May 11, 1954

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2,678,078

COMBINED BENDING BRAKE AND PRESS
WITH RETRACTABLE RAM BRACKETS

Filed May 24, 1950

3 Sheets-Sheet 1

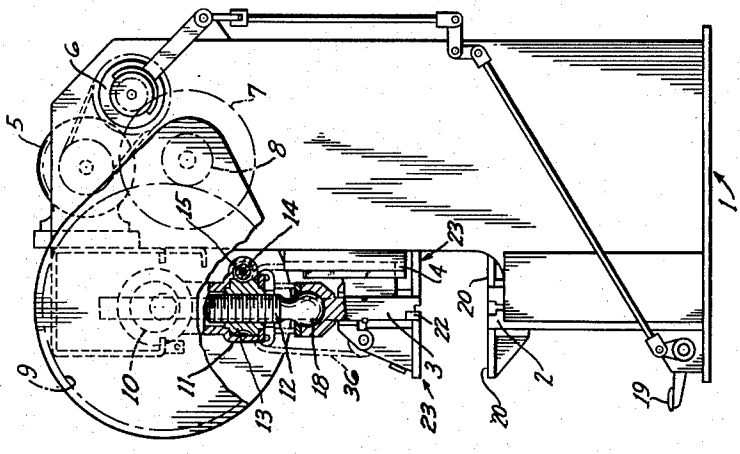


Fig 2.

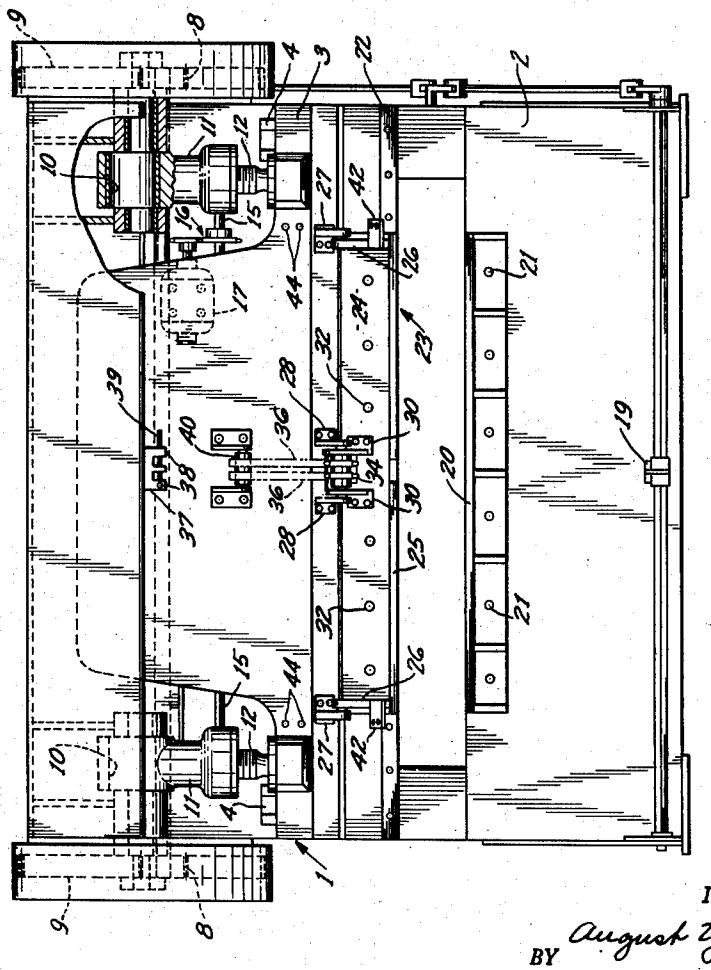


Fig. 1.

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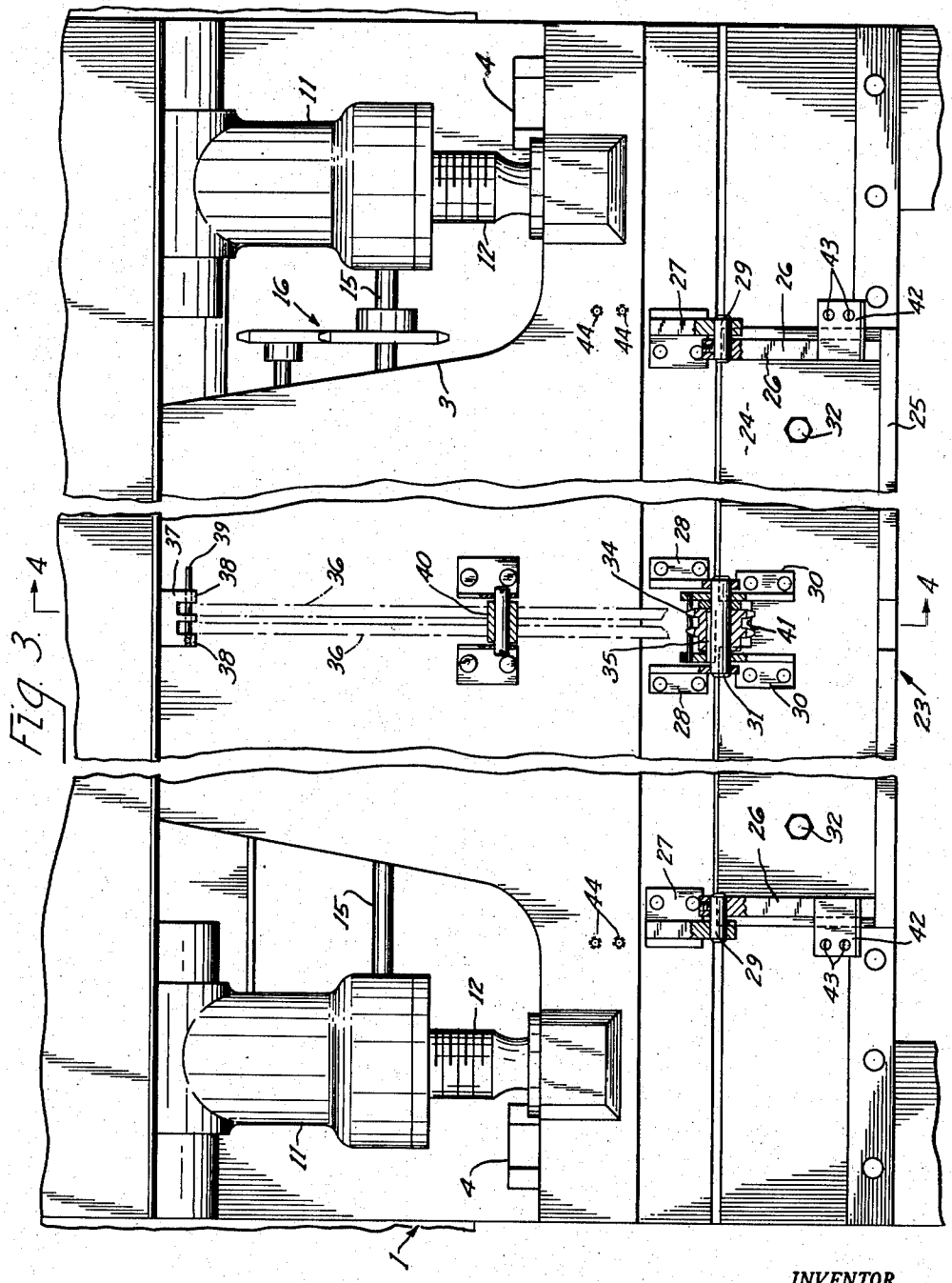


FIG. 3.

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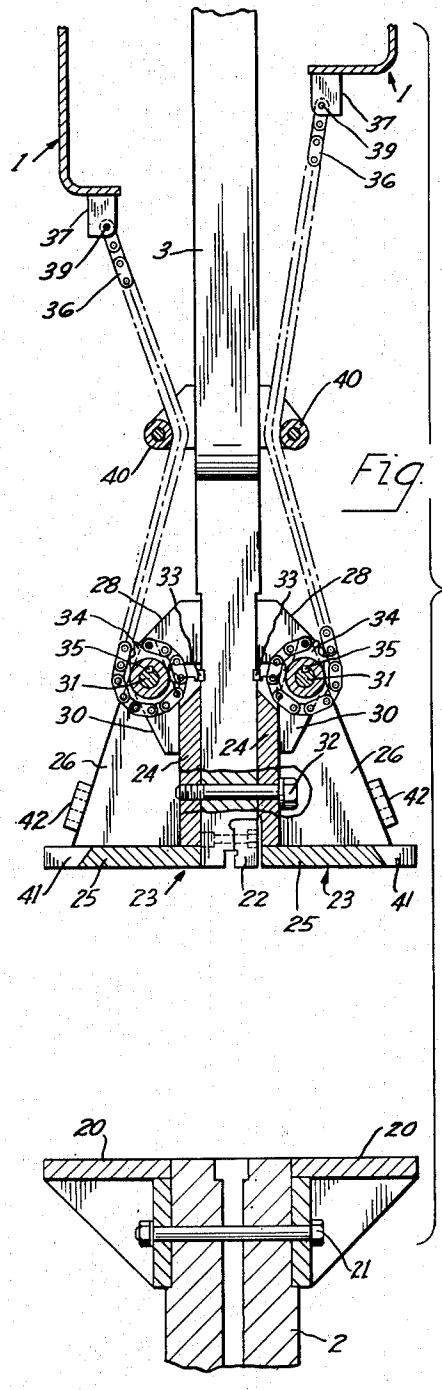


Fig. 4

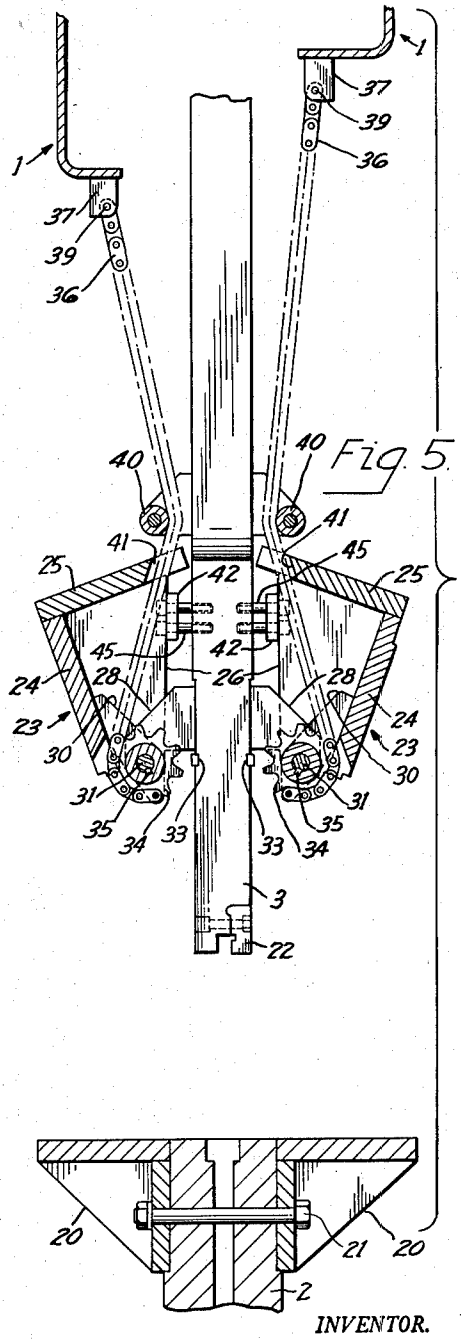


Fig. 5

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UNITED STATES PATENT OFFICE

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COMBINED BENDING BRAKE AND PRESS WITH RETRACTABLE RAM BRACKETS

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Application May 24, 1950, Serial No. 163,999

3 Claims. (Cl. 153—2)

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This invention relates to a combined bending brake and press with retractable ram brackets which are movably supported on the ram and arranged to be moved readily into operative position so as to make possible the use of the apparatus as a press and to be moved readily to an inoperative position so as to make possible the use of the apparatus as a bending brake without interference of the brackets in any manner with bending operations to be performed thereby.

In general, bending brakes are provided with elongated rams which are relatively narrow so as not to interfere with the formation of sharp upward bends in long sheets or plates of stock. On the other hand, presses for punching, blanking, and other types of forming are provided which likewise use an elongated ram but in which the operating or underface of the ram is relatively wide so as to accommodate and apply the pressure evenly over the relatively wide holder for punches, dies, and the like which often are distributed over a wide area forwardly and rearwardly of the press. This type of press is not satisfactory for use as a bending brake due to the wide undersurface of the ram which would interfere with the formation of sharp bends in the material.

Generally in the trade the manufacturer of metal products has need of both a press and a bending brake, often at different times. Though each is critical when needed, both often are idle for considerable periods. Accordingly, detachable ram brackets are provided for bending brakes so that the under face of the ram and the working face of the bed of the brake can be widened forwardly and rearwardly of the brake when desired so that the brake can serve as a brake or press, selectively, merely by removing and attaching the ram and bed brackets.

Necessarily, for use in a press, the brackets for providing the wider undersurface of the ram and working face of the bed must be relatively heavy and generally, on the bending brakes of the sizes widely used for production, they are too heavy to be moved readily by hand unless counterbalanced. Counterbalancing, however, is impractical due to interference with the operations of the various parts of the brake and the handling of the stock.

In the prior structures, the practice is to bolt brackets to opposite upright faces of the ram,

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using a number of workmen and usually cranes or other lifting equipment to move the brackets into place for bolting, and reversing this manner of installation for removing them from the ram. Since such brackets often weight one or two tons, a great amount of work is entailed in removing and replacing the brackets. On the average, even with a number of workmen and lifting devices, it requires about two hours of time to remove or replace the brackets. Generally, the bed brackets are left in place as they seldom interfere with brake operations.

In accordance with the present invention a bending brake and press combination employing an elongated relatively narrow ram with retractable ram brackets is provided so that the same apparatus can be used both as a bending brake and as a press, the retractable brackets on the ram being movably mounted thereon for movement into and out of operating positions and being arranged to be moved readily into and out of said positions by the power customarily applied to the ram.

More specifically the apparatus comprises a bending brake with a relatively narrow elongated ram and ram brackets pivotally connected to the ram at its front and rear faces, respectively, so as to swing downwardly into operative position to provide a wide undersurface on the ram, and detachable connections between the brackets and the frame of the bending brake so arranged that when certain simple connections between the brackets and the frame are made and the ram is lowered, the brackets are swung upwardly into an inoperative position, whereby the apparatus can be used as a bending brake without interference with the stock, means being provided to secure the brackets in either the operative or inoperative position, selectively.

In the present invention this is accomplished by one man without the aid of extraneous lifting devices or special tools, in about ten minutes, thus providing an apparatus which, because of the rapidity with which the change-over can be made, is a combined bending brake and press.

Objects and advantages of the present invention will become apparent from the following description of a preferred embodiment of the present invention wherein reference is made to the drawings, in which:

Fig. 1 is a front elevation of the combined bending brake and press with retractable ram brackets, part thereof being shown in section for clearness in illustration;

Fig. 2 is a right end elevation of the structure illustrated in Fig. 1, part thereof being shown in section for clearness in illustration;

Fig. 3 is an enlarged fragmentary front elevation of a portion of the structure illustrated in Fig. 1 showing particularly the ram operating mechanism, retractable brackets, and the means for moving the brackets to operative and inoperative positions, selectively.

Fig. 4 is an enlarged fragmentary sectional view of the ram, brackets, and bracket operating mechanism, with the brackets in operating position, and is taken on line 4—4 of Fig. 3, the bed of the press being shown in operative relation to the ram; and,

Fig. 5 is a sectional view similar to Fig. 4 but showing the ram brackets in inoperative position.

Referring to the drawings, the apparatus comprises generally a heavy upright frame 1 having a forming bed 2 arranged at the front part thereof at the desired working level. A reciprocable ram 3 is mounted in suitable guides 4 carried by the frame 1 for reciprocation toward and away from the bed 2 for cooperation therewith, both the ram and the bed being adapted to receive and support the cooperating forming tools, tool carriers, or platens required for the particular job.

Power means are provided for operating the ram. In the form illustrated, the power means comprise an electric motor 5 mounted on the frame 1 and drivingly connected to one side of a clutch 6, the opposite side of which is connected to a suitable gear 7. The gear 7, in turn, is fixedly mounted on a jack-shaft extending along the read of the frame 1, this shaft carrying gears 8 near its ends which are rotatable with the shaft and drivingly connected to main driving gears 9 at the ends of the frame. Each of the gears 9 is fixedly secured to an eccentric shaft, or crank 10, which is mounted for rotation in the frame 1. The cranks are drivingly connected to the ram 3 by means of pitmans 11, respectively. Each pitman 11 is preferably extensible and contractable for adjusting the height of the ram.

In the form illustrated, the extensibility of each pitman is obtained by means of a threaded rod 12 which is in threaded engagement with a gear 13 of the pitman 11, the gear 13 being arranged so that upon rotation of the gear 13 about its axis the rod 12 is extended or retracted relative to the main body of the pitman 11. Since there is a pitman 11 near each end of the ram, concurrent adjustment of the same for adjusting the height of the ram is provided. Such may be obtained by means of worm gears 14 which are in engagement with the gears 13 and are connected to a common shaft 15. The shaft 15 is rotatably driven through a suitable gear train 16 by a motor 17. Thus the height of the ram can be adjusted. The rod 12 is connected to the ram 3 by suitable means such as a ball joint 18. A foot treadle 19 is provided at the front of the bed 2 and is connected by suitable linkage, as illustrated in Fig. 2, to the clutch 6 for controlling the operation of the ram.

The structure thus far described is a type of bending brake available on the market and the specific details thereof above described form no part of the present invention.

As is quite customary in brakes of this type

in which removable brackets are provided, the bed brackets for widening the bed of the brake are seldom removed. Accordingly, in conformance with the prior practices, bed brackets 20 are secured to the bed by suitable bolts 21, the usual keyways and shoulders being provided if the brackets are to withstand severe stresses. They are mounted on the bed so that their upper surfaces are coplanar with the upper surface of the bed 2, as best illustrated in Figs. 4 and 5. The ram 3 is provided at its lower edge with a suitable removable clamping plate 22 for securing the desired tool or tool holder thereto.

Referring next to the retractable ram brackets, and the manner in which they are combined with the ram and operated, with which the present invention is concerned, two such brackets 23 are shown, one at the forward face of the ram and one at the rear face. Since the brackets are the same in form, function and operation, one only will be referred to in detail. Referring to the front bracket for purposes of illustration, the front bracket comprises an upright plate or member 24 adapted when in operating position to lie in face to face juxtaposition with the upright forward face of the ram and a bottom plate 25 extending at right angles thereto and arranged so that, when the bracket is in operating position, the plate 25 is coplanar with the underface of the ram. Suitable reinforcing means such as gussets 26 are provided for affording the necessary rigidity to the bracket. The bracket 23 is mounted on the ram 3 for movement relative thereto into and out of operating positions. In the form illustrated, this is accomplished by means of suitable mounting brackets 27 which are fixedly secured to the ram, preferably one at each end of the bracket 23, and intermediate mounting brackets 28 arranged near the longitudinal midportion of the ram and spaced apart from each other at opposite sides of the longitudinal midportion of the ram. The end mounting brackets 27 are connected by pivots 29 to the gussets 26 in spaced relation to the bottom plate 25. The mounting brackets 28 are connected to cooperating mounting brackets 30 which are secured to the retractable bracket 23 by a pivot 31, the pivots 29 and 31 being coaxial. The pivot 34 is keyed to the ram bracket 23 for rotation therewith about the pivotal axis. With this arrangement the retractable ram bracket 23 can be swung upwardly from its operating position away from the lower edge of the ram 3 to an idle position in which it will not interfere with the operation of the apparatus as a bending brake. As illustrated particularly in Figs. 1, 3 and 4, the ram brackets 23 are in operating position, having been swung downwardly about their pivotal connections until the plates 24 are juxtaposed against the front and read faces of the ram, respectively. In this position they are secured in firm face to face relation to the ram 3 by means of bolts 32. For relieving the bolts 32 from the stresses to which the brackets 23 are subjected during operation, suitable keys 33 are provided and are positioned to engage shoulders at the upper edges of the plates 24 and a cooperating keyway in the ram when the brackets 23 are in operating position.

Referring next to Figs. 3 through 5, a suitable means is shown for moving the brackets 23 upwardly, to the inoperative position shown in Fig. 5, by means of the power supplied for the ram. Mounted on the pivot 31 is a suitable drum which, in the form illustrated, is shown as a double

sprocket 34. The sprocket 34 is secured to the brackets 30 and pivot 31 by means of a key 35 so that, upon rotation of the sprocket 34, the brackets 30 and thereby the retractable ram bracket 23 secured thereto are swung about the pivotal axis.

In order to rotate the sprockets 34 from the power supply for the ram, suitable chains 36 are provided. Each of the chains is secured at one end to the sprocket 34 and extends from the connected end outwardly and partially around the sprocket and thence upwardly.

Mounted on the frame 1 of the apparatus is a suitable anchor 37 adapted to receive the other ends of the chains 36 and to be connected thereto readily. In the form illustrated, the anchor 37 is provided at its lower edge with eyes 38 between which the upper ends of the chains are received and to which they are secured by means of a pin 39 which passes through the eyes and the link openings in the upper end links of the chains.

A guide roller 40 is mounted on the face of the rams and engages the chains outwardly therefrom so as to maintain the chains close to the face of the ram so as not to interfere with the bracket 23 when it is swung to its uppermost, or inoperative, position.

Each of the chains 36 is of such length that when the ram 3 is raised to its uppermost position with the ram bracket 23 in operating position on the ram, they can be connected at their upper ends to the anchor 37 without appreciable slack.

In order to swing the bracket 23 from the lowered, or operating position, upwardly, to the raised, or inoperative position, the bolts 32 are removed so as to release the ram bracket 23 for movement. The ram 3 is then fully raised and while so raised the chains 36 are connected to the anchor 37, by the pin 39. Thereupon the ram 3 is lowered and, due to the resultant force on the chains 36 and its movement relative to the ram, the sprockets 34 are caused to rotate in directions to swing the brackets 23 outwardly and upwardly from the operating position illustrated in Fig. 4 to the inoperative position illustrated in Fig. 5. A suitable slot 41 is provided in the bottom plate 25 for affording relative passage of the bottom plate 25 and the chains 36 so that the bracket can be swung upwardly the maximum distance where the edge of the plate 25 is substantially in contact with the forward face of the ram 3.

Mounted on the ends of the ram brackets 23 are suitable ears 42, each of which is provided with apertures 43 for receiving tie-bolts therethrough. The ram is provided with threaded apertures 44 so positioned that when the ram brackets 23 are swung upwardly to inoperative position, the apertures 24 are aligned with the apertures 44. Suitable bolts 45, as best illustrated in Fig. 5, are then passed through the apertures of the ears 42 and engage with the apertures 44 for securing the brackets 23 in idle position. The chains 36 are then detached from the anchor 37 and the apparatus is ready for use as a bending brake.

When it is desired to replace the ram brackets 23 in operating position, first the chains 36 thereof are connected to the anchor 37 with the ram in lowered position so that there is no slack in the chains. The bolts 45 are then removed, and the ram raised by the usual power means, whereby the ram brackets 23 swing by gravity about their pivotal axis into the position illustrated in Fig. 4. In this position they are clamped by the bolts 32 after which the chains 36 are disconnected from the anchor 37. Either operation requires about ten minutes. Various modifications may be made in the structure as described for purposes of illustration without departing from the scope of the invention.

Having thus described my invention, I claim:

1. In a bending brake and press combination including an upright frame and a power driven ram reciprocable therein along a vertical path, a ram bracket having a working underface which, in an operative position of the bracket is positioned adjacent the lower edge of the ram and in an inoperative position of the bracket is disposed at a level above said operating position, pivot means pivotally securing the ram bracket to the ram for swinging movement about a horizontal axis in opposite directions into operative and inoperative positions, respectively, and for movement with the ram, in each of said positions, said bracket being adapted to be secured in said operative and inoperative positions on the ram, selectively, and to be released for swinging movement to inoperative and operative positions, selectively, means operable to operatively connect the bracket and frame so as to swing the bracket to inoperative position upon movement of the ram in one direction along said path, said last named means including a drum coaxial with said pivot means and connected to the bracket for rotation therewith about said axis, a flexible tension member wound about the drum and arranged to rotate the drum when the member is moved endwise under tension and thereby swing the bracket upwardly to said inoperative position, cooperative connecting means on the frame and flexible tension member operable to cause said endwise movement under tension of the flexible tension member by predetermined movement of the ram while the cooperative connecting means are connected, and means for detachably connecting and disconnecting the cooperative connecting means, selectively.

2. The bending brake and press combination according to claim 1 characterized in that said drum is a sprocket, said flexible tension member is a chain engaging the sprocket, and said connecting means is positioned on the frame above the level of the sprocket.

3. In a bending brake and press combination including an upright frame member and a power driven ram member reciprocable therein along a vertical path, a ram bracket having a working underface which in an operative position of the bracket is positioned adjacent the lower edge of the ram member and in an inoperative position of the bracket is disposed at a level above said operating position, pivot means pivotally securing the ram bracket to the ram member for swinging movement relative thereto about a horizontal axis in opposite directions into said operative and said inoperative positions, respectively, and for movement with the ram member, in each of said positions, said bracket being adapted to be secured in said operative and inoperative positions on the ram member, selectively, and to be released for swinging movement to said inoperative and said operative positions, selectively, means to operatively connect the bracket and frame member so as to swing the bracket upwardly to inoperative position upon movement of the ram member downwardly along said path, said connecting means including a

tension element connected at one end to the bracket so as to swing the bracket relative to the ram member to said inoperative position when the tension element is moved endwise under tension, and connected at the other end in fixed position relative to the frame member at a level about the connection of the first end of the tension element to the bracket so as to cause said movement of the tension element endwise under tension by said downward movement of the ram member, and means for detachably, operatively

connecting one end of the tension element to, and disconnecting it from, its associated one of the members, selectively.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
324,812	Clapp	Aug. 25, 1885
402,668	Hart	May 7, 1889
1,235,821	Leland	Aug. 7, 1917
1,997,672	Bath	Apr. 16, 1935