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W. E. GRAHAM.
METAL BENDING DEVICE.
FILED AUG. 24, 1921.

Fig. 1

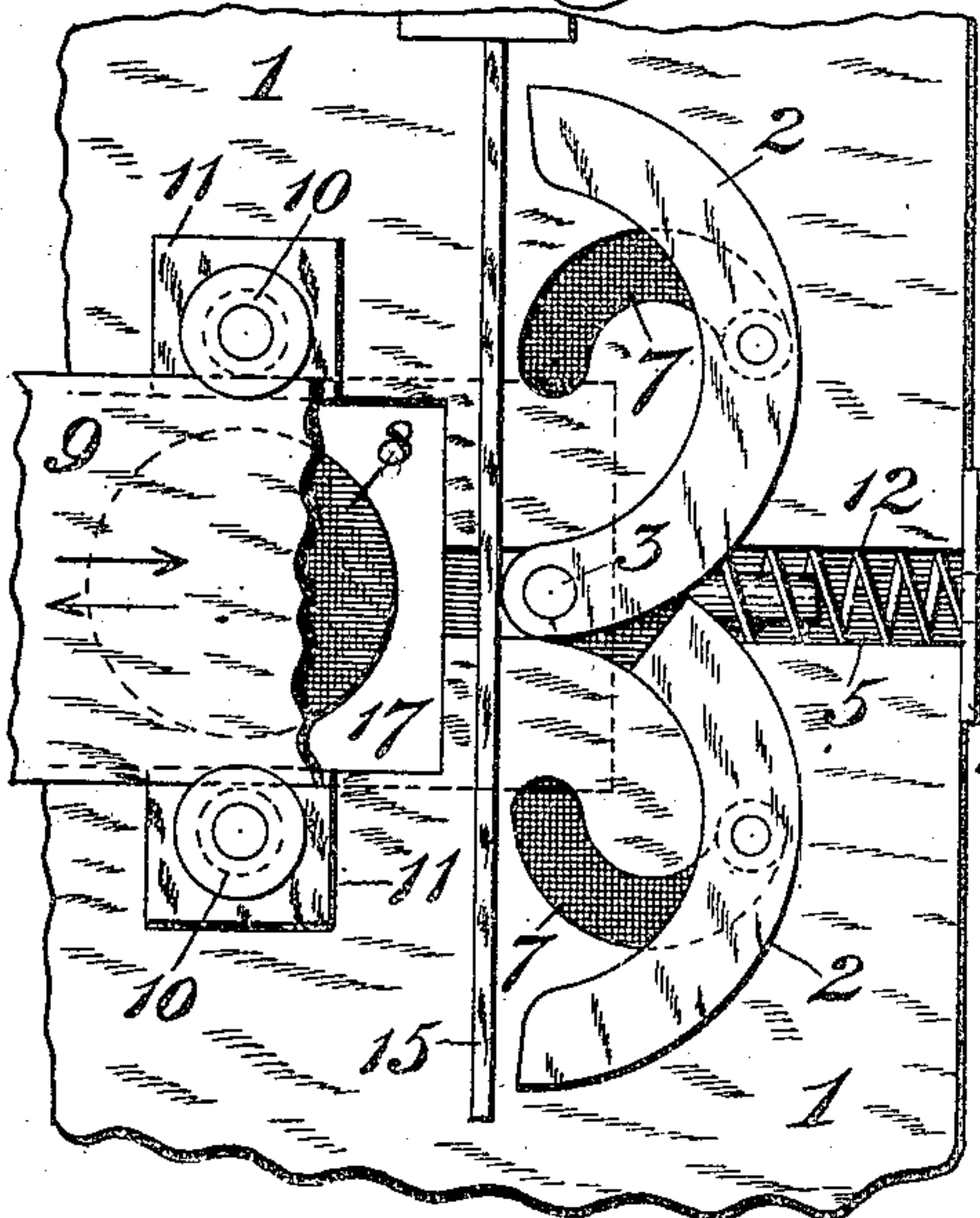


Fig. 2

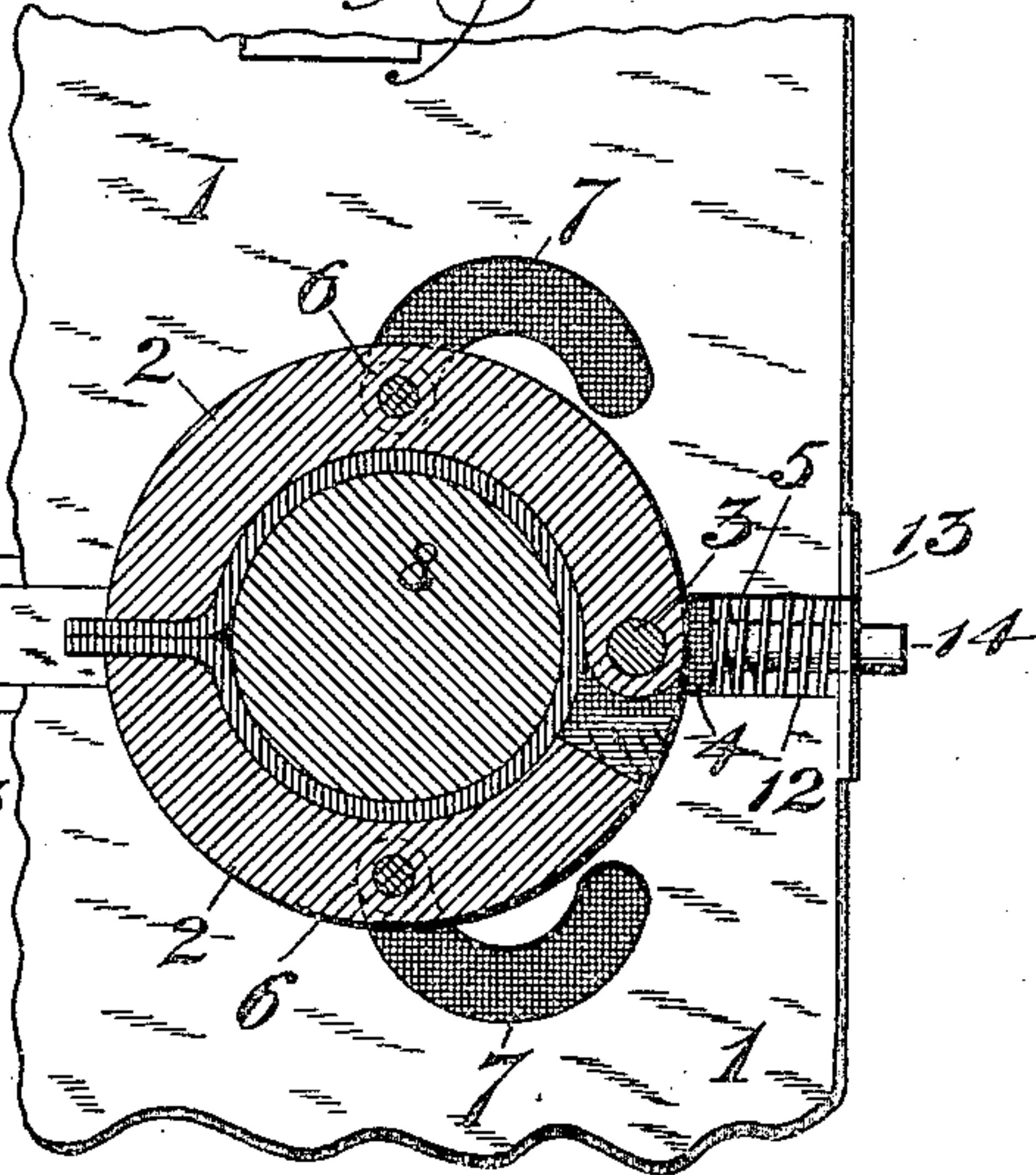


Fig. 4

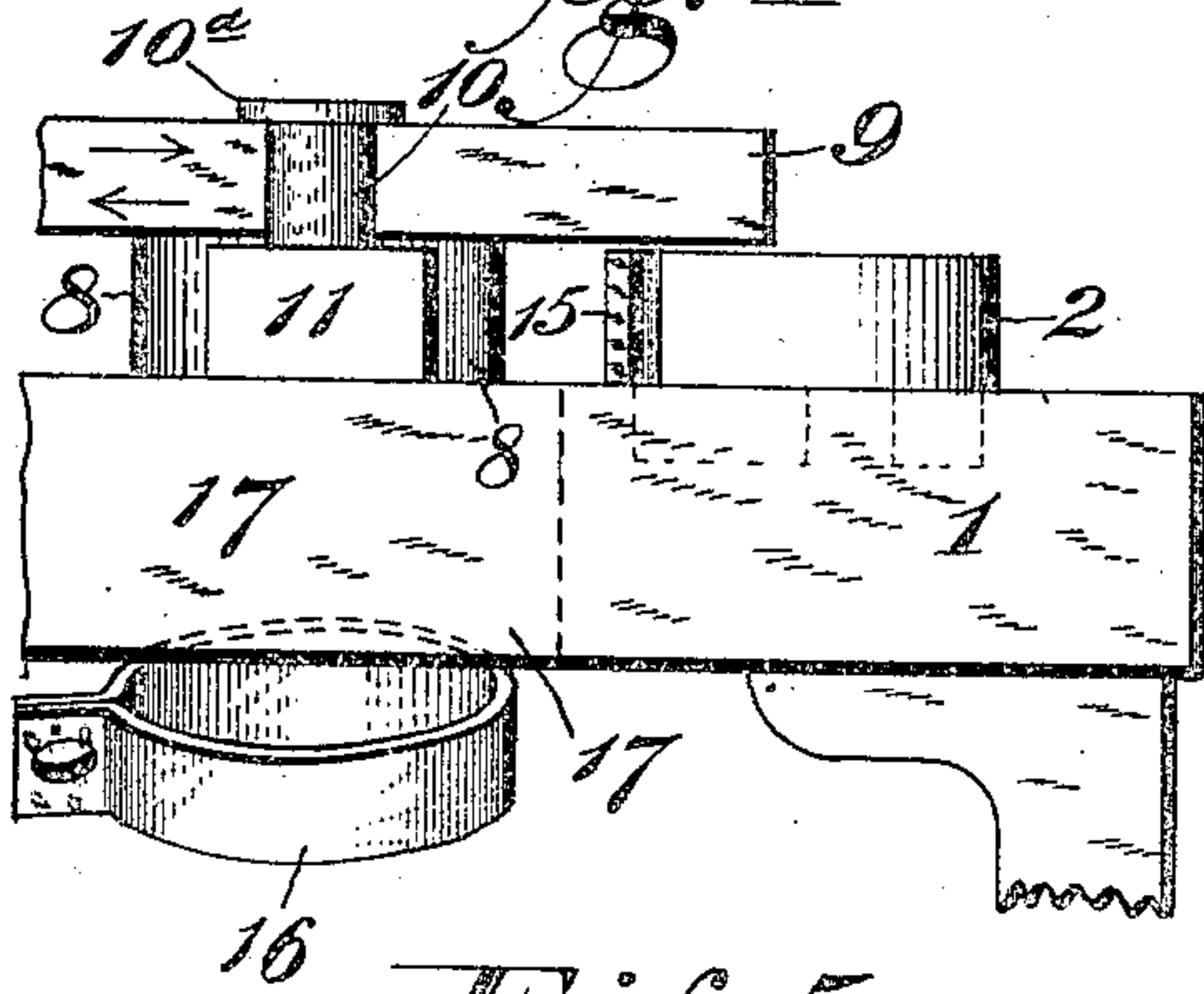


Fig. 3

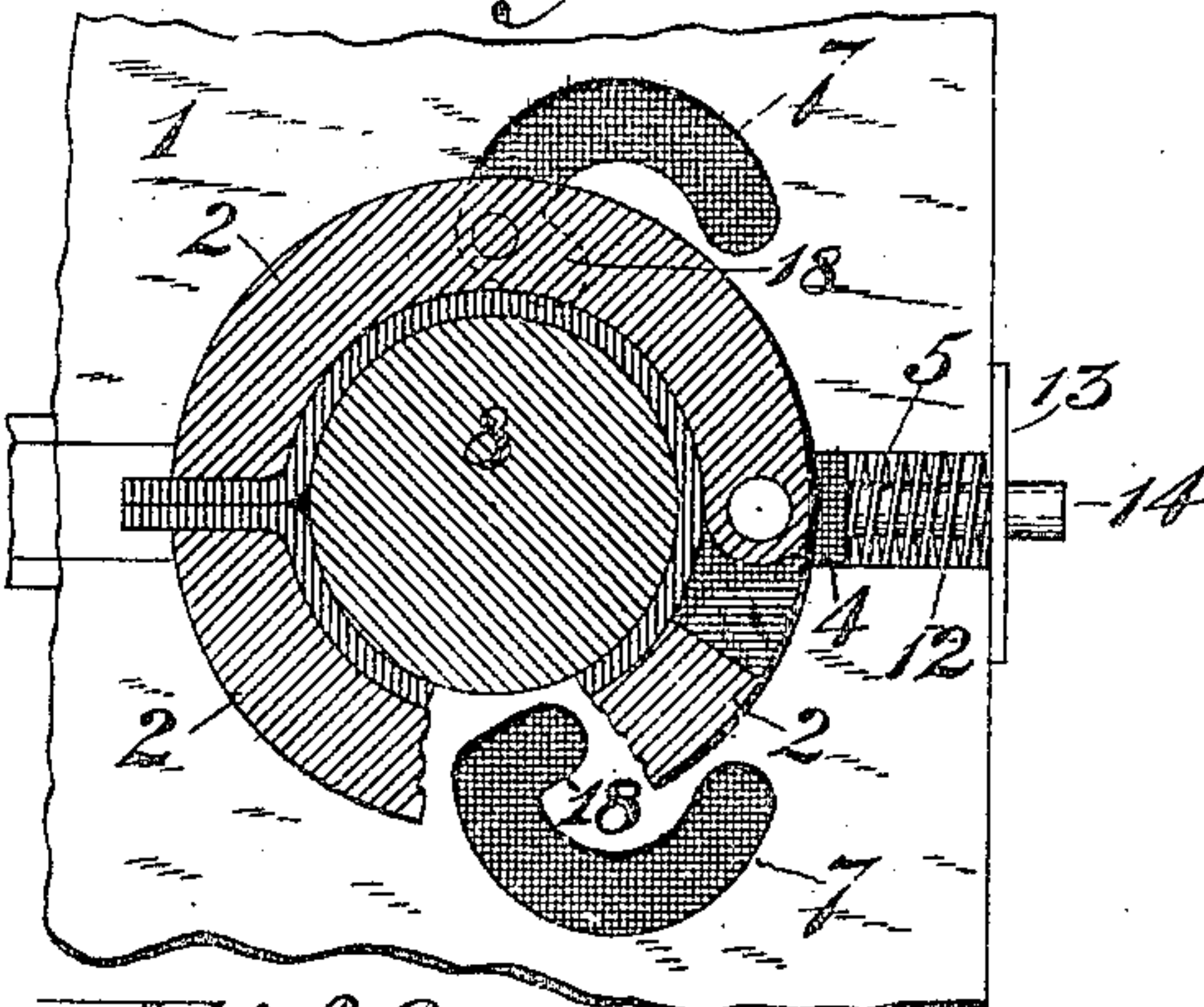


Fig. 5

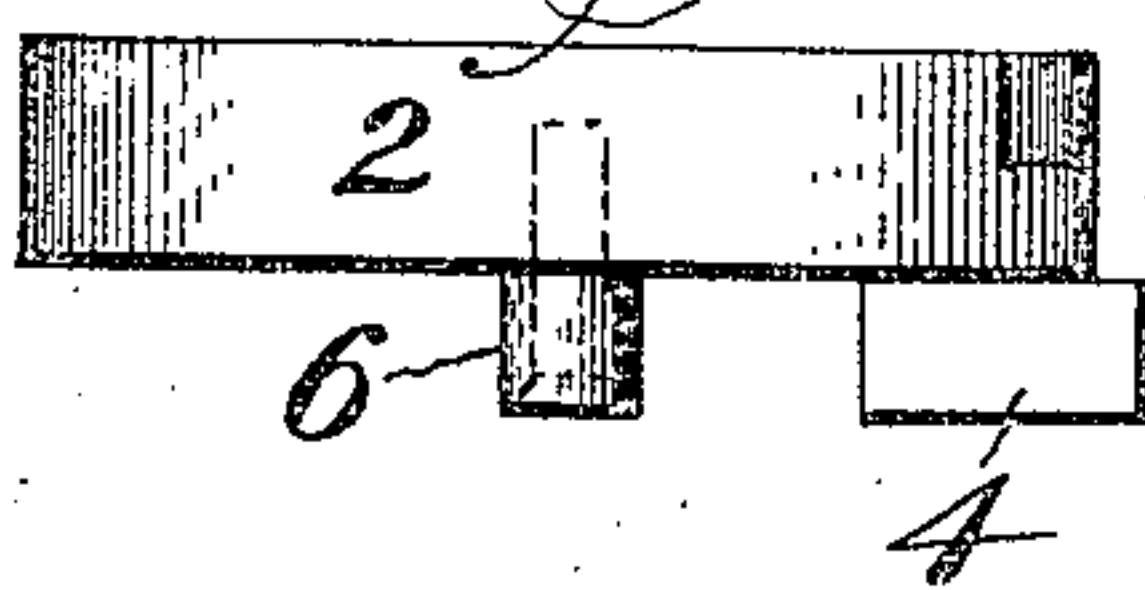
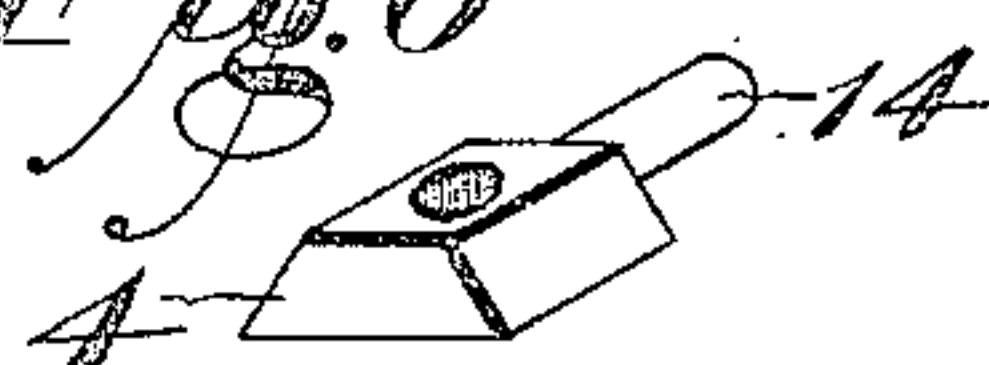


Fig. 6



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METAL-BENDING DEVICE.

Application filed August 24, 1921. Serial No. 495,004.

To all whom it may concern:

Be it known that I, WILLIAM E. GRAHAM, a citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Metal-Bending Devices, of which the following is a specification.

My invention relates to metal bending and forming devices, and more particularly to the forming jaws and the method of operating the same.

My object is to provide a device of this character which will be strong, simple, and durable, and which will deliver a powerful clamping force on the metal operated upon, so as to give a perfect form thereto.

Minor objects will appear in the subjoined description.

A leading feature of the invention consists of a pair of jaws hinged together with their pivot point mounted for guided reciprocating movement in a stationary member, said jaws being provided between their ends with rollers taking into curved slots in the stationary member, so arranged relatively to the line of reciprocating movement of the jaws that the jaws are forced together when they are moved in one direction, and opened when they are moved in the other.

The invention consists in certain novel features of construction and arrangement of parts, as will be hereinafter described and claimed, reference being had to the accompanying drawings, in which:—

Fig. 1 is a plan view showing the jaws open in position to receive a piece of metal to be bent.

Fig. 2 is a horizontal section taken through the jaws showing the relative position of the parts when the bending operation has just been completed.

Fig. 3 shows the parts in the same position as shown in Fig. 2, with a slight modification or addition to the curved jaw-operating slots, one of the jaws being broken away to show one of the slots complete.

Fig. 4 is a broken side elevation showing a part of the supporting table, with the parts in the position illustrated in Fig. 1, and with a pipe hanger (which has just been completed) falling through an opening in the table.

Fig. 5 is a side elevation of the forming jaws, showing the parts connected directly thereto and moving therewith; and,

Fig. 6 is an end view of the dove-tailed guide block of the bending jaws.

The numeral 1 indicates a strong table on which my device is supported. The bending jaws 2 are mounted on top of this table and are formed of two similar pieces hinged together by the pivot 3, which extends down into a dove-tailed guide block 4, which in turn, moves back and forth in a correspondingly shaped guide-slot 5 in the table 1.

The jaws 2 are also provided on their under sides, preferably about midway between their ends, with frictional rollers 6 which are received into the outer ends of curved slots 7 in the supporting table when the jaws are open as shown in Fig. 1. These slots 7 are so disposed relatively to the pivot 3 and the guide slot 5 and the friction rollers 6, that as the pivot 3 with the guide block 4 is moved to the right, the rollers 6 will travel toward the left in the slots 7 and close the jaws 2.

The forming head 8 of my device rests on top of the table 1 in the same plane with the jaws 2, and is rigidly secured at its upper side to the thrust bar 9, which has guided longitudinal movement between the rollers 10, which are suitably supported on blocks 11 rigidly mounted on the table 1. These rollers 10 have flanges 10^a slightly overreaching the top of the thrust bar 9 to hold the same against accidental upward movement. The diameter of the forming head 8 and the inner diameter of the jaws 2 when closed, are of just sufficient difference to receive between the two around the forming head the piece of metal to be operated upon.

The reciprocating plunger 9, carrying the forming head 8, is connected with suitable machinery (not shown) for moving it back and forth a suitable distance into and out of engagement with the bending jaws 2, as is usual with machines of this character.

When the hinged ends of the jaws 2 are moved outwardly in the slot 5 to close the jaws, the spring 12 is compressed, so that as the forming head 8 makes its return movement, the jaws are opened by the action of said spring, which may be connected to the jaws in a variety of ways, but which for purposes of easy illustration, is here shown

as held in the slot 5 by a plate 13 on the edge of the table, and a pin 14 extending from the guide block 4 into the end of said spring, the plate 13 having a bore through which said pin may project when the spring is fully compressed.

The operation of my device is as follows:—

When the parts of the device are brought into position to open the jaws, as shown in Fig. 1, the piece of metal 15 to be bent, is placed in the ordinary way between the jaws, and the forming head 8 carried by the plunger 9 is moved inwardly into engagement with the piece of metal 15 at its middle portion, and as the forming head moves the hinged ends of the jaws outwardly along the slot 5, the rollers 6 travel inwardly in the curved slots 7 till the jaws 2 are closed and the piece of metal bent into form around the forming head, as shown in Fig. 2, at which point the forming head being carried on the plunger 9, begins its receding movement, carrying the piece of formed metal around it, till said forming head is brought over the opening 17 in the table when the piece of formed metal 16 (which in the present instance is a pipe hanger) drops off the forming head 8 and down through said opening 17 onto the floor, or into a suitable receptacle placed under the table for the reception of the finished product of the machine.

It will be understood, of course, that as soon as the forming head begins its receding movement, the jaws 2 are opened by the action of the springs 12, thus completely freeing the forming head with the piece of metal now formed thereon, leaving the piece of metal perfectly free to fall by gravity down through the opening 17 in the table 1 when moved over the same, since the natural resilience of the metal will cause the same to loosen itself around the forming head.

If the metal to be operated upon proves to be a little refractory, it may sometimes be found necessary to apply a very powerful clamping force on the metal just as the clamping operation is completed, and in order to do this without imposing undue strain on any of the parts of the device, I provide the curved slots 7 at their inner ends with the angular extensions 18, the parts being so arranged in that instance that the final movement of the thrust bar will force the rollers 6 slightly into said angular extensions, which will exert a powerful force on the two jaws pressing them toward each other.

The arrangement of the curved guideways 7 relative to the other parts of the device may be somewhat varied according to the nature of the work to be performed, but the relative arrangement of these guideways as shown in the drawings is as fol-

lows:—When the forming dies are closed, a line struck through the centre of the jaws at right angles to the guideways 5 of the fixed member will pass through the centres of the inner ends of the curved guideways 7, and a similar line struck through the pivot 3 of the jaws will pass through the lower ends of said curved guide slots 7; so that the length of the guideways 7 projected on a base line parallel to the walls of slot 5 is approximately equal to the travel of the pivot 3. Again a line passing through the ends of either curved guide slot 7 will be approximately parallel with said guideway 5.

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

1. In a device of the character described, a fixed member having a guideway extending in a straight line, and inwardly curved guideways on opposite sides of said first named guideway, all of said guideways extending in the same general direction; a pair of pivoted forming jaws having guided movement back and forth, at their pivot point, in said first named guideway, and guided movement between their ends in said curved guideways, said cooperating parts being arranged to open the jaws when their pivot point is moved toward one end of said first named guideway and to close them when it is moved toward the other end thereof; a forming head adjacent the pivoted end of the forming jaws movable in alinement with the first named guideway into engagement with said forming jaws at their pivoted end and arranged to move said jaws sufficiently to close the jaws around said forming head.

2. In a device of the character described, a fixed member having a guideway extending in a straight line, and inwardly curved guideways on opposite sides of said first named guideway, all of said guideways extending in the same general direction; a pair of forming jaws pivoted to each other at one end and having guided movement back and forth at their pivot point in said first named guideway, and guided movement between their ends in said curved guideways, said cooperating parts being arranged to open the jaws when their pivot point is moved toward one end of said first named guideway and to close them when it is moved toward the other end thereof; yielding means for normally pressing the forming jaws at their pivoted end in the direction in said first named guideway adapted to open the jaws; a forming head adjacent the pivoted end of the forming jaws movable back and forth in alinement with the first named guideway into and out of engagement with said forming jaws at their pivoted end and arranged to move said jaws

sufficiently to close the jaws around said forming head when moved in the direction toward said yielding means, and to permit the jaws to open when moved in the direction away from said means.

3. In a device of the character described, a fixed member having a guideway extending in a straight line and inwardly curved guideways on opposite sides of said first named guideway, all of said guideways extending in the same general direction; a pair of pivoted jaws adapted to open and close on their pivot and having guided movement back and forth at their pivot point in the first named guideway, the centre of the jaws when closed being in alignment with the inner ends of the curved slots and the pivot point being in substantial alignment with their outer ends; and means approximately midway between the ends of said jaws for operative engagement with said inwardly curved guideways; whereby the jaws will be opened and closed as their pivot point is moved back and forth in its guideway.

4. A device of the character described, comprising a fixed member having a guideway extending in a straight line, a pair of pivoted jaws and a cooperating forming head, the forming head and the jaws at their pivot point having guided movement relatively to the fixed member, the fixed member also having inwardly curved guide-

ways on opposite sides of said first named guideway extending in a general direction substantially parallel with said first named guideway; and projections on the jaws between their ends for engaging said curved guideways, said projection being arranged to come to the inner ends of said curved guideways when the jaws are closed and to their outer ends when the jaws are open; whereby the back and forth movement of the pivot of the jaws in the first named guideway will open and close the jaws.

5. In a device of the character described, a fixed member having a guideway extending in a straight line and inwardly curved guideways on opposite sides of said first named guideway, all of said guideways extending in the same general direction; a pair of pivoted jaws having guided movement back and forth at their pivot point in the first named guideway and projections between their ends taking into said curved guideways, said cooperating parts being arranged to open the jaws when their pivot point is moved in one direction and to close them when it is moved in the other direction, said curved guideways being provided at their inner ends with angular extensions adapted to move the intermediate projections of the jaws still farther toward each other when forced into said extensions.

In testimony whereof I affix my signature.
WILLIAM E. GRAHAM.