets-Sheet 1

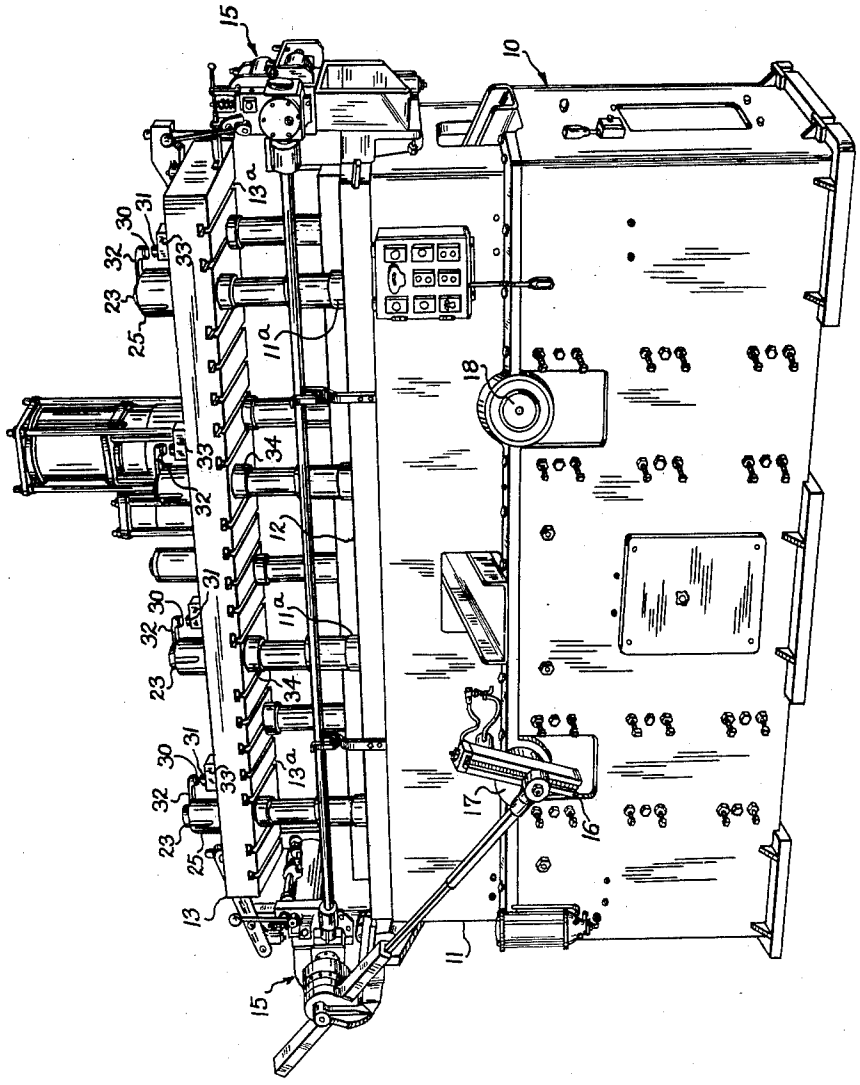


Fig. 1

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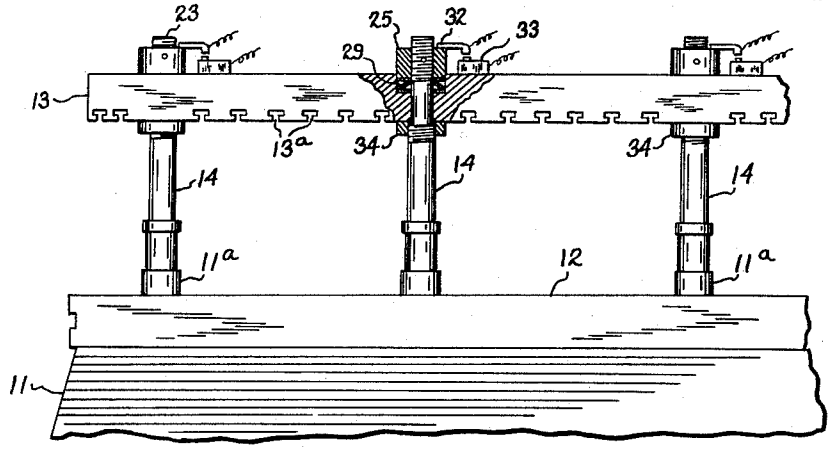


FIG. 2

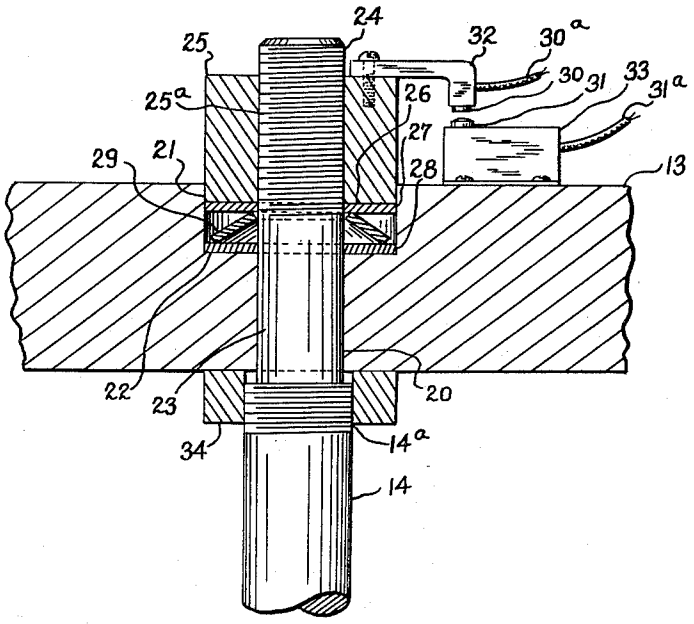


FIG. 3

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PRESS

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1 Claim. (Cl. 113—38)

This invention relates to high speed presses having comparatively extensive tool carrying crossheads of relatively light construction, such as are used with progressive dies capable of performing multiple dieing operations upon a single stroke of the press. More particularly, the invention relates to presses of this character in which the crosshead is reciprocated by a plurality of rod-like elements attached thereto at spaced points to distribute the working forces substantially throughout the extent of the crosshead.

The primary object of this invention is the provision of high speed presses of the above character to which sheet metal or other sheet metal is normally fed from coils and is advanced intermittently between power strokes to be progressively shaped at successive stations of the press, the presses including connections associated with the rod-like element which will yield when the respective rods are subjected to a load in excess of a predetermined amount and a detecting means responsive to yielding of the connection and effective to stop the press.

Another object is the provision of a new and improved high speed press of the character referred to which includes a particularly rugged and reliable crosshead reciprocating means which is simple of construction and serves to protect the crosshead and the tools carried thereby, as well as the tools with which they cooperate, from being damaged by misalignment and nonuniform motion of the crosshead as a whole, due to jamming of the sheet material fed thereto, and in which the associated parts are automatic in operation, allowing the press to be operated at higher, more efficient speeds, not limited by the reaction time of an operator.

The invention may be briefly summarized as consisting in certain novel details of construction and combinations and arrangements of parts described in the specification and illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of a power press embodying the crosshead reciprocating means of this invention;

FIG. 2 is a front view, partly in section of a portion of the press of FIG. 1; and

FIG. 3 is an enlarged sectional view of a representative yieldable connection and associated detecting means.

The presses in which this invention finds its application are high speed presses of the type used in progressive die manufacture of articles from sheet material. The press shown in FIG. 1, and indicated generally at 10, comprises a frame 11, of generally box like structure presenting a horizontal surface 12 adapted to support tools or dies forming a plurality of stations therealong, of which some may be operating stations and some may be idle stations.

Supported in a spaced, parallel relation with the surface 12, and substantially coextensive therewith, is a generally elongated crosshead 13. The crosshead 13 is adapted for linear motion toward and away from the surface 12 and is provided with keyways 13a by which it carries tools or punches for cooperation with the dies on that surface. The crosshead is supported by rod-like connecting elements 14 which are guided for reciprocation by guides 11a forming a part of the frame 11.

Although presses embodying this invention may have but one crankshaft, the press 10 is of the plural crank variety and in this instance includes a pair of crankshafts, the ends of which are seen at 17 and 18. Crankshafts 17 and 18 are connected to a lower crosshead which is substantially coextensive with the tool supporting surface 12

and is guided for reciprocation within the frame 11. The connecting elements 14 serve to connect the crosshead 13 with the crank driven lower crosshead for reciprocating motion through power and return strokes as a unit, while maintaining the crosshead 13 in a parallel relation to the tool supporting surface 12. The press 10 is supplied with power to the crankshafts 17 and 18 by any conventional means, but is preferably supplied through a clutch and under the control of a brake.

Located at each end of the press, and indicated generally by 15, are feed roller mechanisms which are driven by an adjustable crank means 16. Sheet metal or other sheet material is fed intermittently during each return stroke of the crosshead 13 and a forming or shaping step is performed thereon at each operating station upon every power stroke of the crosshead, no dieing being effected on the material at the idle stations. Each of the operating die stations along the surface 12 performs a successive dieing or shaping operation on a given portion of the sheet material.

The connecting elements 14 are connected to the crosshead 13 at a plurality of spaced points thereby distributing forces on the crosshead and avoiding distortion thereof. Using this construction a crosshead of relatively light construction may be employed. The lightness of the crosshead 13 permits rapid reciprocation thereof, while the plurality of connecting elements 14 assure the uniform motion of the crosshead as a whole.

In view of the rapid operation of the lightweight presses of this invention in employing the progressive die procedure, the feed of work stock requires accurate and positive control. The progressive die process is generally carried out with relatively thin and flexible sheet stock supplied from coils. The rapid rate of the advancement of the stock, and its difficult handling properties, lead to instances of jamming, folding, or tearing of the stock due to failure of proper advancement thereof. In presses employing crossheads of light construction, such as the press 10, jamming or folding of the stock may result in substantial distortion or nonuniform motion of the crosshead and in misalignment of the tools carried thereby. Such misalignment and distortion may result in serious damage to the tools, the crosshead, and the drive mechanism of the press.

In a preferred embodiment of the press of this invention, the details of which are best shown in FIGS. 2 and 3, there is found a yielding connection between each of a plurality of rod-like connecting means and the crosshead 13, together with electrical contact elements which are capable of being energized upon a yielding of a connection. Although in this preferred embodiment the yieldable connections are between the elements 14 and the crosshead 13, the yieldable connections may in some instances be advantageously utilized between those elements 14 and the lower crank driven crosshead.

In the event of a jamming of the sheet metal or stock, the resulting distortion of the crosshead 13 will effect a yielding in the adjacent connection with a rod-like element 14. The light weight construction of the crosshead 13 will allow it to be distorted in the vicinity of the jammed stock or other interfering conditions, while otherwise remaining in proper relation to the tool supporting surface 12, hence the necessity of having an overload detecting means associated with each of the pull rods or connecting elements 14.

The crosshead 13 is provided with a number of through openings 20, which openings are preferably counterbored or relieved as at 21 to provide a recess having an annular seat 22 formed therein. The rod-like connecting elements 14 are provided with ends 23 having a reduced diameter of a size adapted to be slidably received in the openings 20. Adjustment of the effective length of the

connecting means is provided for by collars 34 having threaded bores cooperating with threaded portions 14a of the connecting element 14.

The reduced ends of the rod-like elements 14 are provided with threaded portions 24. Retaining elements 25, having centrally threaded bores 25a therethrough, are threadedly engaged with the reduced portions 23. The retaining elements 25 are cylindrical in shape and have an outer diameter of a size permitting them to be recessed in the counterbore 21. The retaining elements have lower faces 26 in spaced relation to the annular seats 22.

Surrounding the reduced portion of the connecting elements 14, and between the retaining elements or nuts 25 and the crosshead 13, are a pair of spaced, hardened, washer elements 27 and 28, adjacent the faces 26 and seats 22 respectively. Between the spaced washers 27 and 28 are disposed cup-shaped, resilient, thrust elements or washers 29. The resilient thrust elements 29 may be made of a size and strength to offer a predetermined resistance to deformation. A pair of electrical contacts 30 and 31 are supported by insulating means 32 and 33, on each of the retaining means 25, and on the crosshead 13 respectively. The contacts 30 and 31 are connected by leads 30a and 31a in circuit with the power means, and each pair thereof is independently effective upon closing, or being actuated, to interrupt the power means as by releasing the clutch, and to set the brake to halt the press.

A distortion of the crosshead 13 will result in movement of a connecting element 14 and retaining element 25 with resuect to the crosshead in the vicinity of the distortion. Such relative movement will compress the yieldable thrust member 29 and bring contact 30 towards contact 31. Sufficient motion will close the contacts 30 and 31 against the resistance of the annular, resilient, thrust member 29, interrupting the power to the press 10, halting the power stroke of the crosshead 13.

The amount of resistance to distortion and nonuniform motion of the crosshead 13 which is offered by the resilient thrust members 29 may be predetermined by adjustment of the retaining elements 25 along the threaded portions 24 of the pull rod elements 14 to thereby preload the thrust members. Only an interference or opposition to motion of the crosshead 13 which is greater than that predetermined amount will bring the contacts 30 and 31, or other motion detecting means, into play to effect a timely stopping of the press. Each of the resilient thrust members 29 may be preloaded differently to determine the maximum thrus the crosshead 13 can exert, consistent with the dieing to be done in the vicinity of each of the rod-like elements 14.

From the foregoing description and the accompanying drawings it will now be readily seen that there has been provided an improved press of the high speed variety, wherein there are yieldable connections to the crosshead together with detecting means adapted to interrupt the power to the press upon a yielding of those connections. An effective and reliable high speed press construction is thereby achieved, protecting the press and its dies against extensive damage in the event of unusual resistance to the normal motion of the crosshead.

Although a preferred embodiment of the invention has been illustrated and described herein, it should be understood that the invention is susceptible of various modifications and adaptations within the scope of the claim.

Having described my invention, I claim:

In a press of the character described, a frame member having a substantially elongated first tool supporting surface, a first crosshead spaced from said frame member and having a second tool supporting surface facing said first tool supporting surface, a second crosshead spaced from said frame member on the side thereof opposite the side from which said first crosshead is spaced, said second crosshead being guided for linear reciprocation toward and away from said frame member, said frame member having a plurality of openings therethrough at spaced locations throughout said first tool supporting surface, said first crosshead having a plurality of openings therethrough aligned with said openings in said frame member, rod elements fixed to said second crosshead and extending through said openings in said frame member and having threaded upper ends projecting beyond the side of said first crosshead remote from said frame member, drive means for reciprocating said second cross head and said nut means threaded on each of said rod elements and engaging the side of said first crosshead facing said first supporting surface so that upon rotation of said first nut means said first crosshead moves relative to said rod elements, second nut means threaded on the end of each of said rod elements extending beyond the side of said first cross head remote from said frame member, a pair of hardened washers slidably mounted on said rod elements and encircling said rod elements between said second nut means and said first crosshead, spring means comprising a resilient cup-shaped thrust washer encircling each of said rod elements and interposed between said washers, first electrical contact means mounted on said first crosshead, and second electrical contact means mounted on said second nut means movable into engagement with said first electrical contact means upon relative movement between said second nut means and said first crosshead occurring upon compression of said spring means and interrupting said drive means, said second nut means being movable relative to said abutment means upon rotation of said second nut means for adjusting said spring means to effect a change in the magnitude of the force necessary to compress said spring means to move said first and second electrical contacts into engagement.

References Cited in the file of this patent

UNITED STATES PATENTS

1,849,362	Byerlein	Mar. 15, 1932
2,340,465	Gerlach	Feb. 1, 1944
2,482,449	Wells	Sept. 20, 1949
2,485,009	Muller	Oct. 18, 1949
2,616,543	Danly	Nov. 4, 1952
2,701,446	Gilbert	Feb. 8, 1955
2,766,710	Brandes	Oct. 16, 1956
2,770,342	Johansen	Nov. 13, 1956
2,812,843	Hummel	Nov. 12, 1957
2,912,564	Deffenbaugh et al.	Nov. 10, 1959
2,937,734	Sommer	May 24, 1960

FOREIGN PATENTS

542,580	Great Britain	Jan. 16, 1942

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,081,725 March 19, 1963

Ross B. Treer

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 4, line 19, after "and said" insert -- rod elements as a unit, abutment means comprising first --; line 42, for "to", second occurrence, read -- and --.

Signed and sealed this 19th day of November 1963.

(SEAL)

Attest:

ERNEST W. SWIDER

Attesting Officer

EDWIN L. REYNOLDS

Acting Commissioner of Patents