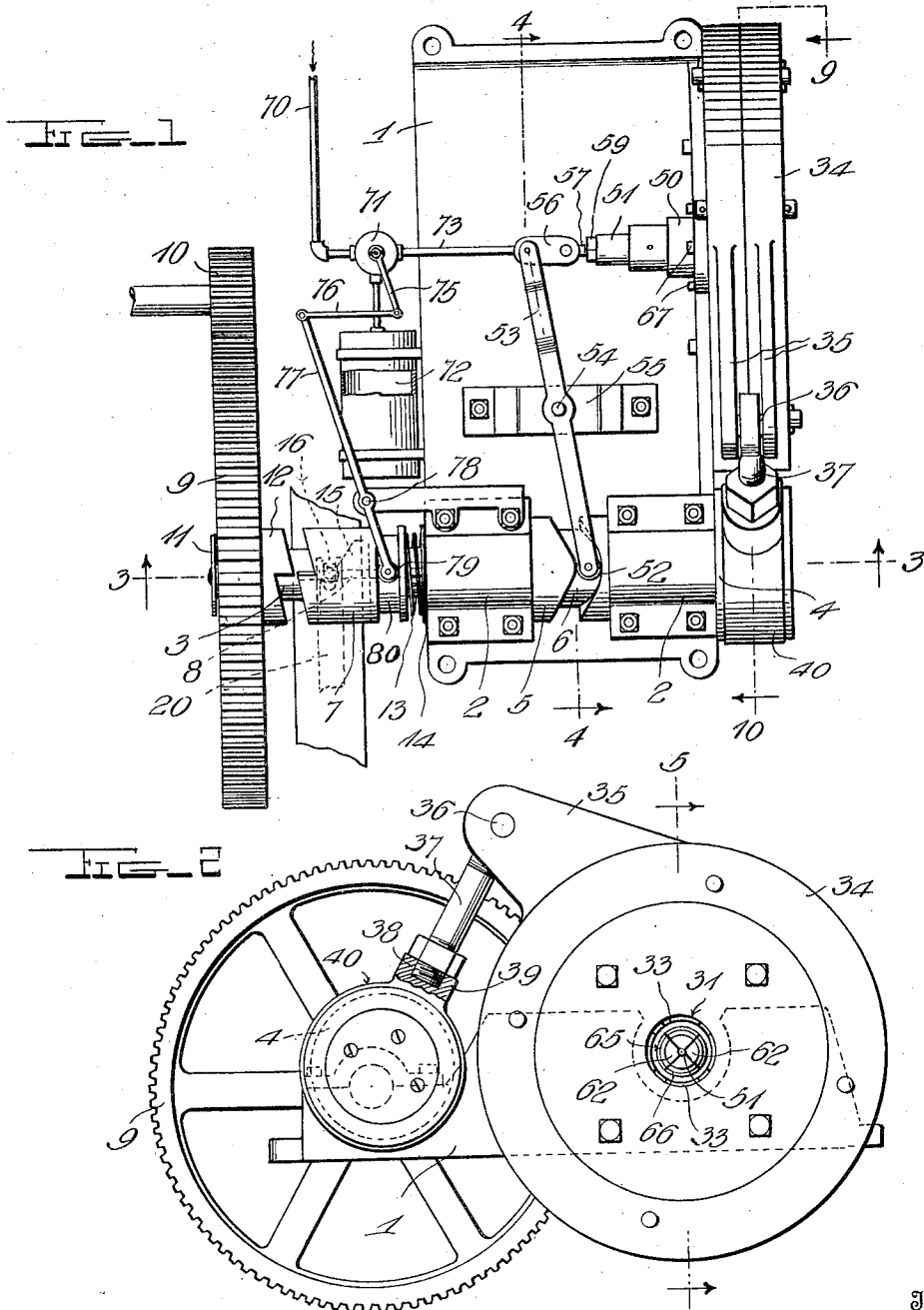


J. C. TASSEY.
BOILER FLUE SWAGE.
APPLICATION FILED MAY 22, 1913.

Patented July 7, 1914.

1,102,818.

3 SHEETS-SHEET 1.



Inventor

Joe C. Tasse

Witnesses

J. Ralph Hoge

By *A. B. Wilson & Co.*
Attorneys

1,102,818.

The drawing consists of several views of a mechanical assembly. Fig. 1 is a side view showing a horizontal base (1) with various components mounted on it, including a vertical shaft (35) and a piston (36). Fig. 2 is a top view of the same assembly. Fig. 3 is a cross-sectional view showing the internal components. Fig. 4 is a detail of a circular component (30) with a central shaft (37) and a piston (36). Fig. 5 is a detail of a circular component (30) with a central shaft (37) and a piston (36). Fig. 6 is a detail of a circular component (30) with a central shaft (37) and a piston (36). Fig. 7 is a detail of a circular component (30) with a central shaft (37) and a piston (36). Fig. 8 is a detail of a circular component (30) with a central shaft (37) and a piston (36). Fig. 9 is a detail of a circular component (30) with a central shaft (37) and a piston (36). Fig. 10 is a detail of a circular component (30) with a central shaft (37) and a piston (36). Fig. 11 is a detail of a circular component (30) with a central shaft (37) and a piston (36). Fig. 12 is a detail of a circular component (30) with a central shaft (37) and a piston (36). The drawing includes numerous numbered labels (1-82) identifying various parts and features.

E. E. Emerson
J. Ralph Hoge

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A. B. Wilson & Co.

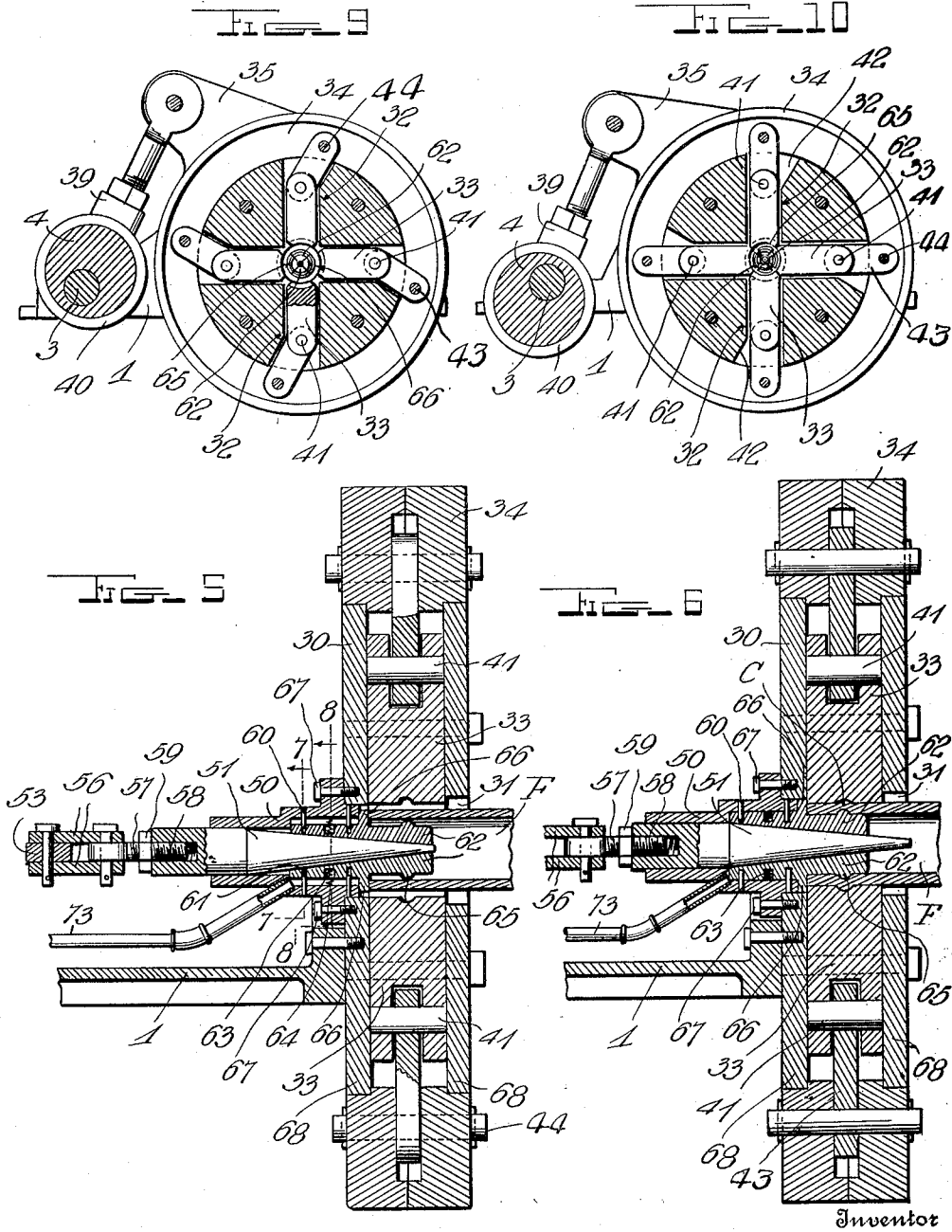
THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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3 SHEETS-SHEET 3.



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UNITED STATES PATENT OFFICE.

JOE CEPHAS TASSEY, OF NASHVILLE, TENNESSEE.

BOILER-FLUE SWAGE.

1,102,818.

Specification of Letters Patent.

Patented July 7, 1914.

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To all whom it may concern:

Be it known that I, JOE CEPHAS TASSEY, a citizen of the United States, residing at Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Boiler-Flue Swages; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to metal bending, and more especially to pipe expanders and flangers; and the object of the same is to produce an improved swaging machine for forming an annular crimp in boiler flues near their ends. This object is carried out by the improved machine hereinafter more fully described and claimed, and as shown in the drawings wherein—

Figure 1 is a plan view, and Fig. 2 an end elevation of this machine complete. Figs. 3 and 4 are sections on the lines 3—3 and 4—4 of Fig. 1 respectively. Figs. 5 and 6 are enlarged sections on the lines 5—6 of Fig. 2, showing the parts in different positions as will be explained below. Figs. 7 and 8 are cross sections taken on the lines 7—7 and 8—8 respectively of Fig. 5. Figs. 9 and 10 are sections on the line 9—10 of Fig. 1, with the parts in different positions. Fig. 11 is a detail showing the treadle mechanism. Fig. 12 is a detail sectional view of the three-way valve, displayed in connection with the cooling system.

The bed 1 of this machine carries bearings 2 in which is journaled a main shaft 3 carrying an eccentric 4 at its front end, a ring 5 having a cam groove 6 between said bearings, and a clutch element 7 splined on the shaft as at 8 in rear of the rearmost bearing 2; while a large gear 9 driven by a power gear 10 runs loose on the rear extremity of the shaft 6 and is held in place by a collar 11, this gear carrying another clutch element 12 as best seen in Fig. 1. The element 7 is pressed into normal engagement with the element 12 by means of a spring 13 coiled on the shaft between a collar 14 thereon adjacent the rearmost bearing 2, and the rear end of said element. The latter also carries one or more radial cam faces 15 adapted to be struck by the upper end of a pin 16 which moves vertically within a guide 17 as best seen in Figs. 3 and 11. The lower end of this pin has

a groove 18 loosely engaged by a fork 19 at one end of a lever 20 which is pivoted at 21 between its extremities and carries a weight 22 at its other end, and weight normally raises the pin into engagement with said cam face as will be clear. A treadle 23 is connected by a rod 24 with the lighter end of said lever 20, and when the treadle is depressed the weight is raised and the pin is retracted. With this construction of parts, the power gear 10 drives the large gear 9 constantly, and this runs free on the shaft 6 unless the clutch elements 7 and 12 are engaged. The expansion of the spring 13 holds said elements normally engaged, and therefore the main shaft would rotate constantly if it were not for the treadle mechanism illustrated in Fig. 11. The normal tendency of the weight 22 is to raise the pin 16, and the rotation of the clutch 7 brings its cam face 15 into contact with the pin and automatically retracts its clutch teeth out of engagement with those on the element 12. So that the addition of the treadle mechanism and weight overcomes the normal tendency of the driving mechanism to rotate the main shaft constantly. When now the operator places his foot on the treadle, he draws the pin downward, releases the clutch element 7 and permits the spring 13 to throw this element into engagement with the element 12, so that the rotation of the main shaft by the gear wheel 9 is resumed. Thus it will be seen that as long as the operator keeps his foot on the treadle, the main shaft will rotate and the parts driven thereby will be actuated, but as soon as he removes his foot the treadle mechanism automatically raises the pin and automatically disengages the clutch elements to stop the rotation of the main shaft.

As above stated, the purpose of this machine is to put a crimp in a boiler flue near its end. Such crimp is formed by expanding an annular band in the flue or pipe and simultaneously compressing or swaging the same from the exterior. To perform these operations simultaneously two sets of tools or dies are required, one working on the interior and the other on the exterior of the flue or tubes; but both are driven by the main shaft through means which will yet be described.

Carried by the bed is a ring-shaped casing 30 having a hole 31 through the center of its front wall in which the flue F is inserted as

shown in Fig. 6, and mounted in radial guides 32 in said casing are dies 33 whose inner ends are shaped to put the crimp C on the exterior of said flue. Rotatably mounted around the casing is a ring 34 having an ear 35 at one side to which at 36 is pivoted a rod 37, one end of which is screwed at 38 into a boss 39 formed on an eccentric band 40 which surrounds the eccentric 4, and the rotation of the latter will therefore oscillate the ring 34 around the casing 30. The outer end of each slot or guide 32 is laterally offset as shown at 42 in Fig. 10, and the outer end of each die 33 is pivoted at 41 to a link 43 whose outer extremity in turn is pivoted at 44 to said ring. When now the cam shaft is rotated, it will be seen that the eccentric and its connection with the ear 35 cause the ring to oscillate; and when the ring turns to the right as seen in Fig. 9, the several dies 33 are retracted, whereas when it turns to the left as seen in Fig. 10, the several dies are projected so that their inner ends come into engagement with the flue F.

Secured to the back of the casing 30 is a sleeve 50 within whose reduced rear end reciprocates a tapered bolt or expander 51. Engaging the groove 6 in the ring 5 is a roller 52 at one end of a lever 53 which is pivoted at 54 on a suitable standard 55 rising from the bed 1, and the other end of this lever is pivotally connected by twin links 56 with the rear end of an eye bolt 57 whose forward end is screwed into said expander 51 as at 58 and held in adjusted position by means of a jam nut 59. Thus when the main shaft rotates the lever rocks on its pivot and the expander is reciprocated longitudinally within the rear end of the sleeve 50. Projecting from the wall of said sleeve radially inward into its bore are pins 60 slidably engaging radial sockets 61 formed in a series of internal dies or wedges 62, and the body of each wedge has a socket 63 in which is mounted an expansive spring 64 bearing the wedge normally inward as the spring presses outward against the bore of the sleeve 50. The inner sides of these wedges are shaped to fit the exterior of the tapered bolt or expander 51, while their outer sides are provided with suitable die-faces or projections 65 to groove the interior of the flue F directly opposite its crimp C as shown in Fig. 6. By preference the various wedges are also provided with radial projections which collectively make up a shoulder 66 that rests squarely against the front end of the sleeve 50. The latter may be rendered removable from the casing 30 as by means of screws 67 so that another set of dies or wedges 62 may be substituted when desired. In like manner the face plates 68 of the casing may be rendered removable by any suitable means, so that access may be had to its interior when it is desired to replace the dies

33 with others with differently shaped active faces at their inner ends.

With this construction of parts, power being applied to the driving gear 9 and a flue F inserted in the hole 31 as seen in Fig. 5, when the operator places his foot on the treadle 23 and draws the pin 16 downward out of engagement with the cam face 15 of the clutch element 7, the spring 13 expands and throws the two elements 7 and 12 into engagement so that the rotation of the driving gear 9 is now communicated to the main shaft 6. Rotation of the latter causes oscillation of the ring 34 and reciprocation of the dies 33 in a manner above described, and the rotation of the main shaft also causes the swinging movement of the lever 53 and therefore the reciprocation of the expander 51 so that the wedges are first pressed outward by the forward movement of said expander, and then borne inward by the expansion of their own springs as the expander is retracted. The parts will be so timed that the inward movement of the outer dies and the outward movement of the inner dies will occur simultaneously, and the result will be that in a very short time a crimp C is formed on the flue F at the points illustrated in Fig. 6. Such action of the various dies will continue as long as the operator keeps his foot on the treadle 23, but when he removes it the weight 22 will cause the lever 20 to move on its pivot 21, with the result that the pin 16 will rise and its tip will be engaged by the cam face 15 on the clutch element 7 the next time the latter revolves. This causes the automatic movement of the clutch to the right as shown in Fig. 1 with the result that the spring 13 is compressed and the clutch teeth are thrown out of engagement so that the rotation of the main shaft 6 ceases, although the rotation of the gears continues as before.

In connection with the above-described mechanism I preferably employ a system for cooling the dies and for blowing the scales out of the flues which are being swaged. This includes a pipe 70 led from a source of compressed air to and through a three-way valve 71 (see Fig. 12) one arm of which is connected with a tank or cylinder 72 and the other arm, 73, of which leads to the swaging mechanism. On the stem of the valve is fixed a crank arm 75 connected by a link 76 with a rock lever 77 which is pivoted at 78 to a suitable bracket carried on the framework, and whose other end has a roller 79 engaging a groove 80 in the clutch 7. The ports in the three-way valve are so disposed that when the clutch elements 7 and 12 are engaged the air pipe 70 delivers the air into the tank 72, but when the clutch element 7 is retracted as seen in Fig. 1 its groove 80 acts on the roller 79 and rocks the lever 77 with the result that the link 76 turns the arm 75

and causes the ports of the valve to cut off the supply pipe 70 and throw the tank 72 into communication with the branch pipe 73. The result of this switching of the air is that what has been stored or compressed within the tank 72 is now delivered through the branch 73 whose other end is directed against the dies which have doubtless become hot during the operation of swaging the flue and also directed into the end of the latter so as to blow out any chips or scales which may have been formed in the operation of the machine. Attention is directed to the fact that the action of this attachment is entirely automatic, because no air is delivered to the machine while the main shaft is rotating and the dies are performing their functions, and on the contrary air from the tank is delivered for cooling purposes when the main shaft comes to rest; but, having exhausted the tank, the air will not be wasted if the parts are permitted to remain in this condition as they would have to do if the operator were changing the dies. The parts of this machine are of the desired proportions, materials, and construction consistent with the following claims:

What is claimed as new is:

1. In a swaging machine, the combination with dies, means for moving the same, a main shaft, and connections between said shaft and means; of a collar fast on the shaft, a clutch element splined on the shaft and having teeth in one end, a gear loose on the shaft and having teeth adapted to engage those on said element, means for throwing the clutch teeth normally into engagement, manually controlled means for disengaging them, a three-way valve whose inlet communicates with a source of compressed air supply and whose outlets are led respectively to a tank and to the tool, an arm on the valve stem, a rock lever pivoted on a support and actuated by the longitudinal movements of said clutch element, and a link connecting the lever with said arm on the valve stem, for the purpose set forth.

2. In a swaging machine, the combination with dies, means for moving the same, a main shaft, and connections between said shaft and means for actuating the latter; of a collar fast on the shaft, a clutch element splined on the shaft and having teeth in one end and a cam face on its periphery, a gear loose on the shaft and having teeth adapted to engage those on said element, an expansive spring between said collar and clutch element for throwing the clutch teeth normally into engagement, a pin adapted to be projected into the path of said face for disengaging said clutch teeth, a three-way valve whose inlet communicates with a source of compressed air supply and whose outlets are led respectively to a tank and to the tools, an arm on the valve stem, a rock

lever pivoted on a support and having a roller at one end, said clutch element being provided with a groove engaging this roller, and a link connecting the other arm of this lever with said arm on the valve, for the purpose set forth.

3. In a flue swaging machine, the combination with a series of internal dies having die faces on their outer sides and their inner sides beveled, a sleeve inclosing the dies, springs pressing the dies normally inward, and a tapered bolt for spreading said dies; of a casing secured to the sleeve and having radial guides, a series of external dies movable in said guides, actuating mechanism for forcing said dies inward or retracting them, a main shaft having a cam and an eccentric, connections between said cam and tapered bolt, and connections between said eccentric and the actuating mechanism for moving all the dies simultaneously.

4. In a flue swaging machine, the combination with a series of internal dies having die faces on their outer sides and their inner sides beveled, a sleeve inclosing the rear ends of said dies, springs in the latter bearing outward within the sleeve and pressing the dies normally inward, and a tapered bolt for distending said dies; of a casing secured to the sleeve and having radial guides, a series of external dies movable in said guides, actuating mechanism for forcing said dies inward or retracting them, a main shaft having a cam and an eccentric, connections between said cam and tapered bolt, connections between said eccentric and the actuating mechanism for moving all the dies simultaneously, a power gear, a large gear meshing therewith and loose on said shaft, its hub having clutch teeth, a clutch member splined on said shaft and having teeth adapted to engage those on said hub, and means for moving this member.

5. In a flue swaging machine, the combination with an upright casing having an axial hole and radial guides offset at their outer ends, a series of dies slidably mounted in said guides, and a link pivoted to the outer end of each die; of a ring rotatably mounted around said casing and pivotally connected with the outer end of each link, and means for oscillating the ring.

6. In a flue swaging machine, the combination with a casing having an axial hole and radial guides offset at their outer ends, a series of dies slidably mounted in said guides, and a link pivoted to the outer end of each die; of a ring rotatably mounted around said casing and pivotally connected with the outer end of each link, an ear projecting from said ring, a power shaft having an eccentric, and connections between the eccentric band and ear for oscillating the ring around the casing.

7. In a flue expander, the combination

with a casing having a hole for the flue, a sleeve secured to said casing with its axis in line with said hole, pins projecting radially inward within said sleeve, a series of dies
5 located in the sleeve and having sockets loosely engaging said pins, and expansive springs between the dies and the wall of the sleeve; of a tapered bolt movable longitudinally within said sleeve and having its conical
10 end projecting between said dies, and means for moving the bolt forward and backward.

8. In a flue expander, the combination with a casing having a hole for the flue, a
15 sleeve secured to said casing with its axis in line with said hole, pins projecting radially inward within said sleeve, a series of dies located in the sleeve and having sockets loosely engaging said pins, and expansive
20 springs between the dies and the wall of the sleeve; of a bolt slidable longitudinally within said sleeve and having a pointed front end disposed between said dies and a threaded socket at its rear end, an eye bolt
25 whose shank is adjustably engaged in said socket, a power-driven rocking lever, and links connecting one end of said lever with the eye of the bolt, for the purpose set forth.

9. In a flue expander, the combination
30 with a casing having a hole for the flue, a sleeve secured to said casing with its axis in line with said hole, pins projecting radially inward within said sleeve, a series of dies located in the sleeve and having sockets
35 loosely engaging said pins, and expansive springs between the dies and the wall of the sleeve; of a bolt slidable longitudinally within said sleeve and having a pointed front end disposed between said dies and a
40 threaded socket at its rear end, a threaded member adjustably engaging said socket, a rock lever pivoted between its ends, connections between one end and said threaded

member, a power shaft having a cam groove, and a roller at the other end of said lever
45 engaging said groove, for the purpose set forth.

10. In a flue expander, the combination with a casing having a hole for the flue, a sleeve secured to said casing with its axis in
50 line with said hole, and a series of dies located in the sleeve; of a bolt slidable longitudinally within the sleeve and having a pointed front end disposed between the dies and a socket at its rear end, a member
55 adjustably engaging said socket, a rock lever pivoted between its ends, connections between one end and said threaded member, a power shaft having a cam groove, and a roller at the other end of said lever engag-
60 ing said groove, for the purpose set forth.

11. In a flue swaging machine, the combination with a series of internal dies having die faces on their outer sides and their inner
65 sides beveled, and a tapered bolt for distending said dies; of a casing having radial guides, a series of external dies movable in said guides, actuating mechanism for forcing said dies inward or retracting them, a
70 main shaft having a cam and an eccentric, connections between said cam and tapered bolt, connections between said eccentric and the actuating mechanism for moving all dies simultaneously, a power gear, a large gear meshing therewith and loose on said
75 shaft, its hub having clutch teeth, a clutch member splined on said shaft and having teeth adapted to engage those on said hub, and means for moving this member.

In testimony whereof I have hereunto set
80 my hand in presence of two subscribing witnesses.

JOE CEPHAS TASSEY.

Witnesses:

J. B. BRADLEY,
H. E. JACKSON.