Dec. 13, 1932. H. S. POWELL 1,890,588

SHEET METAL BENDING MACHINE

Filed May 17, 1929 4 Sheets-Sheet 1

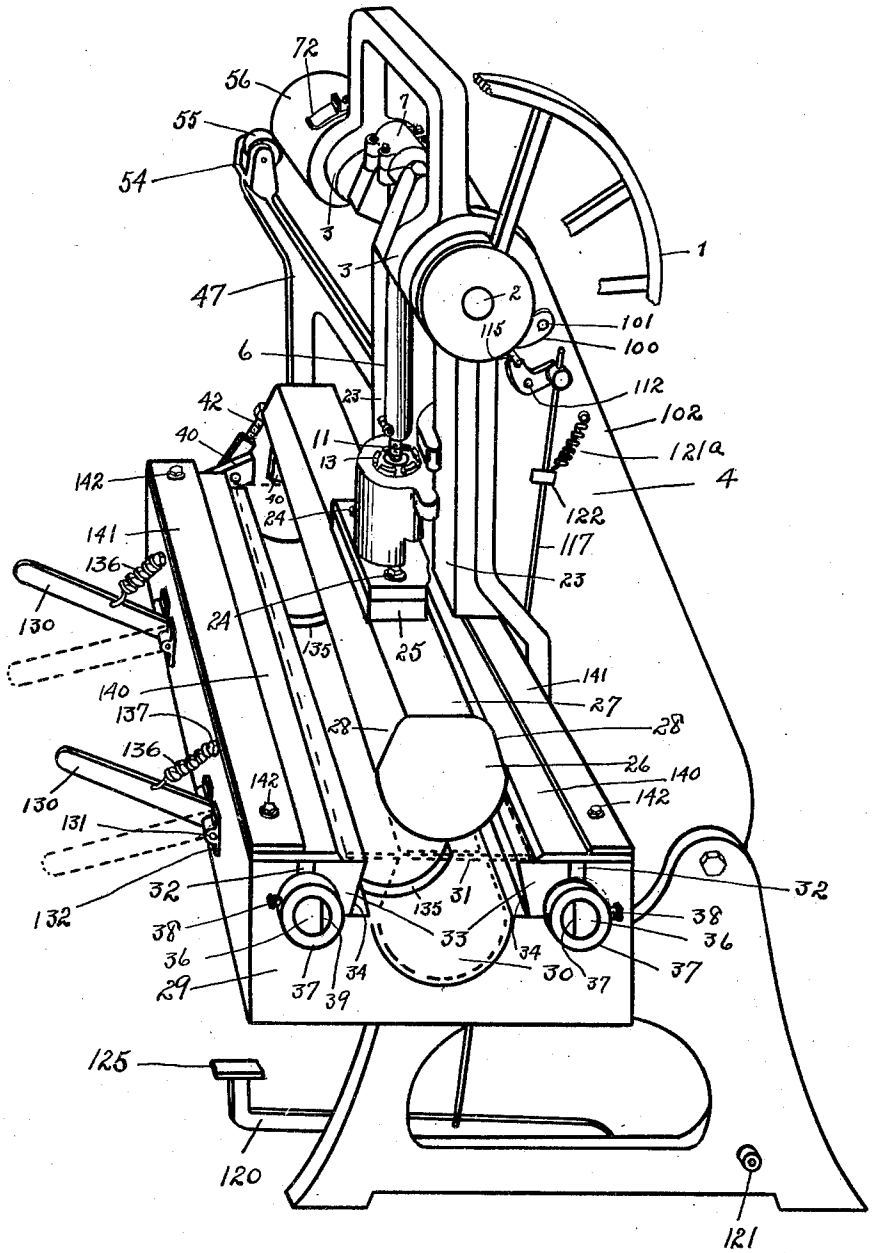


Fig 1

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SHEET METAL BENDING MACHINE

Filed May 17, 1929 4 Sheets-Sheet 2

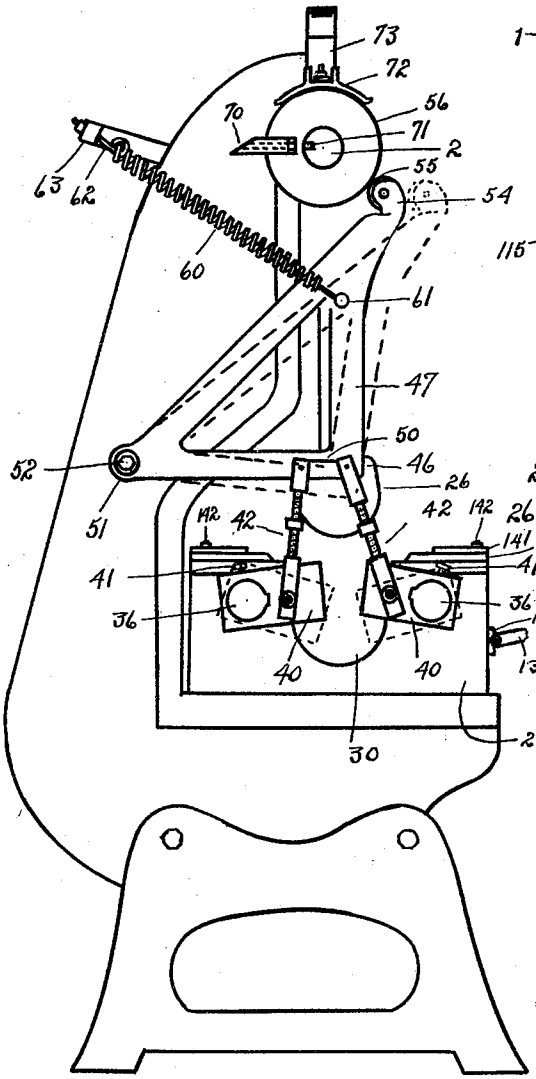


Fig 2

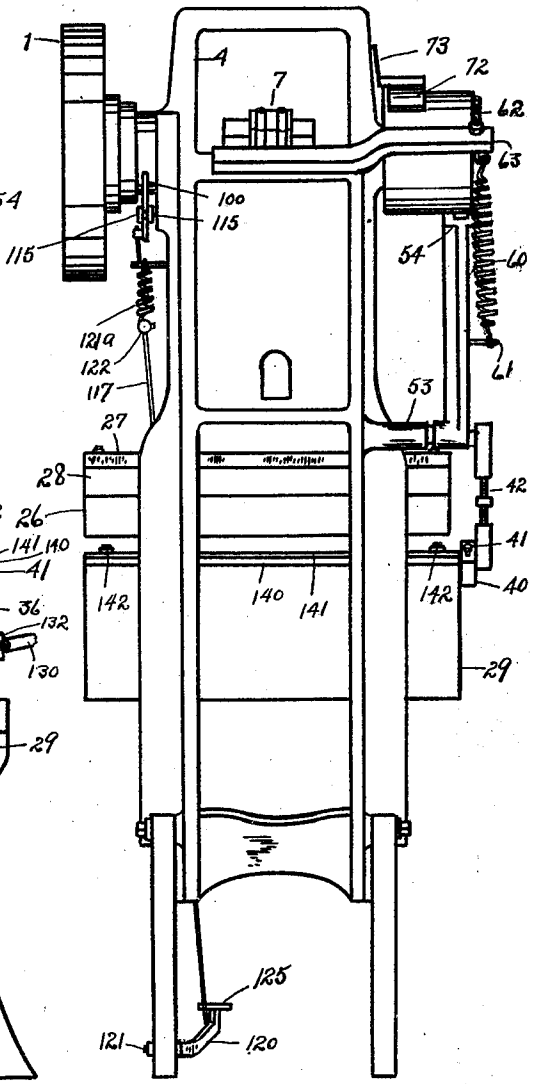


Fig 3

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SHEET METAL BENDING MACHINE

Filed May 17, 1929 4 Sheets-Sheet 3

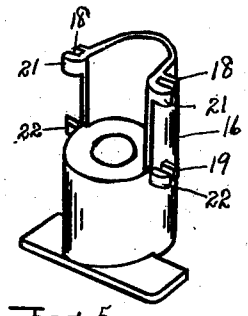


Fig 5

Fig 4

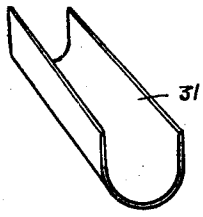


Fig 6

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SHEET METAL BENDING MACHINE

Filed May 17, 1929 4 Sheets-Sheet 4

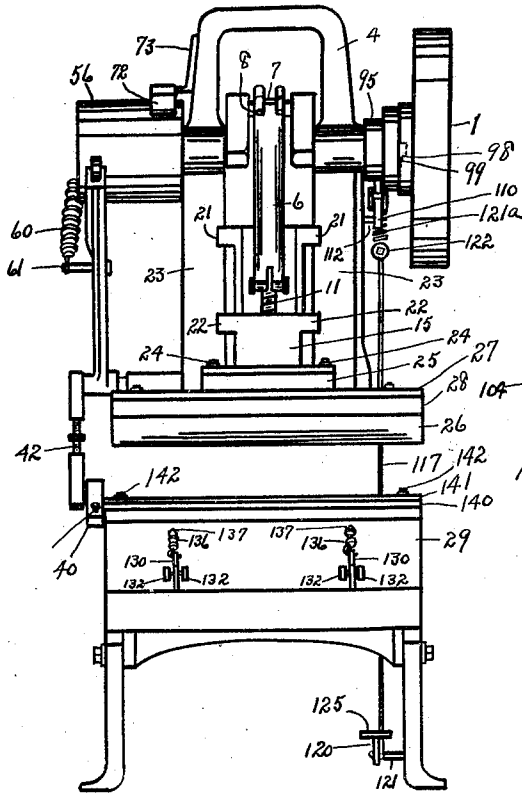


Fig 7

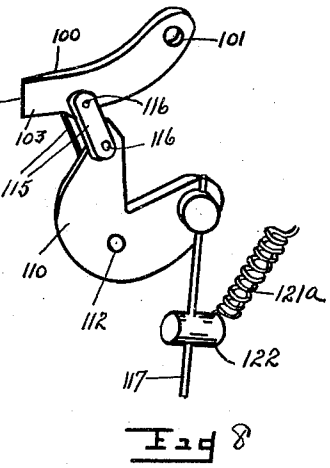


Fig 8

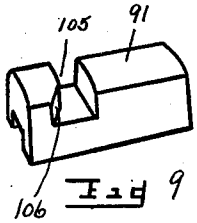


Fig 9

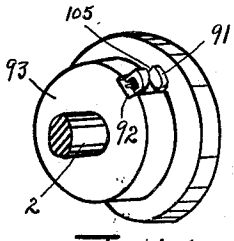


Fig 10

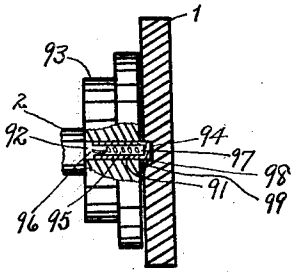


Fig 11

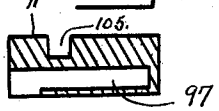


Fig 12

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Patented Dec. 13, 1932 1,890,588

UNITED STATES PATENT OFFICE

HERBERT S. POWELL, OF UTICA, NEW YORK

SHEET METAL BENDING MACHINE

Application filed May 17, 1929. Serial No. 363,829.

My invention relates to a sheet metal bending machine and I declare the following to be a full, clear, concise and exact description thereof sufficient to enable anyone skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings in which like reference characters refer to like parts throughout the specifications.

The object of the invention is to provide a machine for bending sheet metal into cylinder segments, whereby to form one of the parts of the outer casing of a muffler for an internal combustion engine. Such a muffler is constructed by welding the corresponding edges of the cylinder segments together to form a complete cylinder that forms the outer shell or casing of the muffler. The segments are made usually in half parts, whereby two of them will fit together to form a cylinder or outer shell of the muffler.

The object will be understood by referring to the drawings in which

Fig. 1 is a perspective view of the device showing parts broken away.

Fig. 2 is an end elevation of the device.

Fig. 3 is a rear elevation of the device.

Fig. 4 is a front elevation of the device.

Fig. 5 is a detailed enlarged view of a member showing a perspective thereof.

Fig. 6 is a detailed enlarged view showing a perspective of the sheet metal bent by the actuation of the machine.

Fig. 7 is a front elevation of the machine.

Fig. 8 is a detailed enlarged view showing a perspective of parts of a clutch mechanism used.

Fig. 9 is a detailed enlarged view showing a perspective of a plunger member used.

Fig. 10 is a detailed enlarged view showing a perspective and parts in section of a crank member employed.

Fig. 11 is a detailed enlarged view of the parts shown in Fig. 10, taken at another angle and with parts broken away.

Fig. 12 is a central vertical section of the member shown in Fig. 9.

Referring more particularly to the drawings, the device embodies a master pulley wheel 1 that is connected by a belt to some source of power not shown. Pulley wheel 1 is mounted to turn freely on one end of crank shaft 2 that has bearings in journals 3, 3 formed in frame 4. Pulley wheel 1 is periodically connected to turn crank shaft 2 by an automatic clutch hereinafter described. A pitman or connecting rod 6 is clamped at 7 to crank arm 8 of crank shaft 2 in such manner that crank arm shaft 2 revolves in the bearing portion of pitman 6. The lower end of pitman 6 is clamped to a screw bolt 11, whereby to allow for vertical adjustment. The lower end of bolt 11 has formed thereon a ball 12 which fits within a socket made in upstanding bushing or member 15 and held therein by screw threaded cap 13. Member 15 is formed integral with vertically movable reciprocating member 16, which is adapted to slide in an annular channel formed in the back part 17 of frame 4. It is held to slide within said channel by projections 18, 18 and 19, 19 that fit into guide grooves 20, 20 made in part 17 of frame 4. There are also projections 21, 21 and 22, 22 made integral with member 16. Said projections 21 and 22 in each instance have a flat surface adapted to rest against the flat surfaces 23, 23 made on frame 4, whereby to aid in holding said member 16 in its predetermined vertical path of movement. Furthermore member 16 is bolted at 24, 24 to block 25 that is fastened to the upper side of steel sheet pressing iron 26. The upper surface 27 of iron 26 is flat, whereas the upper portion of the sides 28, 28 converge. Its lower portion is formed in the segment of a cylinder which is adapted to cooperate with the cylindrical concaved surface of table 29 adjacent the elongated open groove or trough 30 made therein. For this purpose sufficient space is left between the corresponding surface of iron 26 and that adjacent groove 30 to allow for the thickness of the sheet metal 31, when iron 26 is in its lowermost position, as shown by dotted line in Fig. 1.

Recesses 32, 32 are formed also in the upper surface of table 29 contiguous with and opening into the elongated trough 30. Lateral pressing irons 33, 33 are disposed in said recesses 32, 32. The outer or free surfaces

34, 34 of irons 33, 33 taper somewhat to correspond to the taper of sides 28, 28 of iron 26. Said lateral irons 33, 33 are actuated towards the lateral sides 28, 28 of iron 26, whereby sides 34, 34 thereof will cooperate with the sides 28, 28 of iron 26 by segmental shafts 36, 36. Shafts 36, 36 are partially housed in cylindrical recesses made in table 29, which recesses open into recesses 32, 32. Bosses or collars 37, 37 are secured by set screws 38, 38 to one of the outer ends of each of segmental shafts 36, 36 to aid in holding them from lateral displacement. The flat surfaces 39, 39 of segmental shafts 36, 36 lie adjacent the rear flat surfaces of lateral irons 33, 33, whereby the rocking of shafts 36, 36 will push lateral irons 33, 33 towards each other.

The mechanism for rocking segmental shafts 36, 36 embodies arms 40, 40 through which one of the ends of each of segmental shafts 36, 36 projects and is held by a set bolt 41. Adjustable connecting links 42, 42 are pivotally mounted to arms 40, 40 at one end and to the free corner 46 of triangular rock member 47 at the other. A slight elevation at 50 is formed on triangular member 47 for this purpose. Triangular rock member 47 is fulcrumed at 51 upon a shaft 52 having a bearing in a sleeve 53 formed integral with frame 4. The upper corner of triangular rock member 47 is bifurcated at 54, for mounting a free running wheel 55 adapted to make contact with operating drum 56. Wheel 55 is held yieldingly in contact with the outer surface of a portion of drum 56 by a coiled spring 60 secured at one end to a stud 61, projecting laterally from triangular rock member 47 and at the other to adjustable bolt 62 mounted to bracket 63 that is fastened to frame 4.

An adjustable tooth or wedge 70 is mounted to drum 56 and projects from the peripheral surface thereof. It extends over only part of the width of said drum 56, sufficient to cover the width of wheel 55. A bolt 71 screw mounted to wedge 70 and to drum 56 is adapted to hold wedge 70 in predetermined position. Drum 56 is mounted to turn with master crank shaft 2. An adjustable brake 72 is attached by a bracket 73 to frame 4 and bears against the peripheral surface of drum 56, whereby to aid in retarding the speed of revolution of drum 56 and hence crank shaft 2.

The turning of crank shaft 2, whereby to actuate hammer member 16 and iron 26 connected rigidly thereto is effected by master pulley wheel 1.

Pulley wheel 1 although mounted on crank shaft 2 is connected to turn said crank shaft 2 only through the medium of an automatic clutch which contemplates a spring pressed plunger 91 mounted in an open recess 92 made in disk head 93 of crank shaft 2 and adapted to engage a recess or notch 94 formed in the hub of pulley wheel 1. Plunger 91 is pressed into notch 94 by coiled spring 95 fastened at 96 to head 93 and the other end resting in an open ended recess 97 made in plunger 91. Recess 94 in the hub of pulley wheel 1 has a shoulder at 98 to provide sufficient holding space for said plunger 91 when in clutch position. Shoulder 98 tapers off at 99, however, to allow for an easy approach and retraction of plunger 91. The means for retracting plunger 91 embodies an arm 100 pivoted to a stud 101 projecting laterally from the side 102 of frame 4. The free end 103 of arm 100 tapers to an edge at 104 and rests upon the peripheral surface of head 93 of crank shaft 2. End 103 of arm 100 is adapted to slide into the recess 105 made in the top part of plunger 91, whereby to retract said plunger 91 from its recess 94 in the hub of pulley wheel 1. For this purpose the upper surface of plunger 91 projects above the peripheral surface of disk head 93 and is equipped with a taper at 106 leading into said recess 105, whereby to allow the free end 103 of arm 100 to move plunger 91 laterally against the tension of spring 95 into the plane of arm 100 and out of recess 94 in the hub of pulley wheel 1.

The means for releasing end 103 of arm 100 from its position in the recess 105 embodies a bell crank 110 pivoted to a stud 112 projecting laterally from side 102 of frame 4. Bell crank 110 is connected to arm 100 by links 115, 115. Pivots 116 are used for the connections. The opposite end of bell crank 110 is connected by a rod 117 to foot pedal 120 fulcrumed at 121 to frame 4. A coiled spring 121*a* connected at one end to rod 117 through the medium of a fixed lug 122 and at the other to frame 4 tends to rock bell crank 110 into full line position shown in Fig. 1, whereby the free end 103 of arm 100 will rest normally against the peripheral surface of head 93 and, thereby be in position to engage plunger 91. By stepping on pedal 125, however, said free end 103 of arm 100 is withdrawn from contact with plunger 91 and the latter is free to move under the influence of spring 95 into notch 94 of pulley 1.

The mechanism for raising the bent sheet of metal 31 after iron 26 has descended and again elevated contemplates the use of arms or lifters 130, 130. Each of said arms 130 is fulcrumed upon a stud 131, carried in brackets 132, 132 fastened to the vertical surface of table 29. The inner ends of lifters 130 work free in recesses 135, 135. Coiled springs 136, 136 fastened at one end to lifter 130 and at the other to bolts 137 housed in the vertical surface of table 29 hold said lifter in inoperative position.

The operation of the device is effected by placing a flat sheet of metal 31 upon table 29 across trough 30 in the position illustrated in dotted lines in Fig. 1. The operator then

steps on pedal 125, to release plunger 91 and allow it to move into notch 94 of pulley 1, whereby to cause a revolution of crank shaft 2. This in turn will actuate member 16 and iron 26 connected hereto through pitman 6 into lowermost position illustrated in dotted lines in Fig. 1. Immediately, iron 26 is in this position wedge 70 on drum 56 will make contact with wheel 55 and thereby rock triangular rock member 47. The rocking of triangular member 47 into dotted line position illustrated in Fig. 2 will effect a rocking of segmental shafts 36, whereby their flat surfaces will force lateral pressing irons 33, 33 towards each other and against the end portions of metal sheet 31, to force said ends against the sides 28, 28 of iron 26. This will bend said ends of sheet 31 into substantially parallel planes as shown in Fig. 12, whereby to aid in abutting the contiguous edges of two of said bent sheets 31 to form the shell of a muffler. The sides of iron 26 will move irons 33, 33 back into retracted position as it moves upward. Simultaneously segmental shafts 36, 36 will be rocked back into original position with their flat surfaces against the flat rear surfaces of irons 33, 33 by the reverse rocking of triangular member 47 under the influence of coiled spring 60. Afterwards, the operator will manipulate arms or lifters 130, 130, to raise the bent metal sheet 31 above the lower surface of trough 30, whereby it can be easily grasped and removed by hand.

Plates 140, 140 are held in position on table 29 by supermounted plates 141, 141 and by bolts 142 whereby to determine the position of metal sheet 31. The metal sheet 31 will rest when placed in the machine originally on the upper surfaces of lateral pressing irons 33, 33.

Having thus described my invention what I claim is new and desire to secure by Letters Patent is as follows:

1. In a sheet metal bending machine, a stationary member having a trough for holding a sheet of metal, a vertically movable member cooperating with said first named member, whereby to bend said sheet of metal a crank shaft connected with said second named member, whereby to actuate the same members for further bending said sheet metal and rock members in contact with said second named members, whereby to actuate the same.

2. In a sheet metal bending machine, stationary means having a trough for holding a sheet of metal, a vertically movable member cooperating with said means, whereby to bend a sheet of metal, side members for moving against said sheet of metal, and rock shafts having flat surfaces for actuating said last named members.

3. In a sheet metal bending machine, means for holding a sheet of metal, other means for cooperating with said first named means, whereby to bend said sheet of metal in the form of a half cylinder, laterally movable members cooperating with said second named means, and segmental shafts for actuating said laterally movable members.

4. In a sheet metal bending machine, means for bending a sheet of metal, other means cooperating with said first named means, whereby to further bend said sheet of metal and segmental shafts for actuating said last named means.

5. In a sheet metal bending machine, a member having a recess therein, adapted to hold a sheet of metal, a vertically movable member cooperating with said first named member, whereby to bend said sheet of metal in a form of a half cylinder, other means cooperating the above said members, whereby to further bend said sheet of metal and segmental shafts for actuating said last named means.

6. In a sheet metal bending machine, a stationary member having a recess therein, and adapted to hold a sheet of metal, a second member adapted to cooperate with said first named member, whereby to bend a sheet of metal, movable members mounted on said first named member adjacent to the recess therein, whereby to further bend said sheet of metal, and rock members for actuating said last named members.

7. In a sheet metal bending machine, a member for holding a sheet of metal, another member cooperating with said first named member, whereby to bend said sheet of metal, laterally movable members cooperating with said second named member whereby to further bend said sheet of metal, shafts for actuating said laterally movable members and cam means for actuating said shafts.

8. In a sheet metal bending machine, a hollow member for holding a sheet of metal, a pressing iron for bending said sheet of metal, movable members for pressing said sheet of metal against said iron, rock shafts for actuating said movable members, a cam for rotating said rock shafts and means for connecting said cam with said rock shafts.

In testimony whereof I have affixed my signature.

HERBERT S. POWELL.