April 14, 1964 R. E. HERRSTRUM 3,128,654

HAND-OPERATED PIPE BENDING MACHINE

Filed April 23, 1962

Fig. 1

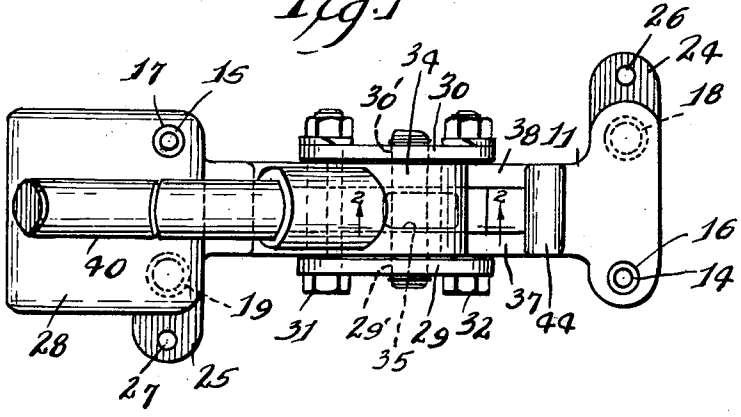


Fig. 2

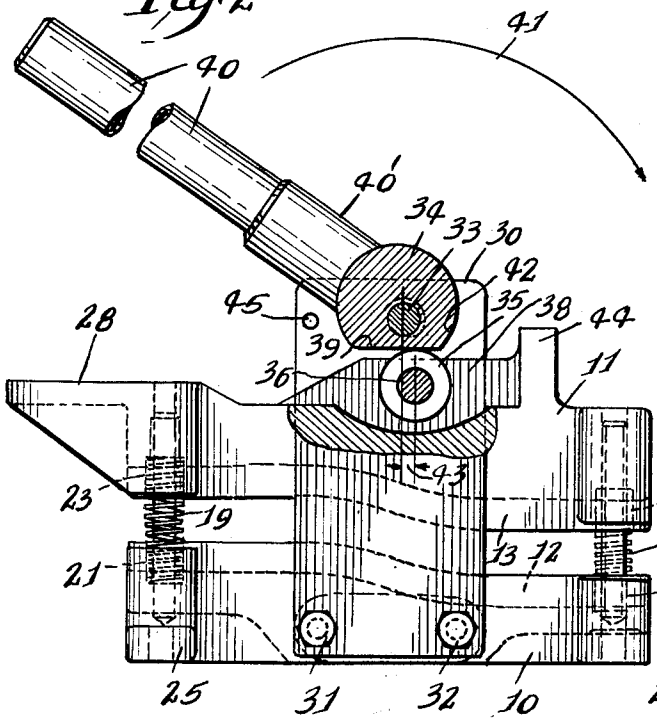
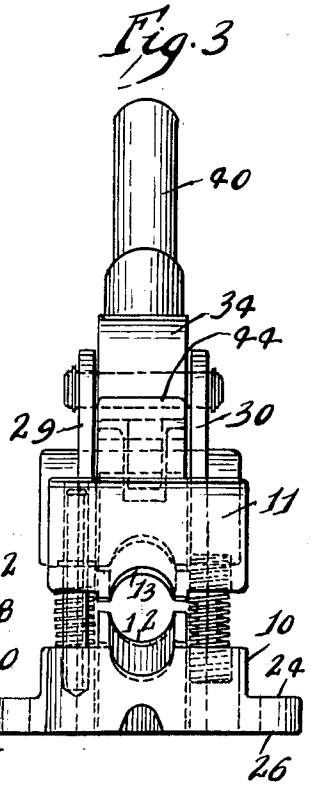


Fig. 3



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HAND-OPERATED PIPE BENDING MACHINE

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This invention relates to new and useful improvements in a hand-operated pipe bending machine.

More particularly the invention relates to such a machine for forming offsets or double bends in electrical wiring conduit.

It is a general object of the invention to provide a new and improved machine of this type.

Another object is to provide a readily portable machine having a pair of forming dies supported for movement toward and away from each other, together with an operating cam mechanism which produces a uniform force throughout the bending operation.

It is another object of the invention to provide such a machine with an operating cam and its follower roller so arranged as to amplify the force applied to the conduit and provide for the formation of the bends in the conduit successively.

Other objects will become readily apparent from the following detailed description taken in connection with the accompanying drawings, wherein:

FIGURE 1 is a plan view of a preferred form of the invention;

FIGURE 2 is an elevational view partly in section, along the line 2—2 of FIGURE 1; and

FIGURE 3 is an end view looking at the right-hand ends of FIGURES 1 and 2.

As shown in the drawings, the invention is embodied in a hand-operated machine for producing offsets in electrical wiring conduit, and consists generally of a lower die block **10** adapted to rest on the ground or another support, and an upper die block **11**, the die blocks having, respectively, forming grooves **12** and **13** on their adjacent faces, shaped as shown in FIGURE 2 in order to produce a corresponding offset in a conduit. Hollow pins **14** and **15** are secured at their lower ends in the die block **10**, and extend upwardly therefrom through suitable bores **16** and **17** in the upper die block to form guide pins for controlling the movement of the upper die block toward and away from the lower die block. Coil springs **18** and **19** are positioned vertically between the other corners of the die blocks and have their ends in recesses **20** and **21** in the lower block and **22** and **23** in the upper block. The springs are under compression and function when the parts are in the positions shown in the drawings to maintain the upper die block **11** in its elevated position.

Preferably, flanges **24** and **25** are provided on the lower die block **10** so that, if desired, screws may be inserted through the openings **26** and **27** to secure the machine to a support. In order that the machine may be operated conveniently without being secured to a support, a foot pedal or step **28** is provided on the upper die block, at the left-hand end as shown in FIGURE 2.

A cam mechanism for operating the machine is supported by means including a pair of laterally spaced, vertically extending plates **29** and **30**, which are generally rectangular in form. At their lower ends these plates are secured by bolts **31** and **32** to the lower die block **10**. A pivot pin **33** is positioned horizontally between the upper ends of the plates **29** and **30** and extends through suitable openings **29'** and **30'** therein, and carries a cam **34** arranged to operate against a roller **35** carried on a short shaft **36** extending between a pair of laterally spaced vertical flange portions **37** and **38** on the upper die block **11**. As shown best in FIGURE 2, the

cam **34** is provided with a flat portion **39** which enables the upper die block to attain a position sufficiently elevated to facilitate the insertion of a piece of straight conduit between the forming grooves **12** and **13**. The cam **34** is arranged to be operated by means of a handle **40** and is swung clockwise as indicated by the arrow **41** during a bending operation. During the initial movement of the handle from the position shown in FIGURE 2, the flat portion **39** of the cam provides a relatively rapid downward movement of the upper die block, after which the cam portion **42** serves to produce a greater force, pressing the upper die block toward the lower die block to produce the offset in the conduit.

In order to increase the pressing force of the machine on the upper die block for a given amount of turning force on the handle **40**, the axis of the cam pivot **33** is shown offset from the axis of the roller shaft **36** by an amount indicated at **43** so that in the operation of the machine, the dies function to bend one end of the double bend offset before the bending of the other, thereby enabling the machine with a handle of reasonable length to produce sufficient force to complete the offset.

Preferably, the upper die block **11** is provided with a portion **44** which engages the handle **40** upon completion of the double bend or offset, thus enabling the operator to know when the bending operation has been completed. A pin **45** may be provided to limit the swinging movement of the handle **40** in the opposite direction.

To facilitate packaging or storage, the handle **40** is removable from a sleeve portion **40'** which, in turn, is integral with the cam **34**.

The drawings illustrate the machine with the parts in the positions normally assumed prior to the insertion of a piece of pipe which is to be given an offset bend. To bend such a pipe it is first inserted into the opening formed by the grooves **12** and **13** in the die blocks, after which, by swinging the handle **40** in a clockwise direction as shown in FIGURE 2, the pipe will be given an offset bend as determined by the curvature of the grooves. If the machine is not anchored on a bench or other supporting structure as by means of screws through the lugs **26** and **27**, the operator, by placing his foot on the step **28**, may provide the necessary resistance to any tipping movement of the machine during the bending operation. Upon completion of the bend, the handle **40** is swung back to the initial position shown in FIGURE 2, after which the pipe may be removed.

It is believed apparent that various modifications may be made without departing from the spirit and scope of the appended claims.

I claim:

1. A hand-operated bending machine having, in combination, a lower die block and an upper die block provided with opposed grooves operable to form an offset bend in a pipe, guide pins anchored in one block and extending slidably into bores in the other block, a pair of members rigidly secured at their lower ends to the lower block and extending upwardly alongside of and to a position above the upper block, a pivot pin extending transversely above the upper block and through openings in the members, an operating cam rotatably supported on said members and operable to move the dies toward each other, and an operating handle extending from said cam, said cam having a somewhat flat spot effective to provide a rapid initial movement of the upper die block to initially engage a pipe when the handle is turned to bend a pipe, and an eccentric portion which thereafter slowly moves the upper die block toward the lower die block.

2. A hand-operated pipe bending machine having, in combination, a lower die block adapted to rest on a support, an upper die block, guide pins anchored in one block and extending slidably into bores in the other block,

a pair of plates rigidly secured at their lower ends to the lower block and extending upwardly alongside of and to a position above the upper block, a pivot pin extending transversely above the upper block and into openings in said plates, an operating cam carried on said pin, a roller mounted on the upper block in position to engage said cam, and on an axis spaced horizontally from the axis of the cam supporting pin, and an operating handle extending from said cam, said cam having a flat spot on its periphery positioned to engage the roller when the die blocks are fully separated and effective to provide a rapid initial movement of the upper die block toward the lower die block when the handle is turned to bend a pipe, and an eccentric portion which thereafter slowly moves the upper die block toward the lower die block.

3. A hand-operated bending machine having, in combination, a lower die block and an upper die block provided with opposed grooves operable to form an offset bend in a pipe, said lower block being adapted to be set on a supporting surface, means for guiding said blocks for movement toward and away from each other, means for moving the upper die block toward the lower die block comprising, a pair of members extending upwardly from the lower die block and rigidly affixed thereto, a pivot pin extending between the upper ends of said members, an operating cam carried on said pin and provided with an operating handle said cam shaped to provide two camming actions including rapid initial movement of the upper die block toward the lower die block and second slower more forceful movement of the upper die block toward the lower die block, means formed on one end of the upper die block for limiting the movement of the handle during a bending operation to a point where the bend has been fully completed, and means on the other end of the upper die block forming a step for the machine operator's foot to prevent the machine from tipping during a bending operation.

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