Aug. 30, 1938. S. GOODMAN 2,128,295

BENDING BRAKE

Filed Sept. 23, 1935 3 Sheets-Sheet 1

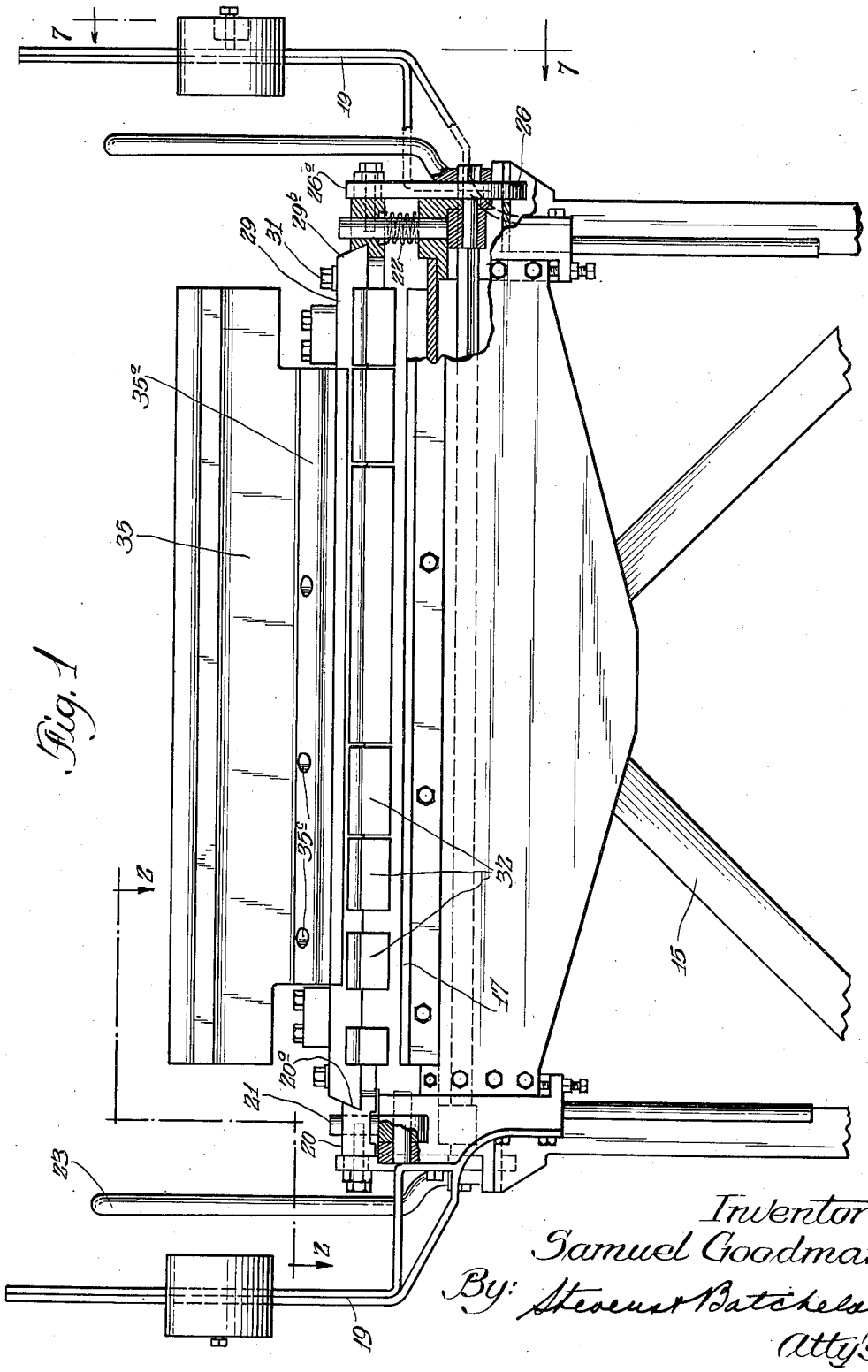

Fig. 1

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BENDING BRAKE

Filed Sept. 23, 1935 3 Sheets-Sheet 2

Fig. 2

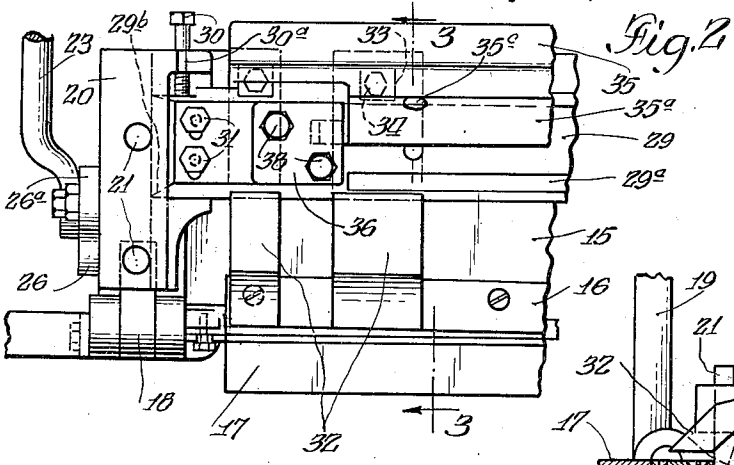


Fig. 3

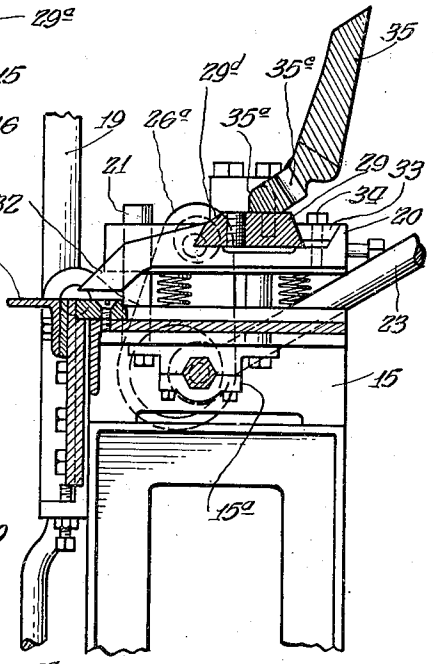


Fig. 4

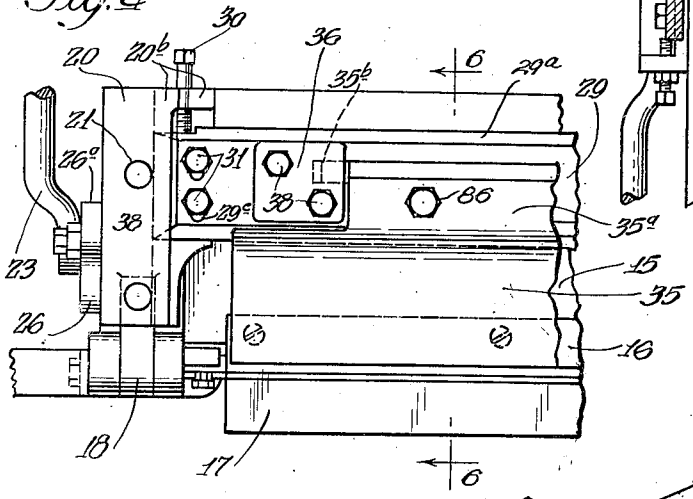
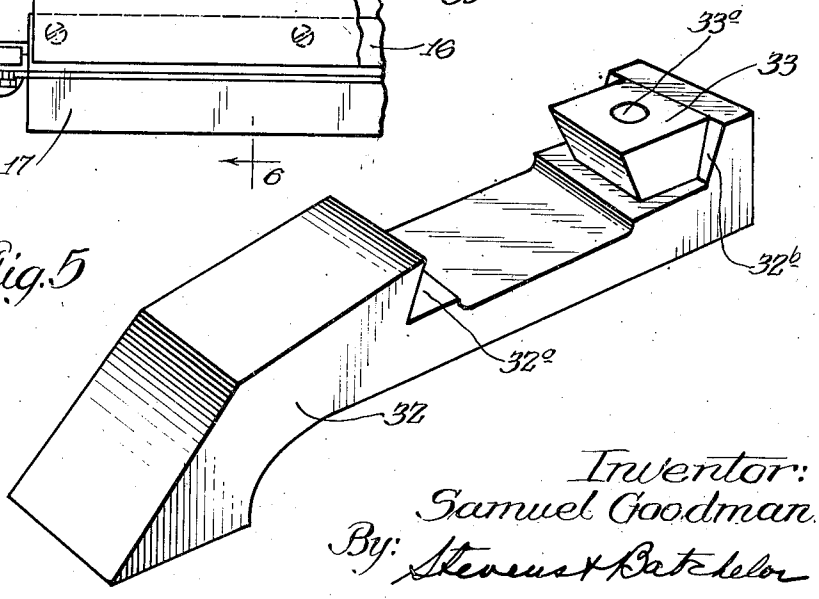


Fig. 5



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BENDING BRAKE

Filed Sept. 23, 1935 3 Sheets-Sheet 3

Fig. 6

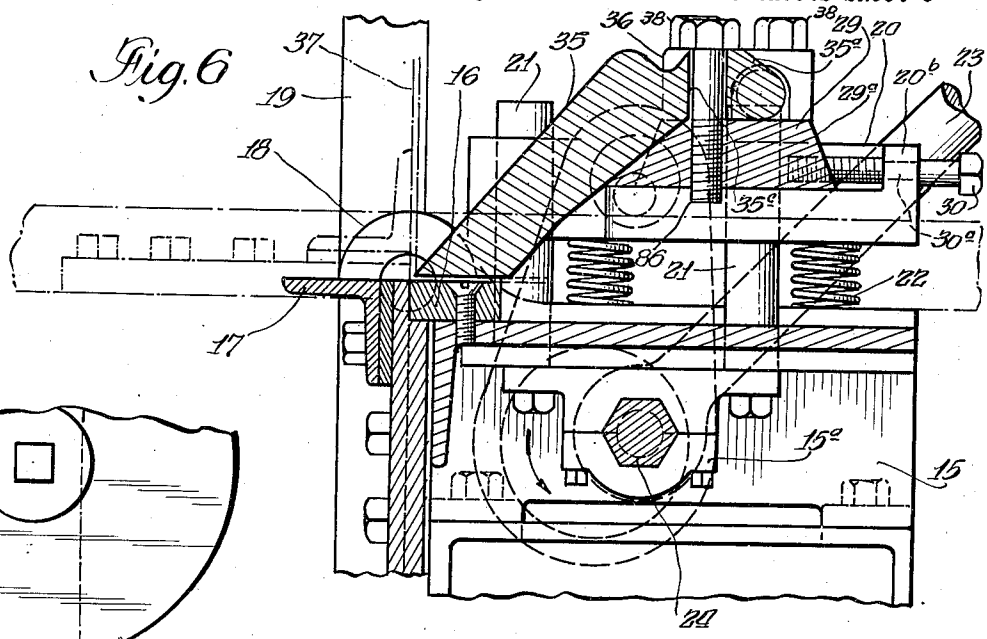


Fig. 7

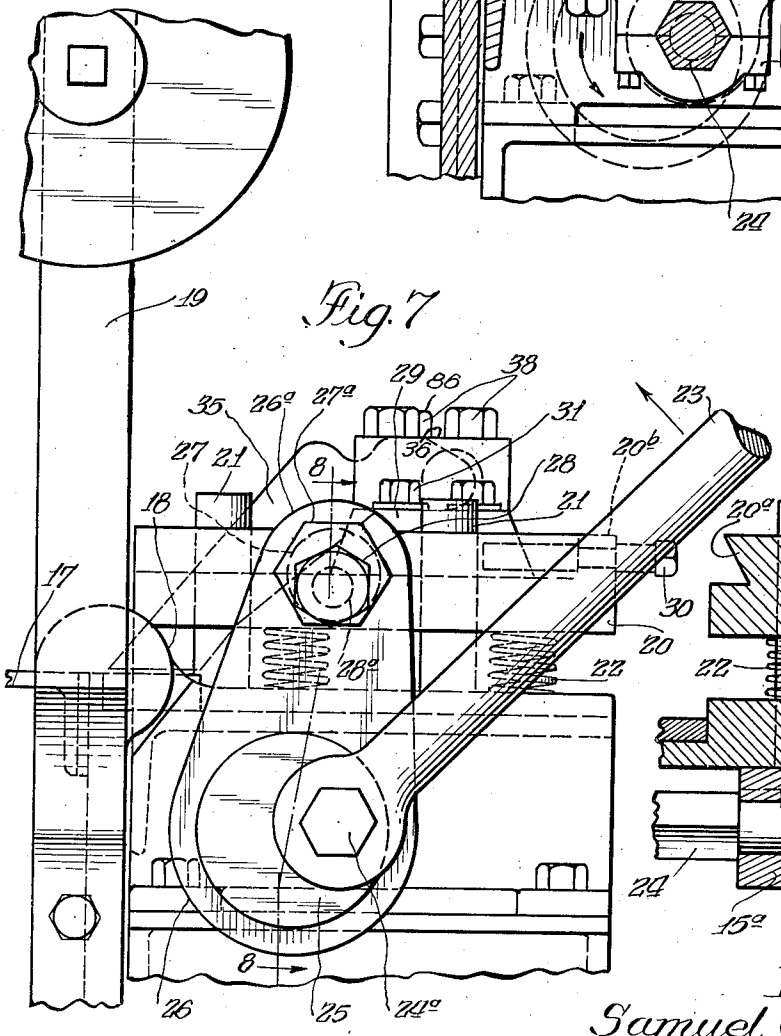
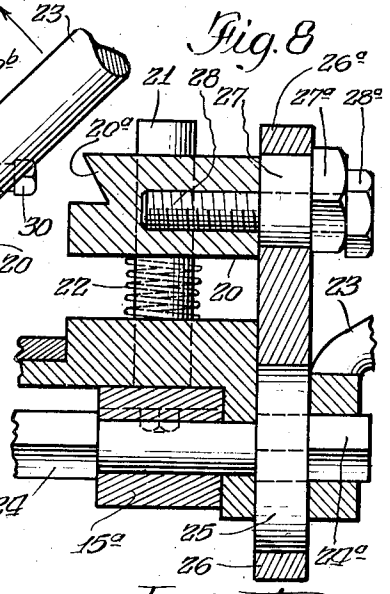


Fig. 8



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Patented Aug. 30, 1938 2,128,295

UNITED STATES PATENT OFFICE

2,128,295

BENDING BRAKE

Samuel Goodman, Chicago, Ill.

Application September 23, 1935, Serial No. 41,799

10 Claims. (Cl. 153—16)

My invention relates to bending brakes for sheet metal and has for its main object to provide a quickly interchangeable means for bending material in short units or in long sheets.

A further object of the invention is to so design the novel machine that the means for bending long sheets may be positioned out of the way yet within easy reach and manipulation, while the means for treating the shorter material is in service position.

A still further object of the invention is to provide simple and handy adjusting means for the forth and back positions of the sheet holding means.

An important object of the invention is to construct the machine along lines of extreme simplicity and with the fewest working parts conducive to efficient operation.

With the above objects in view, and any others which may suggest themselves from the description to follow, a better understanding of the invention may be had by reference to the accompanying drawings in which—

Fig. 1 is a front elevation of the novel bending brake;

Fig. 2 is a fragmentary plan view on the line 2—2 of Figure 1;

Fig. 3 is a section on the line 3—3 of Figure 2;

Fig. 4 is a view similar to Figure 2 showing a work holding jaw suitable for long material;

Fig. 5 is an enlarged perspective view of a work holding finger;

Fig. 6 is an enlarged section on the line 6—6 of Figure 4;

Fig. 7 is an enlarged fragmentary end elevation taken substantially on the line 7—7 of Figure 1; and

Fig. 8 is a section on the line 8—8 of Figure 7.

While most bending brakes follow conventional principles of design, it is significant that for different types of work changes in the machine require more or less dismantling and other major adjustments, these consuming considerable time and keeping the equipment out of service while the changes are being made. This is particularly true where bending work of different lengths is considered, the installations for the long and short types of work being built so thoroughly into the structure of the machine that the changes to prepare the machine for either class of work are more or less radical in nature, so that a machine constituted for the purposes under consideration is necessarily complicated and expensive. I have therefore departed from the difficult and radical measures incident to machines so far devised by designing a bending brake of few parts, easy adjustments and high efficiency.

In accordance with the foregoing, specific reference to the drawings indicates the stand for the machine at 15, the bed or platen at 16, the bending jaw at 17, its bearings at 18, and its counter-weighted operating arms at 19.

As is customary in bending brake design, terminal blocks 20 are provided for the work holding units, such blocks being perforated to slide vertically in relation to the bed 16 along pins 21 upstanding from the latter. Booster springs 22 are provided between the blocks 20 and the bed in order to assist the rise of the blocks when the work is to be released. The descent of the blocks 20 is procured by the forward manipulation of either one of terminal levers 23, that is, in the direction of the arrow in Figure 6. The levers 23 are secured on the hexagonal outer ends 24*a* of a longitudinal rock shaft 24 carried in terminal bearings 15*a* of the stand 15. Along the inner side of each lever the shaft carries an eccentric 25 over which is mounted a follower 26. The latter rises to a point opposite the corresponding block 20 being there formed as a follower 26*a* of an eccentric 27 carried by a bolt 28 whose head 28*a* abuts a hexagonal external enlargement 27*a* of the eccentric 27, as clearly shown in Figure 8, the shank on the bolt being threaded into the block. The action of the lever is indicated at its rearward extreme in Figure 3, and in a more forward position in Figures 6 and 7, it being understood that, as either lever is drawn forwardly the eccentric 25 will draw downwardly on followers 26 and lower the blocks 20. When the latter are considered as carriers of the work holding jaw assembly, it will be apparent that a further adjustment is necessary according to the thickness of the sheet being bent. This is procured by slightly loosening the bolts 28*a* and turning the eccentric head 27*a* to slightly raise or lower the blocks 20 in relation to the follower 26*a*, the bolts being retightened when the proper adjustment has been made.

The end blocks 20 are utilized as supports for a longitudinal plate 29 which forms the carrier for the work holding jaws. The plate 29 is beveled upwardly both at the sides, as indicated at 29*a*, and at the ends, as shown at 29*b*. The blocks 20 are undercut with seats 29*a* to receive the plate 29 endwise, as clearly shown in Figures 1 and 8, the plate being slidable forth and back in such seats. The position of the plate can therefore be adjusted in relation to the blocks whereby to place the work holding jaws accordingly, this be-

ing accomplished by passing bolts **30** through upward lugs **20***b* of the blocks **20** and threading the shanks of the bolts into the plate **29**, as clearly shown in Figure 6. The bolt shanks are unthreaded and somewhat reduced as indicated at **30***a* where they pass through the lugs **20***b*, the latter being divided from the top to receive the bolt portions **30***a*. Therefore, the lugs form bearings against the longitudinal movement of the bolts and permit the bolts to be easily inserted or removed when free of the plate. The latter has cross slots **29***c* at the ends for securing bolts **31** threaded into the end blocks **20**.

The top plate **29** is of a design suitable to support a number of sectional work clamps or fingers **32**, one of which is shown in the perspective view of Figure 5. As indicated in Figure 2, these fingers may be of different widths and are designed to be spacedly adjustable from each other, so that work of corresponding widths and requiring end spaces may be applied with facility to be held before the bending jaw is swung upon the same. To apply one of the clamping fingers **32** to the plate, the shank of the finger is made in its forward upper portion with an undercut seat **32***a*; and the rear portion of the shank is made with an obtuse seat **32***b*. A keystone block **33** is adaptable for the seat **32***b*, being applied after the finger has been passed with its shank under the plate **29** to dispose the latter in interlocked position relative to the seat **32***a* and in resting position on the base of the seat **32***b*. The keystone block **33** is vertically perforated at **33***a*, and the finger shank **32** is tapped in continuation of the bore **33***a*, so that a bolt **34** inserted into the keystone block and threaded into the finger shank will cause the finger to become clamped to the plate **29** by the crowding of the keystone block against the bevels of the plate **29** and seat **32***b*, it being understood that the angularity of the contiguous bevels is similar. It is seen that the single adjustment of the bolt **34** not only serves to clamp the finger **32** securely to the plate **29**, but also that the slight loosening of the bolt permits the finger to be adjusted laterally as desired.

While routine work makes it desirable that the array of sectional work clamping fingers be handy for selection and adjustment as shown, a hold-down clamp is often required for longer or larger work, such clamp to extend approximately the length of the machine. A clamp of this magnitude is indicated at **35**, the same having a somewhat reduced base **35***a* formed with end trunnions **35***b* journalled in bearing blocks **36** carried by the plate **29** and secured thereto by bolts **38**. Thus, the clamp **35** is pivotally disposed in relation to the plate **29**, so that it may be swung back to the position indicated in Figures 1 and 3 when it is out of use, so as to be out of the way of the sectional clamping or finger assembly. However, when the clamp **35** is to be employed, the sectional finger securing bolts **34** and their associated keystone blocks **33** are removed, permitting the fingers **32** to be taken out of the machine. Now, the space previously occupied by the foreparts of the fingers is clear, and the clamp **35** may be swung down to seat squarely with its base **35** upon the top the plate **29** and with its forepart in work clamping position, as indicated in Figure 6, the front edge of the plate being chamfered at **29***d*, as seen in Figure 3, to afford clearance for the clamp base. That its seated position may be maintained, the base of the clamp **35** is vertically perforated at **35***c* at several points along its length, and the plate **29** tapped in continuation of the bores **35***c*, so that bolts **86** may be directed downwardly to firmly secure the clamp **35** in service position to the plate **29**. This position is shown in Figure 6, and the dotted left-hand portion thereof indicates that the bending clamp **17** has been swung in clockwise direction through a quarter turn whereby to form an angle work specimen **37**.

It will be seen from the above description that I have designed a bending brake which is not only versatile in respect to the types of work required, but makes the units changeable for such types readily accessible and quickly convertible. Further, no special tools are required for this purpose. Whatever attention is necessary whether for the adjustment of the machine in general or for the changing of its operative units, involves the mere control, removal or replacement of a few bolts and other simple parts, requiring no particular skill on the part of the attendant. Further, no mechanisms of a delicate character are involved, nor any adjustments which are complicated or unnatural to the handling of a bending brake. Finally, it is obvious that whatever parts or units enter into the machine are of a character to be manufactured at minimum cost.

While I have described the novel bending brake along particular lines, it will be apparent that many minor changes may be made therein without altering the principle of the invention, and I consider such changes as coming within the scope and spirit of the appended claims.

I claim:

1. In a bending brake, a stand, end supports over said stand and vertically movable in relation thereto, a longitudinal plate spanning said supports, work clamping means carried by said plate, said plate being slidable from front to rear and vice versa in relation to the end supports, and means for adjusting the plate to different positions in its sliding movement, such means comprising bolts journaled in the supports against longitudinal motion, the shanks of the bolts threading into the plate.

2. In a bending brake, a support including a longitudinal plate, a work clamping finger applied to said plate, the shank of said finger being positioned beneath said plate, the front and rear edges of the plate being beveled from the bottom, the frontal portion of such shank being undercut to form a retentive joint with the frontal bevel of the plate, a receptacle formed at the rear end of the finger shank, and an element co-operating with the receptacle and the rear beveled edge of the plate to retain the rear portion of the shank to the latter while permitting the finger to slide along the plate.

3. The structure of claim 2, said receptacle forming an obtuse seat, and said element comprising a keystone block with sides conforming to said seat and the rear bevel of the plate, and a bolt passed downwardly through the keystone block and threaded into the receptacle.

4. A bending brake having a support, a full-length work clamp carried by the same, means pivotally securing the rear-part of the clamp to the support for the movement of the clamp between operative and inoperative positions, and means rigidly securing the fore-part of the clamp to the support when the clamp is in the operative position.

5. A bending brake having a support, a full-length work clamp carried by the same, means pivotally securing the rear-part of the clamp to the support for the movement of the clamp between operative and inoperative positions, the

fore-part of the clamp having a series of laterally-spaced perforations, the support having a series of tapped bores registering with said perforations when the clamp is in the operative position, and bolts threaded into said bores by way of said perforations to rigidly secure the fore-part of the clamp to the support.

6. In a bending brake, the combination with a support adapted to have a set of part-length work clamping fingers removably secured thereto; of a full length work clamp pivotally secured to the support and swingable to a position clear of the zone occupied by the fingers.

7. In a bending brake, the combination with a support adapted to have a set of part-length work clamping fingers removably secured thereto and operative at the front of the brake; of a full length work clamp pivotally secured to the support and swingable from front to rear to a position clear of the zone occupied by the fingers.

8. In a bending brake, the combination with a support adapted to have a set of part-length work clamping fingers removably secured thereto and operative at the front of the brake; of a full length work clamp pivotally secured to the support and swingable rearwardly beyond the pivot to rest on the support in a position clear of the zone occupied by the fingers.

9. In a bending brake, the combination with a support adapted to have a set of part-length clamping fingers removably secured thereto in operative positions; of a full length work clamp mounted on the support and movable in relation to the latter when the fingers are removed to occupy the same operative position as said fingers.

10. In a bending brake, the combination with a supporting bar adapted to have a set of part-length clamping fingers removably secured to its bottom surface; of a full length work clamp pivotally mounted on the top surface of the bar and swingable forward when the fingers are removed to occupy an operative position in respect to the bar.

SAMUEL GOODMAN.