Dec. 26, 1967 O. J. FILLIP 3,359,772

HAND BRAKE

Filed Aug. 26, 1965 4 Sheets-Sheet 1

Fig. 1

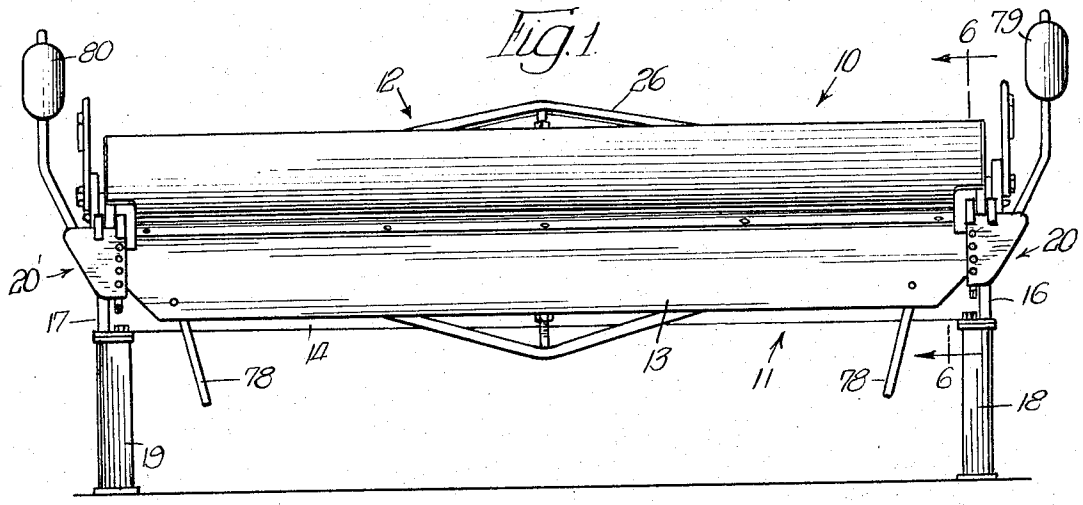


Fig. 3

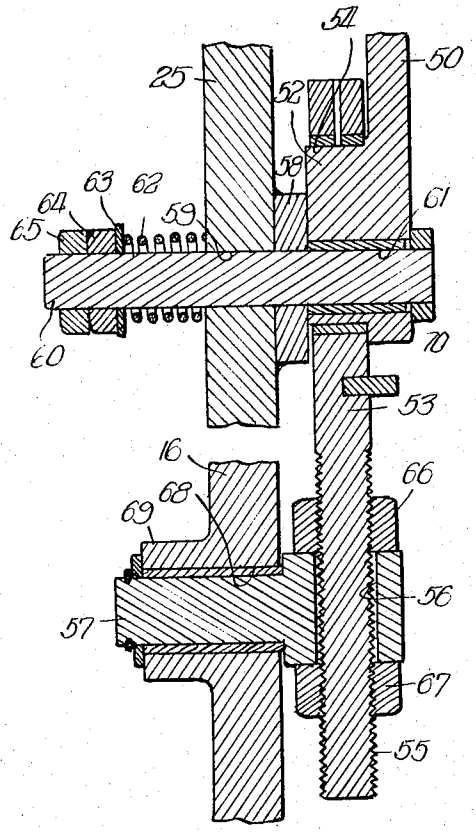
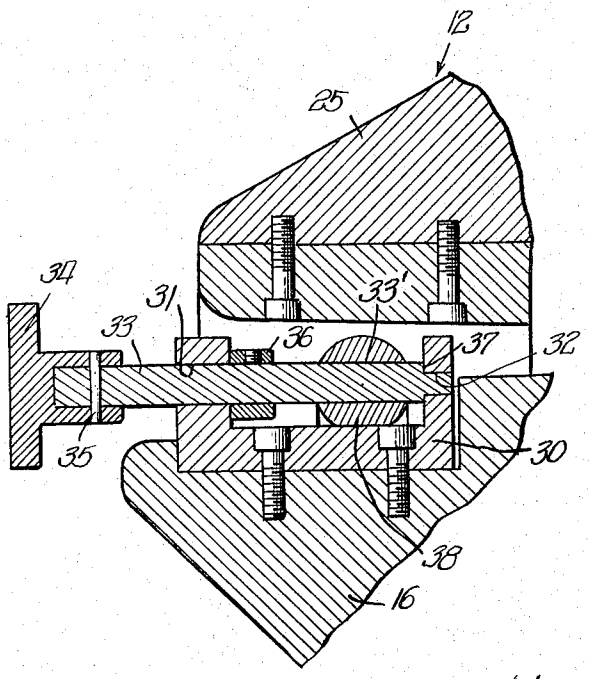


Fig. 5



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HAND BRAKE

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Fig. 2

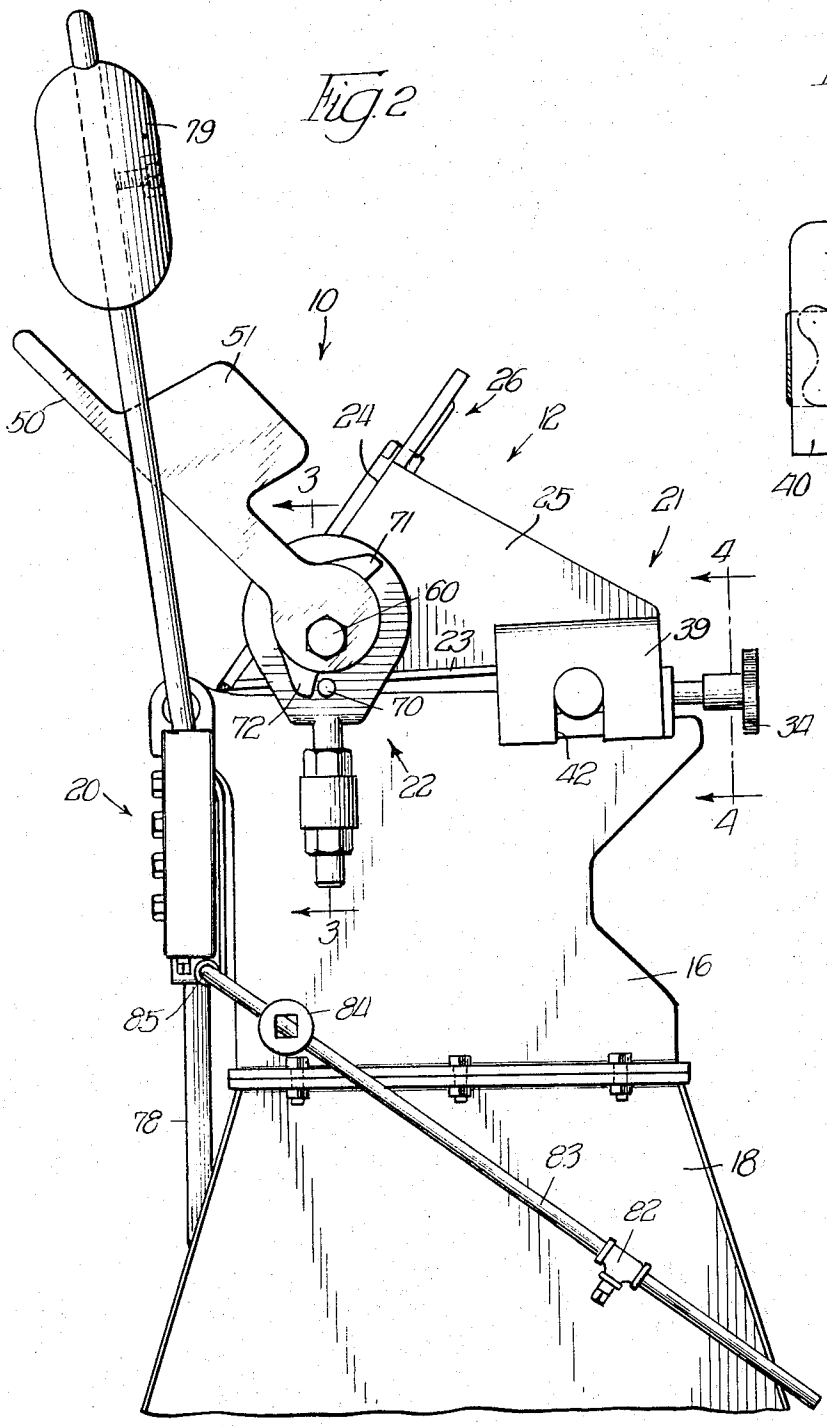
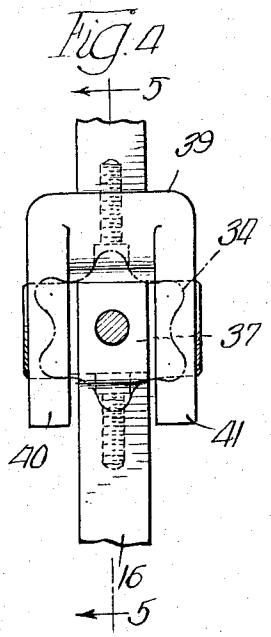


Fig. 4



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HAND BRAKE

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Fig. 6

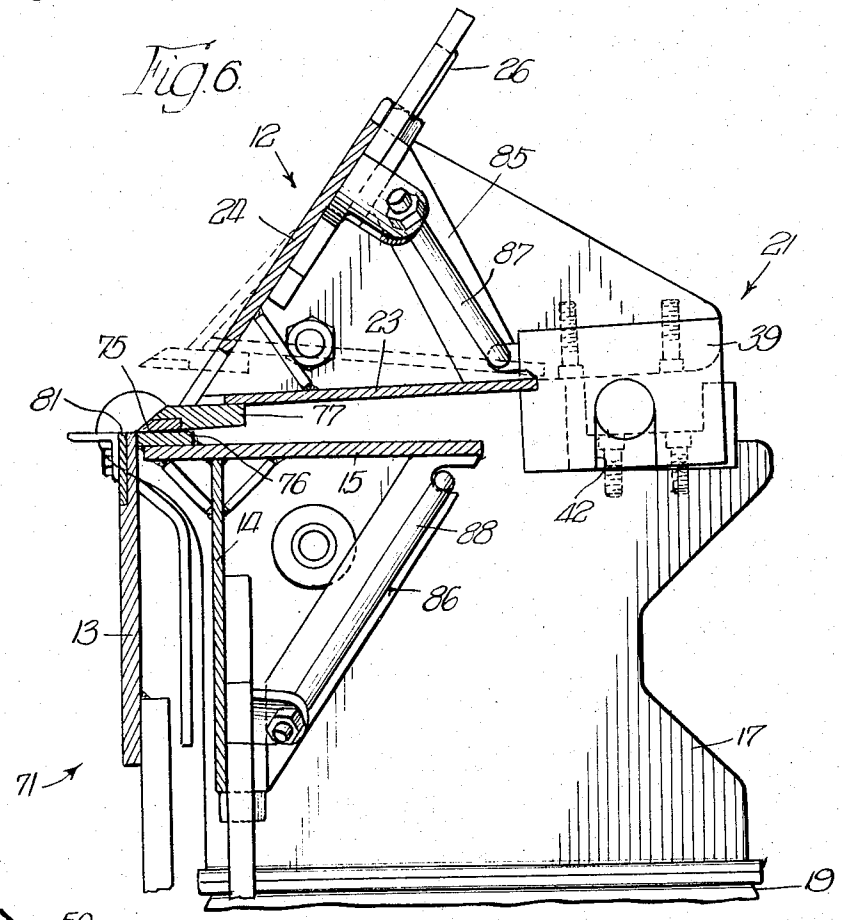
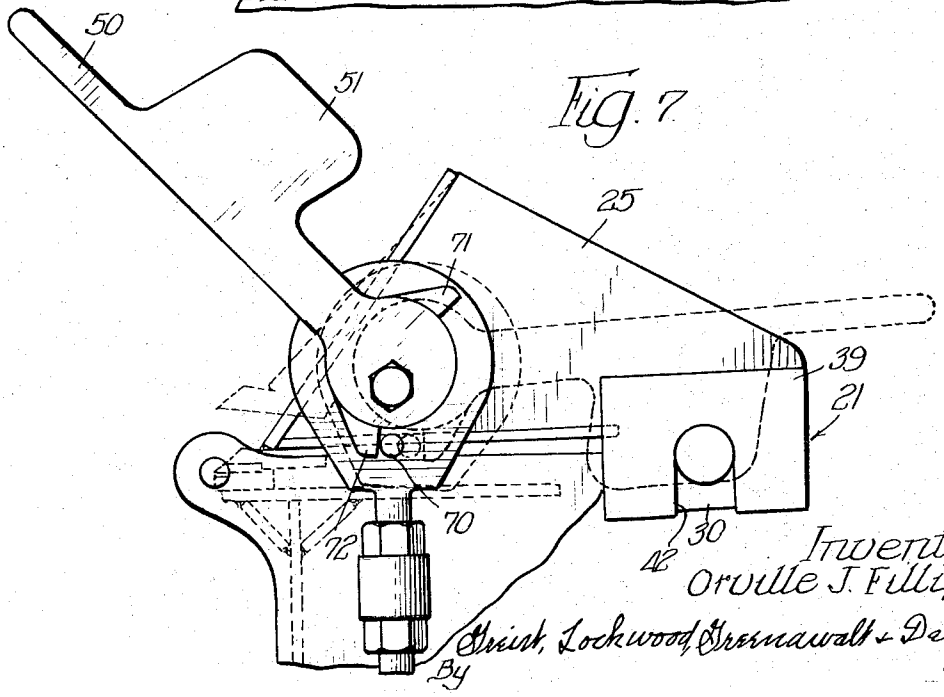


Fig. 7



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HAND BRAKE

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Fig. 8.

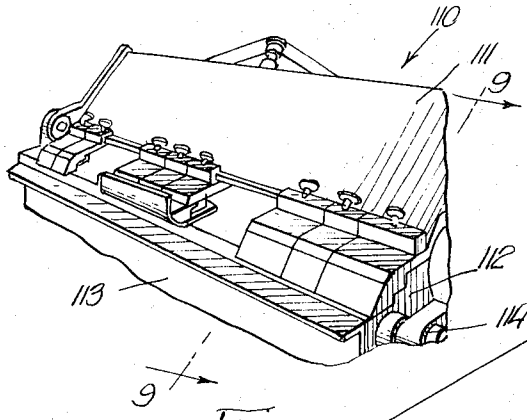
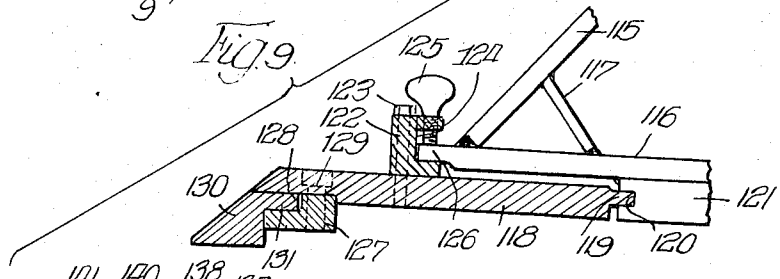


Fig. 9.



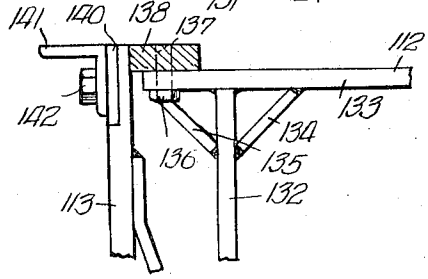


Fig. 11

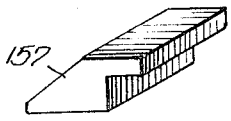


Fig. 12

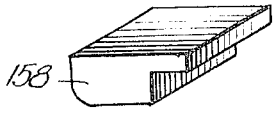


Fig. 13

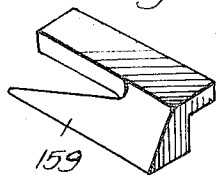
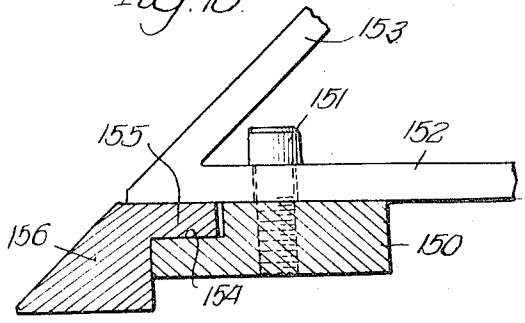


Fig. 10.



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United States Patent Office 3,359,772 Patented Dec. 26, 1967

3,359,772

HAND BRAKE

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Filed Aug. 26, 1965, Ser. No. 482,817
1 Claim. (Cl. 72—319)

ABSTRACT OF THE DISCLOSURE

A hand brake having a top leaf supported on the bottom leaf by a hinge arrangement which is adjustable without the aid of tools, and is self-locking. The hinge arrangement consists of an upper saddle mounted on the top leaf and lower saddle on the bottom leaf. A cylindrical nut is adjustably carried by the lower saddle and receives U-shaped slots in the upper saddle. A finger mounting arrangement which permits fingers to be installed and removed without the aid of tools is also shown.

This invention relates to improvements in floor mounted, standard and box and panel type brakes and more particularly is directed to new and improved brakes of uncomplicated construction having a novel means for permitting expedient adjustment of the top leaf assembly to compensate for changes in thickness of the metal stock to be bent. In addition, suitable means is provided permitting adjustment of the clamping pressure to accommodate changes in thicknesses of metal stock. A novel mounting arrangement of fingers is also provided in the box and pan design which facilitates easy and expedient changing of the nose bars.

Bending brakes or metal brakes as they are sometimes called, find wide use in the heating, ventilating, automobile repair and like fields. In the smaller sheet metal job shops, a floor mounted hand brake is an extremely important piece of equipment since it is used to make various bends in day-to-day operations. Thus, it is important that the brake be versatile for optimum use with different thicknesses of sheet stock.

Generally speaking, brakes are characterized by co-operating elements including a bottom support member which is sometimes referred to as an anvil assembly or clamping bed. A top leaf is disposed above the anvil assembly and is provided with means to draw the same into clamping engagement with the anvil assembly. In the box and pan type as contrasted with the standard type, the clamping fingers may be removably mounted and in the present design, are mounted in a novel manner for ease of interchangeability. A bending leaf is hingedly mounted for swingable movement about a horizontal axis on the forward portion or front of the anvil assembly to bend the material clamped.

As the sheet metal emerges from the anvil assembly where it is clamped between a nose portion of the top leaf and the anvil, it intersects the plane of the bending leaf so that movement of the latter causes the emerging portion to be bent. Suitable means is oftentimes provided to permit the clamping pressure to be adjusted and also in the past means has been provided to permit forward and rearward adjustment of the top leaf both of which function to accommodate varying thicknesses in sheet metal. In prior art designs, if forward and rearward adjustment was provided at all, it usually consisted of an adjustable nut and co-operating lock nut arrangement

requiring the operator at the brake to have wrenches continuously available. Needless to say, to effect an adjustment of this type was very cumbersome, time consuming, and as a consequence, costly.

The new and improved hand brake of the present invention contemplates the provision of a unique manner of mounting the top leaf portion on the anvil assembly. The mounting arrangement permits expedient forward and rearward adjustment of the nose portion of the top leaf with unequalled ease. No lock nut arrangement is required as in former designs. A unique clamping pressure adjustment also is provided, however, it requires adjustment much less frequently than the forward and rearward adjustments of the top leaf assembly.

It is a principal object of this invention to provide an extremely simple and economical hand brake which is easily operated including a unique means to permit rapid adjustment of the top leaf relative to the anvil assembly to compensate for varying thicknesses in metal.

It is a further object of this invention to provide a new and improved hand brake assembly of uncomplicated design which permits bending of sheet metal to be accomplished with greater rapidity than heretofore experienced.

It is a further object of this invention to provide a new and improved hand brake having a novel adjustment for forward and rearward movement of the top leaf assembly and a novel means to adjust the clamping pressure.

It is a further object of this invention to provide a new and improved hand brake assembly having the anvil assembly, top leaf assembly, and bending leaf assembly so disposed and mounted relative to one another to permit accurate bending to be performed with a minimum of effort.

It is a still further object of this invention to provide a novel mounting arrangement for the clamping fingers in the box and pan design.

Further and fuller objects will become readily apparent when reference is made to the accompanying drawings wherein:

FIG. 1 is a front elevational view of the hand brake of the present invention;

FIG. 2 is an end elevational view of the hand brake of FIG. 1 with the supporting leg being shown fragmentarily;

FIG. 3 is an enlarged cross sectional view taken generally along the lines 3—3 of FIG. 2;

FIG. 4 is an enlarged fragmentary elevational view taken generally along the lines 4—4 of FIG. 2;

FIG. 5 is an enlarged cross sectional view taken along the lines 5—5 of FIG. 4 to show the top leaf adjustment means;

FIG. 6 is an enlarged cross sectional view taken generally along the lines 6—6 of FIG. 1;

FIG. 7 is an enlarged fragmentary end elevational view showing the top leaf in the closed position in solid lines and the open position in phantom lines;

FIG. 8 is a fragmentary perspective view of a box and pan brake;

FIG. 9 is a fragmentary enlarged view taken along the lines 9—9 of FIG. 8;

FIG. 10 is an enlarged view of the nose bar clamping portion shown in FIG. 9; and

FIGS. 11–13 illustrate representative types of nose bars and extension fingers usable with the arrangement of FIGS. 8–10.

Referring now to FIG. 1, the hand brake of the present invention is illustrated generally at **10** including the usual bottom leaf portion **11** supporting a top leaf assembly shown generally at **12** and front leaf or bending leaf assembly at **13**. The bottom leaf **11** may be formed in any desired manner and as illustrated includes longitudinally extending plate members **14** and **15** which are joined to each other at right angles and suitably braced. End support members **16** and **17** are joined to opposite ends of the plate members **14** and **15**. Each end support **16** and **17** is mounted on a respective leg member **18** and **19** which in turn may rest on a mounting pad, factory floor, skid or the like.

Suitable means such as the hinge assemblies **20** and **20'** mount the bending leaf assembly **13** on the end support members **16** and **17** in a manner to be described in greater detail hereinafter. As is well known sheet metal is placed between the upper leaf assembly **12** and the bottom leaf **11** and clamped into place by suitable means with the end or edge to be bent projecting outwardly. The bending leaf **13** is then raised to the desired degree to bend the material to the appropriate angle which angle can be controlled or repeated on the present machine by a simple but effective adjustment as will be seen.

Referring now to the enlarged end elevational view of FIG. 2, the more detailed features will be described. A top leaf adjustment is indicated generally at **21** and the clamping pressure adjustment is indicated generally at **22**. In FIG. 2, the brake is illustrated with the top leaf assembly in the clamped position and the bending leaf at rest. The top leaf assembly **12** may be formed in any suitable manner such as by joining the longitudinal plate members **23** and **24** to triangular shaped end plates (only one shown at **25**) to form a generally wedge-shaped top leaf assembly **12**. A suitable truss member **26** may be provided to permit adjustment of the central section of the top leaf assembly **12** to compensate for deflection when clamping pressure of unusual magnitude is applied.

Referring now to FIGS. 2, 4 and 5, the front-to-back adjustment provided by the novel hinge assembly **21** will be described. Each hinge assembly **21** is of uniform construction and is disposed at opposite ends of the top leaf. In the interest of brevity only the right-hand hinge assembly **21** will be described, it being understood that both assemblies are identical. The hinge assembly **21** includes a lower adjustment saddle member **30** as seen in FIG. 5, and is of a channel or generally U-shaped configuration having bores **31** and **32** in each of the leg members to slidably receive a threaded adjustment screw **33**. A handle member **34** is joined to the projecting end of the adjustment screw **33** by means of a roll pin or the like **35**. A collar member **36** and a shoulder **37** on the adjustment screw **33** serves to maintain the screw properly positioned to permit a flat sided adjustment nut **38** to travel between the collar **36** and shoulder **37** in response to rotation of the handle **34**.

As seen in FIG. 4, a top saddle member **39** is generally U-shaped in endwise elevation having leg portions **40** and **41** overlying opposite sides of the lower adjustment saddle **30** and the associated end support **16**. The top adjustment saddle **39** as well as the lower adjustment saddle **30** may be mounted in the seats formed in the top and bottom end supports **25** and **16**, respectively, by means of cap screws as illustrated. Each of the respective supporting surfaces may be machined to receive co-operating machined surfaces on the top and bottom saddles to insure accurate position of one part relative to the other. The top adjustment saddle **39** in side elevation contains a U-shaped slot in each of the legs **40** and **41** with one in evidence at **42** in FIG. 2. The U-shaped slots receive the cylindrical adjustment nut **38** with a bearing fit on opposite sides of upper saddle **39** to permit the top leaf assembly to rotate about an axis passing through the central axis of the nut which coincides with the hinge axis.

As is apparent, the central axis of each of the nuts is

movable to shift the hinge axis of the top leaf assembly. Rotation of the handle **34** causes the adjustment screw **33** to rotate thereby causing the adjustment or hinge nut **38** to slide on the flat side thereof between limits established by the collar **36** and shoulder **37**. Accordingly, the hinge axis of the top leaf assembly is shifted forwardly and rearwardly depending upon the direction of rotational movement of the handle **34** to provide the desired bending clearance.

In the past it has been necessary to provide some form of locking means, usually in the form of lock nuts and the like, to prevent slippage of the adjustment once set, however, no locking means is necessary in the present design as once the hinge axis is set, the adjustment nut **38** remains exactly as positioned.

The adjustable clamping assembly indicated generally at **22** in FIG. 2 will now be described with reference to FIGS. 2, 3 and 7. A suitable handle **50** is provided with a centrally disposed weighted section **51** which in the present case is streamlined for better appearance and weight distribution. The handle is formed with an annular integral raised boss **52** at its inner end. A clamping link **53** is provided with an opening **54** lined with bearing material or the like to reduce friction. The raised boss **52** on the handle is received in the opening **54** in the link **53** with a bearing fit. The link **53** has an elongated threaded portion **55** which extends through an opening **56** formed in one end of a pivot shaft **57** mounted on the end plate **16**. The end plate **25** at the end of the top leaf assembly is provided with a reinforcing plate **58** to increase the bearing area of the aperture **59** formed in the gusset **25** to mount the clamping pin **60**. An opening **61** is formed in the handle assembly and may be lined with a bearing material or the equivalent to enhance the ease of movement of the handle **50** about the clamping pin **60**. A spring **62** has one end bottomed on the gusset plate **25** and the other end bottomed against a washer **63** with the latter held in place by lock nuts **64** and **65**. In this manner, the raised boss **52** on the handle **50** is resiliently held in engagement with the reinforcing block **58** on the gusset plate **25**. As seen in FIGS. 2, 3 and 7, the opening **61** in the handle assembly **50** is offset relative to the center of the opening **54** in the link so that rotation of the handle causes a camming action within the opening **54** in the link, raising and lowering the top leaf assembly **12** in response to handle movement.

The pivot shaft **57** acts through a pair of nuts **66** and **67** to restrain the link **53** from movement while permitting rotational freedom about the axis of the opening **68**, formed in the end member **16**. The opening may be lined with bearing material **69** to reduce friction. A snap ring fitted into a groove in the shaft holds the pin **57** to the support **16**.

A stop pin **70** is carried by the link **53** and co-operates with integral stops **71** and **72** carried on the handle assembly **50**. In this manner, the limits to the rise and fall of the cam are established to obtain optimum clamping pressure and prevent the operator from going past the high and low points of the cam as the handle is moved between the open and close positions. Since the stop pin is symmertical, the links at opposite ends are interchangeable for manufacturing convenience.

A clamping assembly **22** including the handle cam and link arrangement is provided at the left-hand end of the brake as is shown in FIG. 1, and is of identical construction except for reversal of the raised boss on the handle.

As is best seen in FIGS. 1, 6 and 7, a nose bar portion **75** is secured by machine screws (not shown) to a clamping plate **77** which is carried by the longitudinal plates **23** and **24** forming a part of the top leaf **12**. The nose bar **75** is formed a hard steel to co-operate with a hard longitudinally extending clamping block **76** suitably joined to the plate member **15**. The nose bar **75** and clamping

block **76** form a pair of jaws which open and close in response to movement of the handle **50**.

Referring now to FIGS. 6 and 7, the operation of the brake will now be described. Sheet stock is positioned on the bottom leaf **11** with the nose portion of the top of leaf asembly **12** in a raised position as shown in phantom in FIG. 6. The handles **50** on opposite ends of the brake are rotated from the phantom position in FIG. 7 to the solid line position to close the jaws as shown in solid lines. The sheet stock is thus held in the clamped position with a portion of the stock projecting beyond the nose bar **75**. The bending leaf **13** is then raised by handles **78** (FIG. 1) with the counter weights **79** and **80** assisting in movement of the bending leaf.

As the bending leaf **13** is rotated about its hinges **20** and **20'** the upper edge folds the protruding portion of the sheet stock upwardly. Each hinge assembly **20** and **20'** is provided with needle bearings for greater accuracy in bending, to reduce the wear, and make the bending function easier. The bending leaf may be provided with a hard insert along the upper edge as well as the usual clamps to accommodate special forming attachments.

The nose bar **75** is illustrated in FIG. 6 as being adjacent the plane of the bending leaf **13** when the latter is at rest. When metals of substantial thickness are to be bent the top leaf is moved to the open position and the nose bar **75** may be moved rearwardly to provide clearance between the upper edge of the bending leaf **13** and the front edge of the nose bar **75**. The novel hinge adjustment **21** of the present invention permits selectivity of the desired clearance with unequalled ease. For example, rotation of the handle **34** shifts the adjustment nut **38** which in turn moves the top saddle **39** forwardly and rearwardly depending upon the direction of rotation. This shifts the nose bar **75** relative to the front edge of the clamping block **76** on the bottom leaf **11** thereby to adjust the clearance between the nose bar and the bending leaf. If desired, only one end of the brake need be adjusted if the metal strips to be bent are of narrow width. In bending large sheets which occupy substantially the entire width of the brake, the adjustments may be determined by the number of rotations of the handle **34**. Suitable marker or index means may be provided to assist in such adjustment.

When the clamping pressure is desired to be increased or decreased, the lock nuts **66** and **67** shown in FIG. 3, may be moved in the appropriate direction to cause the threaded shaft **55** to be raised or lowered, thereby shifting the eccentric axis formed by the clamping pin **60**. Accordingly, the entire upper bending leaf is raised or lowered depending upon the desired adjustment. A similar adjustment is performed at the opposite end so that uniform clearance between the nose bar **75** and clamping block **76** is provided for optimum ease in clamping and minimum distortion of the bending leaf.

As seen in FIG. 6, a gusset **85** may be provided to brace the plates **23** and **24**. A similar gusset **86** may be provided to brace the lower anvil assembly plates **14** and **15**. The usual truss rods **87** and **88** are provided on each assembly to permit tension adjustment in a manner well known.

In straight bending operations the desired angle may be pre-set by adjusting a T-shaped stop member **82** having a set screw which permits it to be moved relative to the supporting rod member **83**. The rod member **83** is slidably received in a fixed stop member **84** carried on the end portion **16** of the bottom leaf **11**. One end of the rod **85** is pivotally received in the lower hinge assembly **20** so that the rod is drawn through the bearing **84** as the bending leaf or apron **13** is raised. If desired, the rod may be provided with suitable indicia to permit pre-setting of the desired angle of bend. Obviously, with this arrangement, repeatability of bends is assured.

FIG. 8 illustrates a fragmentary portion of a floor mounted box and pan type brake **110** constructed in accordance with the principles set out in FIGS. 1–7. The brake of FIG. 8 may also be provided with removable type legs as shown at **18** in the standard brake to facilitate ease of manufacture and reduction in bulk for shipment.

The brake shown fragmentarily at **110** in FIG. 8 includes a top leaf **111** supported for movement into clamping engagement with a bottom clamping bed **112**. A bending leaf **113** is carried by hinge portions **114** at opposite ends of the bottom leaf **112** to perform the bending function after material has been clamped by the top and bottom leafs. The top leaf **111** may be constructed and mounted in accordance with the description given above, and as seen in FIG. 9 includes plate members **115** and **116** welded into a wedge-shape with a suitable bracing **117**.

A finger extension **118** is disposed along the underside of the top leaf **111** and has the rearward end formed to a reduced section or tongue **119** which is received in a longitudinal slot **120** formed in a mounting block **121** carried beneath the bottom plate **116**. A finger clamping bar **122** is joined to the finger extension **118** by means of a bolt **123** and has a generally U-shaped slot **124** opening rearwardly to receive the lading edge of the bottom plate **116** of the top leaf **111**. A set screw **125** clamps the leading edge **126** of the bottom plate **116** to assist in mounting the finger extension **118**.

At the forward end of the finger extension **118** is provided a nose clamping bar **127** of L-shaped configuration mounted beneath the finger extension with a cap screw **129** to form a channel-shaped groove **128**. A nose bar **130** has a rearwardly projecting tongue **131** received in the channel-shaped groove **128** and clamped between the extension finger **118** and the nose bar clamp **127**. The tongue **131** may be slightly thicker than the width of the groove **128** to provide good clamping action.

The bottom leaf **112** may be formed from plate stock **132** and **133** joined at right angles by means of welding with suitable reinforcing provided by brace members **134** and **135**. At the forward edge of the plate **133** forming the bed of the bottom leaf **112**, a series of openings are provided to permit passage of bolts **136** which are received in spaced tapped openings **137** formed through the bottom bar **138**. When mounted in this manner, the bottom bar **138** may be reversed to permit renewal of the edge adjacent the bending leaf **113** four times. Also, the bolted arrangement facilitates easy replacement of the bottom bar if such should become necessary. If desired, the bottom bar may be welded to the plate **133** in lieu of bolting, however, the former expedient makes replacement or renewal of the front surface more difficult. The bending leaf may be provided with an insert bar **140** and angle bar **141** bolted to the main leaf portion as at **142** or may take any desired form.

In FIG. 10 is shown a modified method of holding the nose bar, with nose bar clamp **150** joined by means of a cap screw or the like **151** to the bottom plate **152** of a top bending leaf **153**. The nose bar clamp is provided with a rabbeted groove or cutaway portion **154** which forms with the bottom plate a channel to receive a rear extension or tongue **155** provided on the nose bar **156**.

As seen in FIGS. 11–13, modified forms of nose bars may be used in lieu of nose bar **156** in order to meet any particular need in metal forming. In FIG. 11 is illustrated a radiused nose bar **157**, while a larger radiused nose bar **158** is shown in FIG. 12. An open end finger is shown at **159** in FIG. 13. Each of the nose bar and extension figures shown in FIGS. 11–13 is also provided with a rearwardly projecting tongue to permit easy, expedient and rigid installation in brakes.

Upon a consideration of the foregoing, it will become obvious to those skilled in the art that various modifications may be made without depending from the inventive concepts embodied herein. Accordingly, only such limitations should be imposed as fall within the spirit and scope of the appended claim.

I claim:

In a hand brake having a top leaf assembly, a bottom leaf and a bending leaf as well as means to move said top leaf relative to said bottom leaf, the improvement comprising an adjustable hinge means mounted at opposite ends of said top leaf assembly for shifting the rotational axis of said top leaf assembly, each of said adjustable hinge means including a generally U-shaped top saddle member attached to said top leaf assembly, a lower saddle member attached to said bottom leaf and slot means formed in side portions of said U-shaped top saddle member for co-operation with a hinge pin on said lower saddle member to form a hinge, and hand adjustable means to shift said hinge pin relative to said lower saddle member thereby to move said top leaf assembly relative to said bottom leaf thereby to adjust the position of said top leaf relative to said bending leaf.

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