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BENDING BRAKE WITH ADJUSTABLE WORK STOP AND CLAMPING MEANS

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FIG. 2

FIG. 3

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BENDING BRAKE WITH ADJUSTABLE WORK STOP AND CLAMPING MEANS

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My invention relates to metal brakes and has for
an object to provide a simple and practical
metal brake which may be manually operated to
bend and form various types of work and with a
great variety of bends and forms.

Another object of the invention resides in pro-
viding a metal brake in which the work is rigidly
and securely attached to the bed on which the
same is supported.

Another object of the invention resides in pro-
viding the brake with a jaw for clamping the work
to the bed and in further providing adjusting
means for regulating the distance of the forming
edge of the jaw from the corresponding edge of
the binder.

A still further object of the invention resides in
providing a brake in which narrow offsets can
be bent in sheets of metal and in which the bend-
ing bar of the binder is exceedingly rigid and
properly supported to form the work as desired.

Another object of the invention resides in pro-
viding a lever associated with the clamping jaw
and connected thereto by means of a link and in
further providing operating means for moving
the lever to procure movement of the jaw toward
the bed.

A still further object of the invention resides in
providing a rock shaft for moving said lever and
in further providing a thrust member between
said rock shaft and lever and adapted to move
the same upon swinging of the shaft.

Another object of the invention resides in con-
structing the rock shaft and lever with facing
notches and in constructing the thrust member
with fulcrums seated in said notches.

An object of the invention resides in providing
a construction for adjusting the angle of bend
of the work.

A feature of the invention resides in construct-
ing said adjusting means with an adjustable
stop and adapted to engage an engaging member
carried by the binder.

A feature of the invention resides in pivoting
said stop on said rock shaft.

Another object of the invention resides in con-
structing the binder with a plurality of circum-
ferentially arranged sockets and in providing a
pin insertable into any of the said sockets and
forming the engaging member of the invention.

Other objects of the invention reside in the
novel combination and arrangement of parts and
in the details of construction hereinafter illus-
trated and/or described.

In the drawings:

1. Fig. 1 is a plan view of a metal brake illustrat-
ing an embodiment of my invention.

2. Fig. 2 is an elevational sectional view taken on
line 2—2 of Fig. 1 and drawn to a greater scale.

3. Fig. 3 is a sectional view taken on line 3—3
of Fig. 1 and drawn to the same scale as Fig. 2.

4. Fig. 4 is a perspective view of the invention.

5. My invention consists of a base 10 having two
standards 11 and 12 projecting upwardly there-
from. These standards have mounted in them
stub shafts 13 which are disposed in alignment
and which pivotally support a bender indicated
in its entirety by the reference numeral 14 for
swinging movement relative to the base 10. The
base 10 has two supporting blocks 15 formed
thereon and which carry a bed 16. The bed 16
is attached to the blocks 15 by means of screws
17 which extend through said bed and are coun-
tersunk into the upper surface 18 of said bed
and which are screwed into the blocks 15.

6. Mounted on the bed 16 is a clamping device 18
which supports the work to be formed on the bed
16 and which provides a forming edge over which
the work may be bent.

7. The bender 14 comprises two arms 21 and 22
which are substantially identical in construction
and which are pivoted on the stub shafts 13. Due
to the similarity of the same, only the arm 21,
which is shown in Fig. 3, will be described in
detail. The arm 21 has an offset portion 23 pro-
jecting outwardly therefrom. To this offset por-
tion of each of the arms is attached a forming
bar 24. The bar 24 is notched at its corners as
designated at 25 in Fig. 1, to receive the two off-
set portions 23. Cap screws 26 extend through
said bar and are screwed into the offset portions
23 to securely attach the bar to the same. By
means of this construction, the two arms 21 and
22 of the bender 14 are rigidly tied together and
operate in unison. The bed 16 is cut back at an
angle along the surface 27 thereof shown in Fig.
2. The bar 24 is similarly cut back along the
upper portion 28 of the same, so that when the
bender 14 is swung into the position shown in
Fig. 2, the said bar has a narrow surface 29
which lies in continuation of the upper surface of
the bed 16. The surface 29 is further reduced by
cutting the same back as indicated at 32 in
Fig. 1. For swinging the the bender 14, two rods
33 are employed which are attached to the lower
ends 34 of the arms 21 and 22. This is accom-
plished by means of cap screws 35 which are
screwed into said portions of said arms. The
rods 33 have secured to the outer ends thereof
handles 36 by means of which the said bender
may be swung about the axis of the stub shafts 13.

The clamping device 18 comprises a jaw 37 in the form of a flat bar which has a beveled face 38 at the forward portion of the same and a flat surface 39 at the lower portion of the same. The jaw 37 overlaps the bed 16 and is disposed with the surface 39 facing the surface 19 of said bed. The jaw 37 is held in place thereon by means of the following construction:

At the ends of the jaw 37 are formed two elongated holes 41 and through which two bolts 42 extend. A washer 43 encircles each of these bolts and rests upon the upper surface of the jaw 37. A nut 44, screwed upon each bolt adjusts the position of the jaw 37 with reference to the bed 16 in a manner to be presently described in detail. The movement of the jaw 37 toward the bed 16 is controlled by means of set screws 45 which are threaded into the said jaw and engage the upper surface 19 of the bed 16.

The jaw 37 is urged upwardly by means of compression coil springs 46 which are received in cavities 47 formed in the bed 16 and encircling the bolts 42. The said springs engage the bed 16 from above and the jaw 37 from below and urge the said jaw upwardly, so that the sheet metal to be clamped and which is indicated in dotted lines at 48 can be readily inserted in between the said jaw and bed.

For operating the jaw 37 to cause the same to clamp the work 45 upon the bed 16, a rock shaft 49 is employed. This rock shaft extends through the two standards 11 and 12 and is journaled in bearings formed therein. Said shaft also extends through the two blocks 15 and is likewise further journaled in bearings formed in said blocks. The shaft 49 is located intermediate the base 10 and the bed 16. Below the shaft 49 and overlying the base 10 are two levers 51 which are identical in construction. The said levers have holes 52 extending through the same and through which the bolts 42 loosely extend. The heads 53 of the bolts 42 engage the said levers from beneath and when the levers are moved downwardly, the said bolts draw upon the jaw 37 and urge the same downwardly to the bed 16 in opposition to the springs 46. For supporting the levers 51 for swinging movement, two pins 54 are employed which are set into the base 10 and which upwardly therefrom. These pins are received in holes 55 drilled in the levers 51 which holes are fairly loose to permit of the said levers rocking to move the jaw 37. The levers 51 engage the base 10 at the localities indicated at 56 which forms the fulcrum points for the levers. The pins 54 and the holes 55 hold the levers in operating position.

For operating the levers 51, the said levers are each provided with a V-shaped notch 57. In a similar manner, the shaft 48 has two V-shaped notches 58 which are eccentric with reference to the axis of the said shaft and which are disposed immediately above the notches 57. These notches serve as bearings. Between the shaft 48 and the levers 51 are disposed two thrust members 59 which have fulcrums 61 and 62 seated in the notches 58 and 57. When the lever 51 is in the position shown in Fig. 2, the crotch of the notch 58 is to the right of the lines joining the axis of the shaft 55 and the crotch of the shaft 59. Movement of the shaft in a clockwise direction, as viewed in Fig. 2, causes the crotch of the notch 58 to move to a position substantially in said line previously referred to, or a slight amount to the left of said line. This urges the levers 51 downwardly and the bolts 42 which form in links between the levers 51 and the jaw 37 draw the said bolts downwardly to close the work 45 disposed between said jaw and the bed 16.

For rocking the rock shaft 49, a rod 63 is employed which is formed with a head 68 through which said shaft extends. This head is attached to the end of said shaft by means of a set screw 68, shown in Figs. 1 and 4. The said rod extends upwardly and has a handle 83 secured to the upper portion of the same.

The thrust members 59 are held from endwise movement in one direction by engagement with the blocks 15. For holding said thrust members 59 from movement in the opposite direction, pins 84 are employed which are shown in detail in Figs. 3 and 4. These pins are so located that the pins 84 engage the ends of the thrust members 59 which are opposite to the ends engaged by the blocks 15. By means of this construction, the shaft 49 is also held from endwise movement.

In order to form different types of bends on the work, for example, bends of smaller or greater radii, the forward edge 53 of the jaw 37 is guided for movement, and which is indicated in dotted lines at 48 can be readily inserted in between the said jaw and bed.

The movement of the jaw 37 toward the bed 16 is controlled by means of set screws 45 which are threaded into the said jaw and engage the upper surface 19 of the bed 16. Such movement is accomplished by means of the elongated slots 41 as previously described. The distance between the edges 63 and 64 is maintained by means of set screws 65 which are screwed into the forming edge 64 of the bed 16. Said heads may be made integral with the bed or the same may be made separate, as shown, and attached to the said bed by means of cap screws 67, as illustrated in Figs. 2 and 4 of the drawings. The edge 65 of the forming bar 24 and the edge 64 of the bed 16 are substantially at the axes of the two stub shafts 15. When the edge 63 is close to the axes of the stub shafts, a sharp bend with small radius is produced. When the edge 63 is moved away from the edge 64, a bend with greater radius is procured.

In order to determine the angle to which the work is to be bent, two stops 71 and 72 are employed which are rotatably mounted on the rock shaft 45 between the levers 51 and the bars 21 and 22. The stop 71 and the stop 72 are identical in construction, only the stop 72 will be described in detail and which is best shown in Figs. 3 and 4. This stop comprises an upwardly extending arm 73 which has an engaging portion 74 formed with an engaging surface 75. The said surface 75 may be engaged by means of a pin 76 insertable into any of a number of drilled holes 77 arranged in circumferential formation on the arm 21. When this pin engages the engaging surface 75, movement of the bend 14 is terminated. Coarse adjustment of the angularity of the bend may be procured by inserting the pin 76 in a hole 77. Fine adjustment of the angle may be procured by means of an adjusting screw 86 which is screwed into an arm 87 formed on the stop 72. The screw 86 engages the base 10 and forms an abutment limiting swinging of the stop 72 on the shaft 49. The movement of the portion 74 of said stop. Screw 86 is held in adjusted position by means of a lock nut 88.

The operation of my invention is as follows: When a sharp bend is to be made on the work, the stops are arranged as shown in Figs. 2 with all of the edges 53, 64 and 65 substantially at the
2,474,688

The advantages of my invention are manifest. The device functions in an efficient effective manner. With my invention repeated, operations can be readily performed. By means of the adjustable stops, the angularity of the bend can be accurately determined. Having stops at both ends of the device, the angularity at both ends of the work can be made the same. By adjustment of the jaw member, the curvature of the work can be controlled at will. The clamping device serves to hold the work rigidly in position and is quickly applied and released. By means of the notched rock shaft and levers and the thrust members cooperating therewith, extremely great pressure is procured on the jaw whereby the work is firmly held in position. By constructing the forming bar in the manner disclosed and extending in a direction at right angles to the direction of the extent of the bed when in normal position, an extremely narrow engaging surface can be procured whereby narrow, short offset bends, such as Z-shaped bends can be procured. My invention is extremely sturdy in construction and will operate to bend fairly heavy material.

Changes in the specific form of my invention, as herein disclosed may be made within the scope of what is claimed without departing from the spirit of my invention.

Having described my invention, what I claim as new and desire to protect by Letters Patent is:

1. A metal brake, a bed, a jaw overlying said bed, a lever supported for swinging movement relative to said bed, connecting means between said lever and jaw, a rock shaft disposed in spaced relation to said lever, said lever having a V-shaped notch therein, said rock shaft having a V-shaped notch therein eccentric with respect to the axis of said shaft and facing the notch in said lever, and a thrust member disposed between said rock shaft and lever and having two fulcrums, one seated in the notch in the lever and the other seated in the notch in the shaft, said shaft, upon rotation, moving said thrust member to cause movement of the lever away from the shaft and movement of the jaw toward said bed.

2. In a metal brake, a bed, a jaw overlying said bed, a lever supported for swinging movement relative to said bed, connecting means between said lever and jaw, a rock shaft disposed in spaced relation to said lever, said lever having a V-shaped notch therein, said rock shaft having a V-shaped notch therein eccentric with respect to the axis of said shaft and facing the notch in said lever, and a thrust member disposed between said rock shaft and lever and having two fulcrums, one seated in the notch in the lever and the other seated in the notch in the shaft, said shaft, upon rotation, moving said thrust member to cause movement of the lever away from the shaft and movement of the jaw toward said bed.

3. In a metal brake, a bed, a jaw overlying said bed, a lever supported for swinging movement relative to said bed, connecting means between said lever and jaw, a rock shaft disposed in spaced relation to said lever, said lever having a V-shaped notch therein, said rock shaft having a V-shaped notch therein eccentric with respect to the axis of said shaft and facing the notch in said lever, and a thrust member disposed between said rock shaft and lever and having two fulcrums, one seated in the notch in the lever and the other seated in the notch in the shaft, said shaft, upon rotation, moving said thrust member to cause movement of the lever away from the shaft and movement of the jaw toward said bed.

4. In a metal brake, a base, a bed spaced from and disposed above said base, a jaw overlying said bed, a lever overlying said base, a bolt extending through said lever, bed and jaw and loosely fitting within the said base, a head on said bolt engaging the lever from below, a nut on said bolt engaging said jaw from above, said bolt forming a link connecting said jaw member with said lever, said bed having a cavity in the upper portion of the same encircling said bolt, a spring in said cavity engaging said bed from above and said jaw from below and urging said jaw upwardly, and means between said bed and lever for moving said lever downwardly to engage the head on said bolt and thereby urge said jaw toward said bed in opposition to said spring.

5. In a metal brake, supporting means for a bed carried by said supporting means, means for clamping the work on said bed, a bender, pivot means for supporting said bender for swinging movement in a manner to form the work on the bed, a stop pivoted to said supporting means and having engaging means, an engaging member carried by said bender and adapted to engage the engaging means of the stop, said engaging means being adapted to move substantially in the same direction as the engaging member and a screw carried by said stop and engaging said supporting means and moving the stop in one direction and limiting movement of the stop in the opposite direction.

6. In a metal brake, a support, a bed carried thereby, means for clamping the work on said bed and including a rock shaft, a bender, a stop pivoted on said rock shaft and including two arms, engaging means formed on one of said arms, an engaging member carried by said bender and adapted to engage the engaging means of the stop, and a screw carried by said second arm and engaging said support for limiting the movement of said stop about said shaft.

7. In a metal brake, a support, a bed carried thereby, means for clamping the work on said bed and including a rock shaft, a bender, a stop pivoted on said rock shaft and including two arms, engaging means on one of said arms, said
bender having a plurality of sockets circumferentially arranged about the axis of the pivot means therefor, a pin adapted to be positioned in any of said sockets and adapted to engage the engaging means of the stop, said stop including a second arm and a screw carried by said second arm and engaging said support for limiting the movement of said stop about said shaft.

8. In a metal brake, supporting means, a bed carried by said supporting means, means for clamping the work on said bed, a bender, pivot means for supporting said bender for swinging movement in a manner to form the work on the bed, a stop pivoted to said supporting means and having engaging means, an engaging member carried by said bender and adapted to engage the engaging means of the stop, said engaging means being adapted to move substantially in the same direction as the engaging member and a screw carried by said stop and disposed in the plane of movement of said stop and tangent to a circle having its center at the axis of said stop, said screw engaging said supporting means and moving said stop in one direction and limiting movement of said stop in the other direction.

9. In a metal brake, a bed, a jaw overlying said bed, a lever supported for swinging movement relative to said bed, connecting means between said lever and jaw, a rock shaft disposed in spaced relation to said lever, said lever and rock shaft having opposed bearings, the bearing on said rock shaft being eccentric, and a thrust member disposed between said lever and shaft and engaging said bearings, said shaft upon rotation moving said thrust member to cause movement of the lever away from said shaft and movement of the jaw toward said bed.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>72,473</td>
<td>Gleason</td>
<td>Dec. 24, 1867</td>
</tr>
<tr>
<td>816,917</td>
<td>Keene</td>
<td>Apr. 3, 1906</td>
</tr>
<tr>
<td>886,600</td>
<td>Frey</td>
<td>Nov. 27, 1906</td>
</tr>
<tr>
<td>951,539</td>
<td>Frazier</td>
<td>Mar. 8, 1910</td>
</tr>
<tr>
<td>2,401,031</td>
<td>Manasek</td>
<td>Oct. 12, 1944</td>
</tr>
<tr>
<td>2,417,478</td>
<td>Flowers</td>
<td>Mar. 18, 1947</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Country</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>69,110</td>
<td>Germany</td>
<td>June 10, 1893</td>
</tr>
<tr>
<td>806,866</td>
<td>France</td>
<td>Nov. 14, 1836</td>
</tr>
</tbody>
</table>