Dec. 12, 1950 J. H. TAYLOR 2,534,185

METHOD OF AND MACHINE FOR MAKING PIPE FITTINGS

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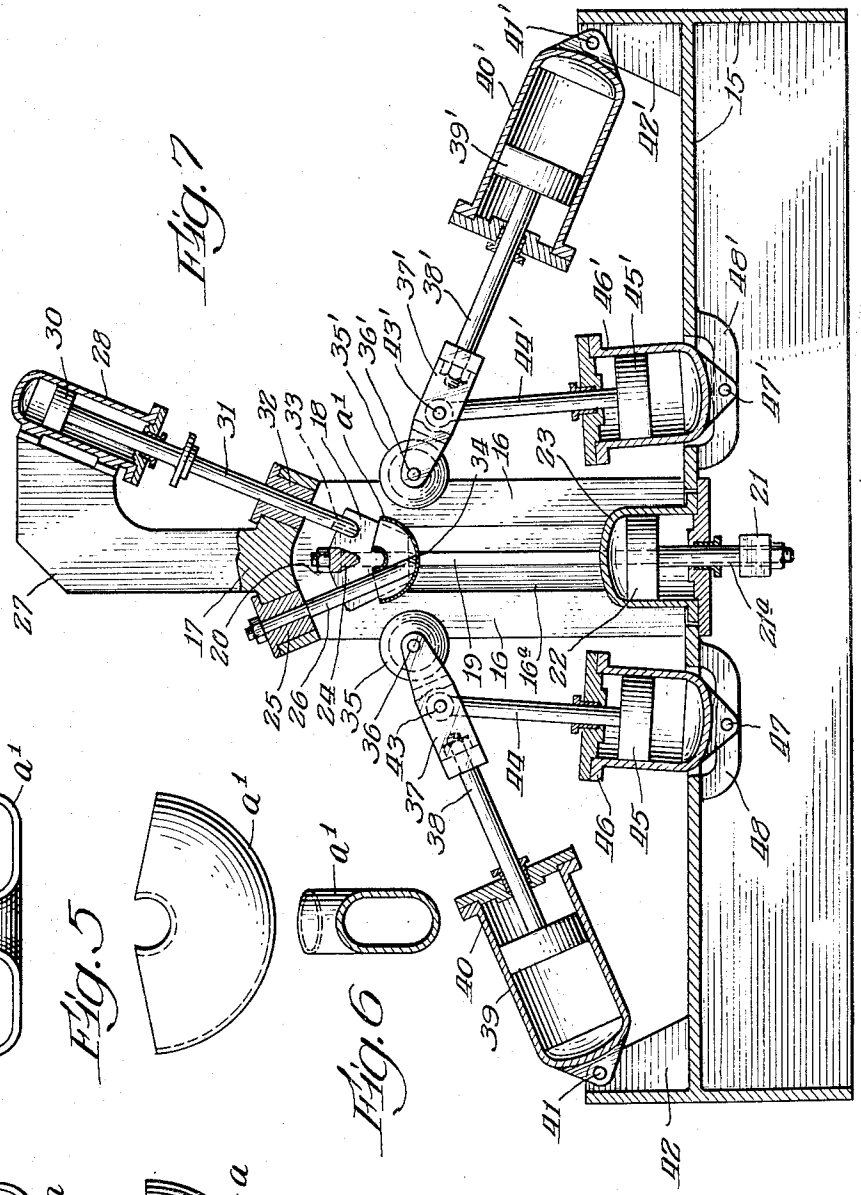


Fig. 7

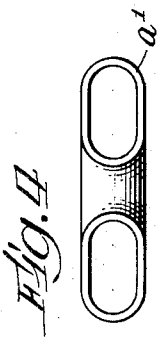


Fig. 4

Fig. 5

Fig. 6

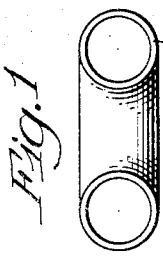


Fig. 1

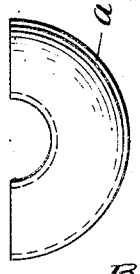


Fig. 2

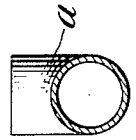


Fig. 3

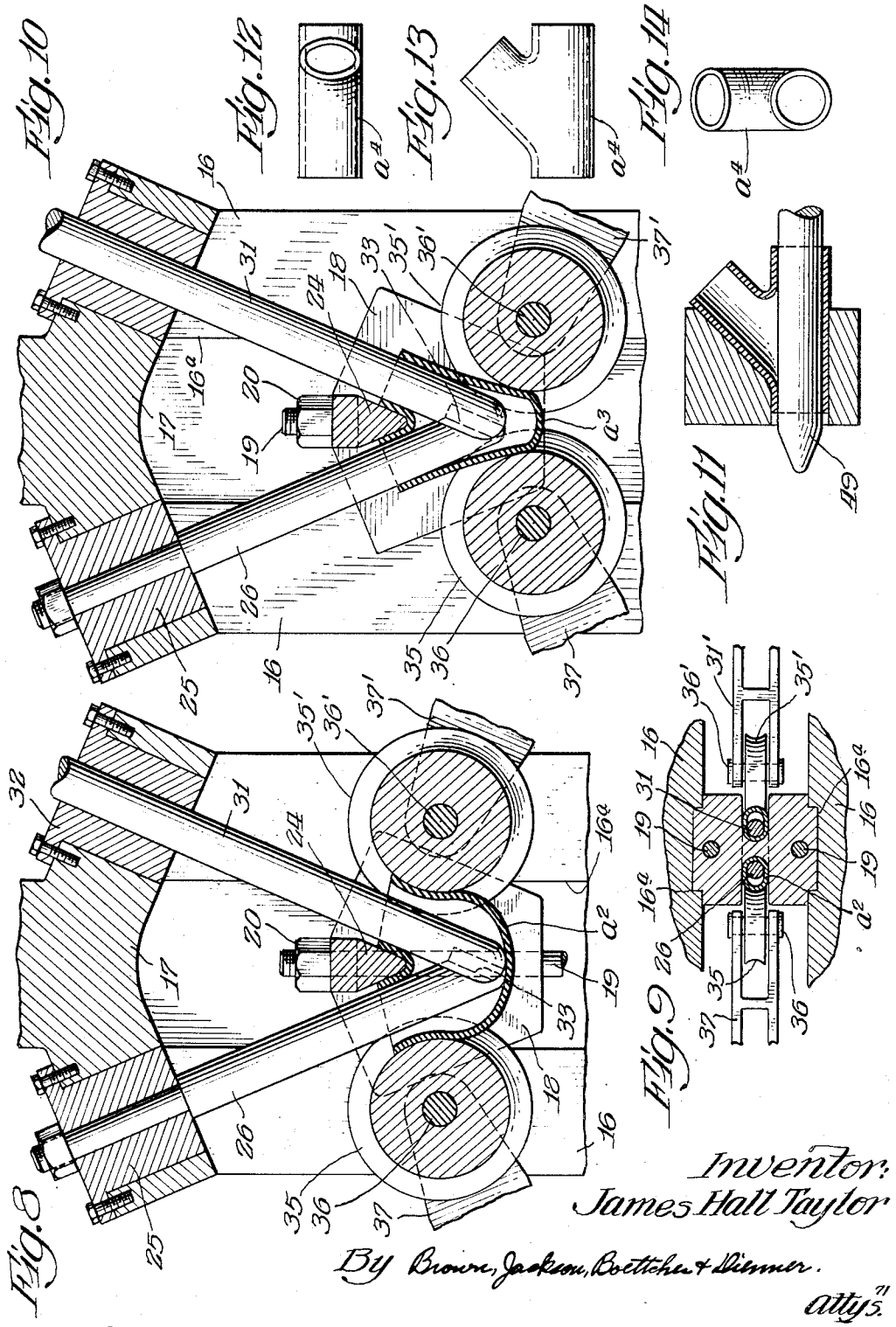
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METHOD OF AND MACHINE FOR MAKING PIPE FITTINGS

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METHOD OF AND MACHINE FOR MAKING PIPE FITTINGS

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4 Claims. (Cl. 29—157)

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My invention relates to the manufacture of pipe fittings, particularly such fittings as are known as "laterals," i. e. a straight pipe section with an obliquely disposed branch.

My object, accomplished by my invention, is to produce a one-piece formed fitting of this kind, i. e. a one-piece lateral of wrought metal brought to ultimate shape by die operation.

The method of my invention begins with a conventional pipe bend (of wrought metal), the manufacture of which as a standard article is well known. To it I apply a series of forming steps, including steps performed by the machine of my invention, resulting finally in a lateral of the character above indicated.

In the accompanying drawings,

Figures 1, 2 and 3 are self-explanatory views of the pipe bend from which my invention proceeds;

Figures 4, 5 and 6 are corresponding views of the same article after the first step of my method has been performed thereon;

Figure 7 is an elevational view of the machine of my invention, parts being shown in section to aid description, and the article of Figures 4, 5 and 6 being shown in place therein;

Figures 8 and 9 show the next step of my method, this being the first operation in the machine of my invention, the latter figure also further illustrating the machine;

Figure 10 is similar to Figure 8, showing further operation in the machine;

Figure 11 shows the article, removed from the machine, and in a final punching operation; and

Figures 12, 13 and 14 are self-explanatory views of the finished fitting.

The pipe bend *a* of Figures 1, 2 and 3 is a conventional return bend (of wrought metal), of circular cross-section, a standard article obtainable on the market. While I have shown, by way of example, a pipe bend of approximately 180° extent, i. e., a return bend, that is not essential and my invention comprehends the use of any suitable pipe bend.

Firstly, between platen surfaces, the pipe bend *a* is flattened to the shape shown at a^1 in Figures 4, 5 and 6.

It is then placed in the machine shown in Figure 7.

This machine comprises a base 15, having uprights 16, 16, joined at the top by the bight 17. The uprights 16, 16 are provided, on their inner sides with the complementary vertical grooves 16*a*, 16*a*, in which die block 18 is mounted (see Figure 9). This die block is supported by ver-

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tical rods 19, 19, threaded therein and locked by nuts 20, and the lower ends of these rods are mounted in cross-piece 21, carried on stem 21*a* of piston 22, reciprocally mounted in closed-end cylinder 23, fixedly mounted in the base 15, whereby a limited reciprocal movement can be imparted to the die block 18.

The die block 18 is in the form of two main portions bridged by a grooved wedge-shaped die portion 24, the distance between said two main portions being equal to the fitting outside diameter. The wedge-shaped die portion determines the ultimate angle between the main portion of the fitting and its branch.

Fixedly mounted in bushing 25 in the bight 17, at one side, is the cylindrical mandrel 26, extending obliquely downwardly between the two main portions of the die block 18 (see Figure 9) parallel to the proximate side of the wedge-shaped die portion 24. The lower end of this mandrel is formed to desired shape and to interlock with another mandrel, as will appear presently; and the diameter of this mandrel determines the fitting inside diameter.

Extending upwardly from the bight 17 is the inverted L-shaped bracket 27, to the end of which closed-end cylinder 28 is fixedly secured with its axis in the transverse plane of the axis of the mandrel 26. The stem 29 of piston 30 for this cylinder 28 has attached thereto the downwardly extending mandrel 31, all on an oblique axis symmetrical with the axis of the mandrel 26. Thus the mandrel 31 also extends between the two main portions of the die block 18 parallel to the other side of the wedge-shaped die portion 24. The mandrel 31 slides in the bushing 32, mounted in the other side of the bight 17. The diameter of the mandrel 31 (as shown) is the same as that of the mandrel 26, and its lower end is formed to desired shape and is provided with a mortise 33 to receive the tenon 34 formed on the lower end of the mandrel 26.

Grooved forming rollers 35 and 35′ are provided to enter between the two main portions of die block 18 (see Figure 9), there to cooperate with mandrels 26 and 31 in operations on the "blank" a^1.

Roller 35 is mounted on pin 36 in yoke 37 secured to the free end of stem 38 of piston 39, reciprocating in closed-end cylinder 40, which, in turn, is pivoted at 41 to bracket 42 on base 15. By this means, inward and outward movement (i. e. toward and away mandrel 26) may be imparted to the roller 35.

Pivoted at 43 in yoke 37 is the stem 44 of pis-

ton 45, which reciprocates in closed-end cylinder 46, which, in turn, is pivoted at 47 to bracket 48 on base 15. By this means, up and down movement may be imparted to roller 35.

Symmetrical, but otherwise identical mechanism is provided on the other side of the base for cooperation with mandrel 31. The corresponding parts have been supplied with the same reference characters primed.

The pistons 22, 30, 39, 45, 39' and 45' are operated by fluid pressure on one side and release of pressure on the other, all in manner and by means well known and therefore neither illustrated nor described.

The blank a^1 (Figures 4, 5 and 6) is placed in the machine in the position shown in Figure 7, the mandrel 26 extending into that end which is to be the branch of the ultimate fitting.

Thereupon, the die block 18 is lowered to bring the wedge-shaped portion 24 thereof into the crotch of the bend, the mandrel 31 is lowered into the other end of the blank, and the rollers 35 and 35' are advanced toward their respective mandrels 26 and 31 and are moved downwardly and upwardly in rolling action against their mandrels.

The first result in this operation is illustrated at a^2 in Figure 8. The blank being confined on the sides, as will be clear from Figure 9, the crotch of the blank is brought against the grooved wedge-shaped member 24 by the mandrels, and the interlocked lower ends of the mandrels engage the central portion of the inside surface of the outer wall of the blank, being formed, together, to confine such engagement to a restricted area approximately that of the cross-section of the main straight portion of the ultimate fitting.

The effect of further advance and further upward and downward movement of the rollers 35 and 35' is shown at a^3 in Figure 10, which depicts the operation in the machine almost completed. It remains only to complete the rolling of the blank against the mandrels to the form a^4 shown in Figure 11 with the exception that the lower end is still closed.

Upon completion, the article is removed from the machine and the wall closing the end is removed by a punch 49 in a final operation illustrated in Figure 11.

The result is the finished fitting illustrated in Figures 12, 13 and 14.

I claim:

1. The method of making a pipe fitting, which comprises partially flattening a conventional pipe bend of wrought metal, confining said bend between planar surfaces and upon a grooved wedge-shaped die member, inserting a pair of relatively obliquely disposed mandrels into the respective ends of said bend to intersect at the central portion of the inside surface of the outer wall of said bend, then shaping the walls of said bend against said mandrels, and then removing the closed end of said bend.

2. In means for making pipe fittings from pipe bends, means providing spaced apart flat surfaces, a vertically movable downwardly tapering grooved wedge shaped member bridging the space between said surfaces, a fixed mandrel extending downward between said surfaces with its lower end underlying said wedge shaped member, a second mandrel having rectilineal movement toward said first mandrel and positionable between said surfaces with its lower end in close proximity to the lower end of said first mandrel and underlying said wedge shaped member, said mandrels being disposed in a common plane and at opposite sides of said wedge shaped member substantially parallel with the sides thereof, forming members at opposite sides of and substantially aligned with the space between said surfaces, said forming members being mounted for vertical swinging movement about substantially horizontal axes, and means for moving said forming members into said space toward and away from said mandrels and for swinging said members about said axes.

3. In means for making pipe fittings from pipe bends, a downwardly tapering grooved wedge shaped die member, a stationary mandrel extending downward along one side of and in the plane of said member parallel therewith, a movable mandrel positionable in fixed downwardly converging relation to said stationary mandrel at the opposite side and in the plane of said member parallel therewith, said die member being movable toward said mandrels into cooperating relation therewith effective for forming to said mandrels the inner side of a pipe bend mounted on said mandrels, and forming members underlying said mandrels at opposite sides of said die member substantially in the plane of the latter and movable toward said mandrels and lengthwise thereof for forming the outer side of the bend about said mandrels.

4. In means for making pipe fittings from pipe bends, a downwardly tapering grooved wedge shaped die member, a stationary mandrel extending downward along one side of and in the plane of said member parallel therewith, a movable mandrel positionable in fixed downwardly converging relation to said stationary mandrel at the opposite side and in the plane of said member parallel therewith, said die member being movable toward said mandrels into cooperating relation therewith effective for forming to said mandrels the inner side of a pipe bend mounted on said mandrels, forming members underlying said mandrels at opposite sides of said die member substantially in the plane of the latter and mounted for vertical swinging movement about substantially horizontal axes, and means for moving said forming members toward and away from said mandrels and swinging them about said axes.

JAMES HALL TAYLOR.

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