H. McCABE.

FLANGING MACHINE.

APPLICATION FILED SEPT. 20, 1911.

1,030,416.

Patented June 25, 1912.

4 SHEETS—SHEET 1.

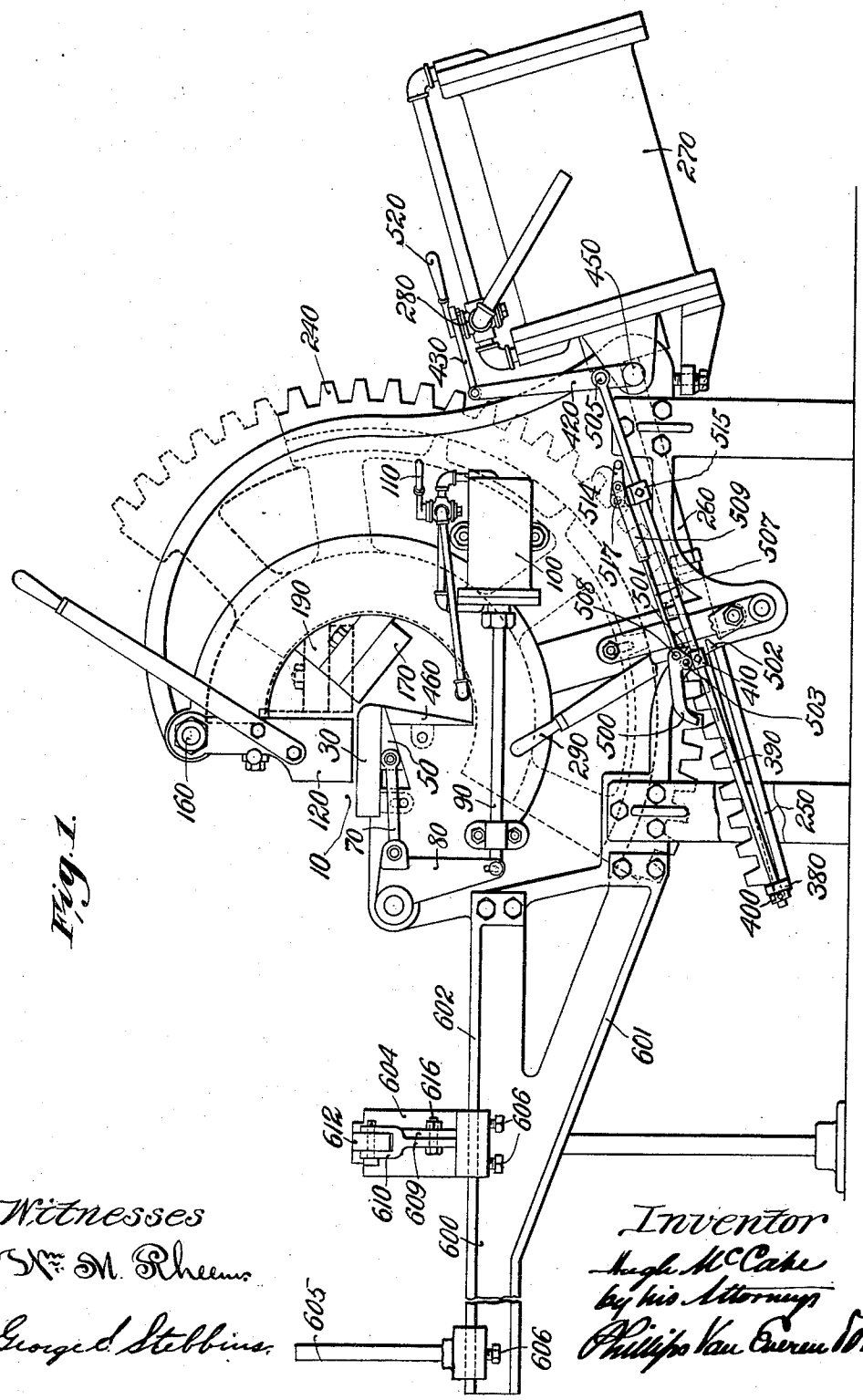

Fig. 1.

Witnesses

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4 SHEETS—SHEET 2.

Fig. 2.

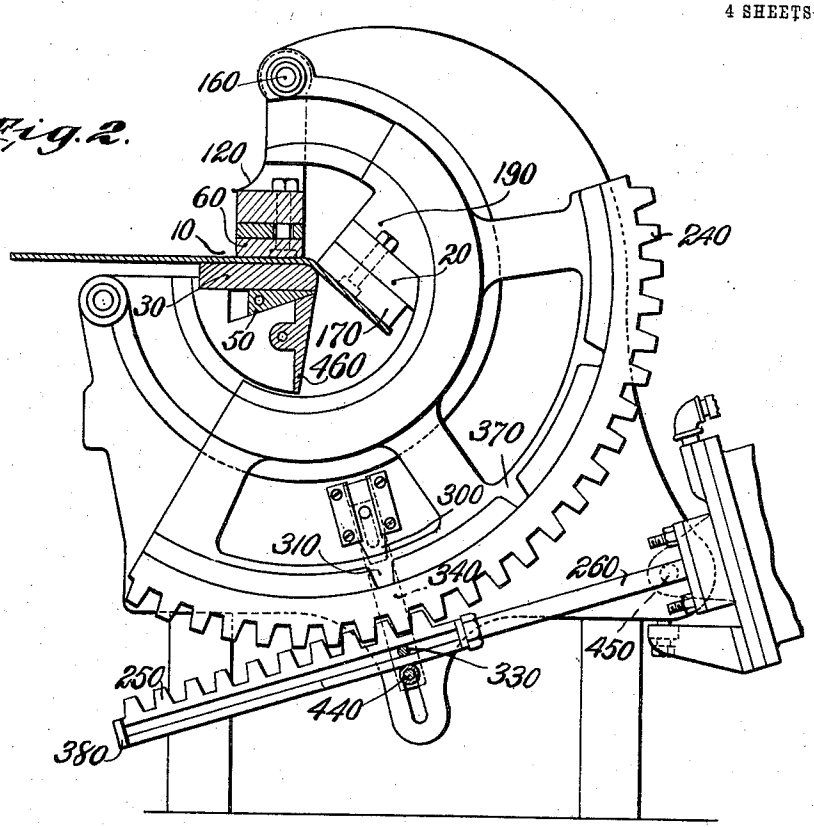
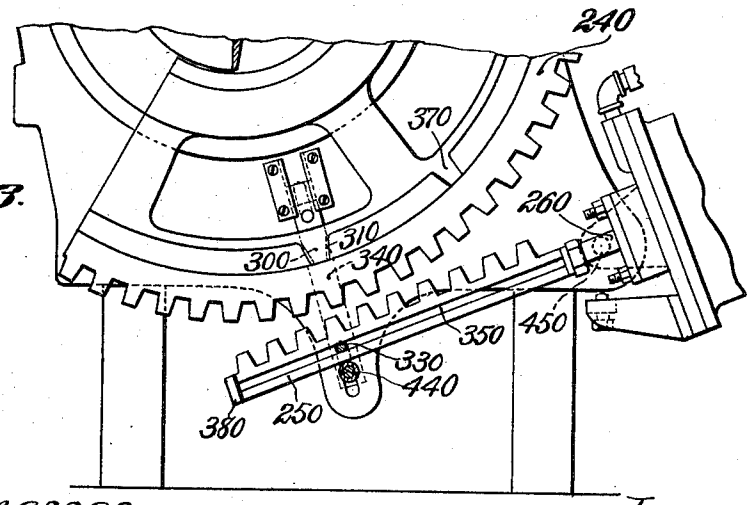


Fig. 3.



Witnesses

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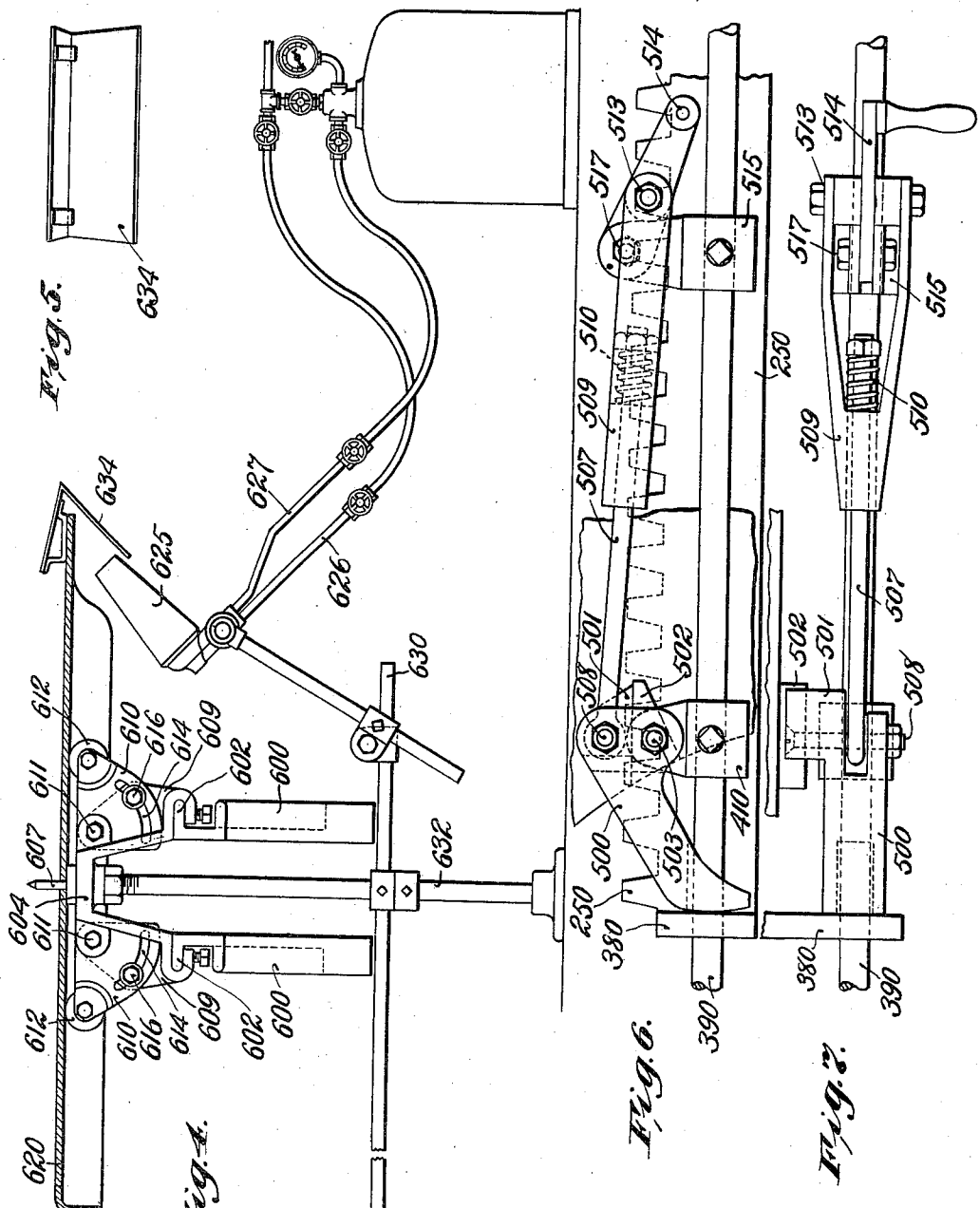

Fig. 5.

Fig. 4.

Fig. 6.

Fig. 7.

Witnesses.

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4 SHEETS—SHEET 4.

Fig. 8.

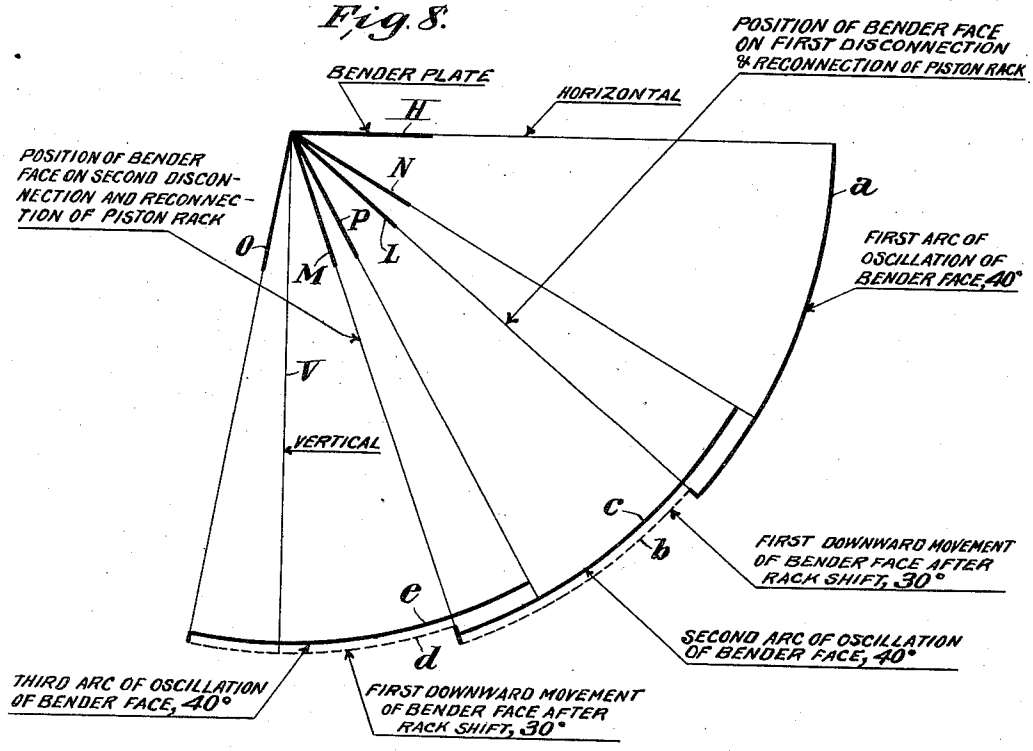
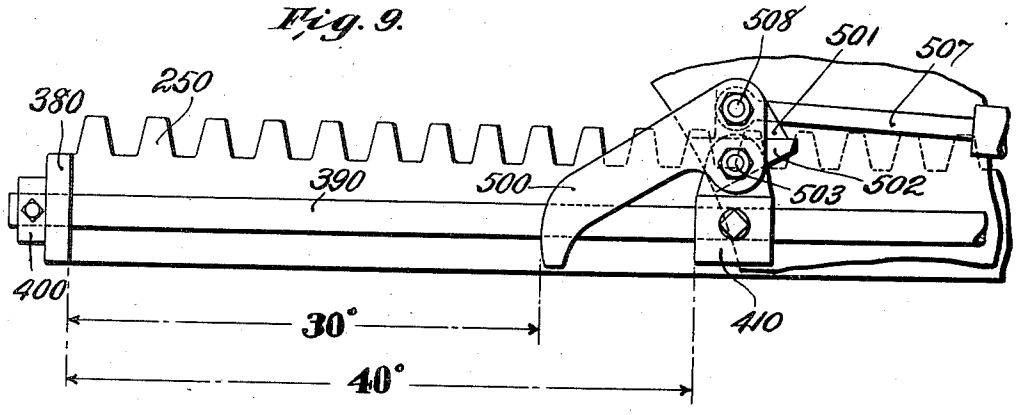


Fig. 9.



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HUGH McCABE, OF LAWRENCE, MASSACHUSETTS.

FLANGING-MACHINE.

1,030,416. Specification of Letters Patent. Patented June 25, 1912.

Application filed September 20, 1911. Serial No. 650,465.

To all whom it may concern:

Be it known that I, HUGH McCABE, a citizen of the United States, residing at Lawrence, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Flanging-Machines; and I do hereby 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.

The present invention relates to flanging machines, and more particularly to flanging machines of the type disclosed in the patent to Hugh McCabe No. 1,006,861, October 24, 1911, for flanging machines, upon which the present invention is an improvement.

The flanging machine disclosed in said patent operates to form a flange by bending the material step by step. During each step the material is bent through a part of the angle through which it is bent to form the completed flange. Each step comprises a number of separate and repeated oscillations of the bender through the same angle. The work is flanged during these bending oscillations and is released between the bending oscillations and then fed along so that the whole flange or a portion thereof is bent through the angle of bending representing this particular step. After one step in the bending operation is completed, the bender is shifted angularly forward and the partially bent flange is bent still further. The flange is thus bent step by step, the bender being shifted angularly forward between each step to re-position the bender so that the position from which the bender starts its bending oscillations or strokes during any step is the position to which the bender was moved at the end of its bending oscillations of the next preceding step.

In forming flanges on metal plates, and particularly on plates of metal having any degree of resiliency, the flange springs back somewhat after it is bent by the bender, so that the position in which the flange is set after any step of the bending operation is a position of less bending than the position of the bender plate at the forward extremity of its bending oscillations during this step. This interferes with the free feeding and handling of the work because the initial position of the bender during the next step is angularly farther forward than the flange was set. It is therefore important that the machine have some provision for compensating for the springing back of the flange so that the work may be freely fed without interference from the bender.

One object of the present invention is to produce a flanging machine having a bender which operates to bend the flange in a plurality of steps, each consisting of a number of flange-bending movements of the bender, and having provision for compensating for the springing back of the flange, so that the work may be freely fed. This object is attained in the present invention by shifting the position of the bender forwardly between the successive steps of the flange-bending operation through a distance less than the amplitude of the oscillations of the next preceding step, for the purpose of re-positioning the bender preparatory to again oscillating the bender to further bend the flange, so that the flange-bending oscillations of proximate steps will overlap by an angle not less than the angle through which the resiliency of the flange causes it to spring back.

Another object of the present invention is to provide an improved handling and supporting means for the material to be flanged.

Still another object of the present invention is to provide means for heating the material to be flanged without removing the material from the work support.

With the above objects in view the present invention consists in the flanging machine hereinafter described and particularly pointed out in the claims.

In the accompanying drawings which illustrate a preferred form of the invention, Figure 1 is a side elevation; Fig. 2 is a side elevation partly in section; Fig. 3 is a side elevation showing a detail; Fig. 4 is a front elevation of the work support and heating means; Fig. 5 is a perspective view of the heating hood; Figs. 6 and 7 are detail views showing the pivoted dog or stop used when shifting the position of the bender segment; Fig. 8 is a diagram of the movement of the bender face; and Fig. 9 is a detail showing diagrammatically the lengths of reciprocation of the actuating rack which correspond to certain arcs of movement of the bender segment.

In the drawings the work clamp is indi-

cated in a general way by reference numeral 10 and the bender by the reference numeral 20. The clamp 10 consists of bottom and top plates 30 and 60. The bottom plate 30 is lifted by a wedge 50 to clamp the work. The wedge 50 is reciprocated by compressed air in the cylinder 100 through the connecting links 70 and 90 and lever 80. The supply of air to the cylinder 100 is controlled by a hand valve 110. The top clamp plate 60 is mounted on a top clamp 120 which is pivoted to the machine frame at 160, and which may be swung out of the way when necessary to remove the work. The bender 20 has a face plate 170 carried by the segmental bender carrier 190. The bender segment 190 is provided on its outer periphery with a segmental gear 240. The bender segment is adapted to be oscillated by a piston actuated rack 250. The segmental gear 240 constitutes a toothed driven member and the rack 250 constitutes a toothed driving member for moving the segmental gear. The rack 250 is carried on the outer end of the piston rod 260 which is attached to a piston in the cylinder 270. The cylinder 270 is adapted to be supplied with compressed air and the regulating valve 280 affords provision for admitting air to the one or the other side of the piston. The cylinder 270 is pivoted at 450 to the machine frame so that the rack 250 may be moved into and out of engagement with the segmental gear 240. A slide bar 340 mounted in the machine frame is adapted to be reciprocated by means of the hand lever 290, in the same manner as the slide bar 34 is reciprocated by the hand lever 29 in the flanging machine illustrated in the above-mentioned McCabe patent. The upper end of the slide bar 340 is provided with a dog 300 adapted to be forced into engagement with the recesses 310 and 370 when the slide bar 340 is forced down. The slide bar 340 carries near its lower end a pin 330 and an anti-friction roller 440. The pin 330 is engaged in a groove 350 in the side of the rack 250 so that when the slide rod 340 is moved downwardly the rack 250 is moved out of mesh with the segmental gear 240 and the roller 440 affords support for the rack when it is engaged with the gear. The rack 250 is provided at its end with a stop or collar 380 which embraces the rod or bar 390 but moves freely thereon. The stops or collars 400 and 410 are clamped on the bar 390 at appropriate places. The bar 390 is connected to the lever 420 and by means of the link 430 with the valve 280. The above described parts numbered 10 to 450 are substantially the same as the parts indicated by the reference numerals 1 to 45 in the above-mentioned patent except that the segmental gear 240 is about 10 deg. longer than the segmental gear 24 in said patent and the rack 250 is of about four-thirds the length of the rack 25 in said patent.

Pivotally mounted upon the collar 410 is a stop or dog 500, the toe of which is adapted at certain times to contact with the collar 380. The heel of the dog 500 is provided with a lug 501 which is adapted to contact with a stop lug 502 on the machine frame when the rod 390 is moved laterally downward. When the lugs 501 and 502 are brought into contact the dog 500 is turned about its pivot 503 into the path of the rack collar 380. The rod 390 is pivoted at 505 to the lever 420 and its other end is embraced by the collar 380 on the rack 250 so that when the rack 250 is moved out of engagement with the segmental gear at 240, the rod 390 is moved downwardly, the lugs 501 and 502 are brought into engagement and the dog 500 is moved into the path of the collar 380 as shown in Fig. 9. A rod 507 pivotally secured at 508 to the dog 500 is slidingly received in a yoke 509. A helical spring 510 surrounding the end of the rod 507 acts to pull said rod to the right in Fig. 1 and normally holds the dog 500 raised out of the path of the collar 380, as shown in Fig. 1, except during such times as the rack 250 is disengaged from the gear 240. The yoke 509 is pivoted at 513 to a hand lever 514 carried by a collar 515 on the rod 390. When the hand lever 514 is in the position illustrated in Figs. 1 and 6, the spring 510 holds the dog 500 up, but when the hand lever 514 is raised, the rod 507 is allowed to move to the left and the dog 500 to drop into the path of the collar 380. It is to be noted that the connection 513 between the yoke 509 and lever 514 is normally below and behind the hinge or pivot 517 of the lever so that a pull on the rod 507 does not tend to raise the lever 514 from its lowered position. The hand lever 514 is not ordinarily used, but may be employed whenever it is desired to drop the dog 500 without depressing the rack 250. The plate 460 corresponds to the plate indicated at 46 in said McCabe patent, differing only in that its face, instead of being vertical, as in said patent, is inclined at an angle of about 10 deg. to the vertical.

The operation of the machine is as follows, reference being had particularly to the means for shifting the relative position of the rack and segment, which constitutes one of the improvements of the present invention over the machine disclosed in the above-mentioned patent. The segment 190 is swung up so that the face of the bender plate 170 is horizontal, as indicated at H in Fig. 8. The material to be flanged is placed in the clamp 10 and the handle 110 turned to admit air to the cylinder 100 and wedge the lower clamping plate 30 firmly

against the work. The valve 280 is then opened by the handle 520 to admit air to the cylinder 270, to move the piston rod 260 outwardly and swing the segment 190 down through an angle of about 40 deg. to the position indicated by L in Fig. 8. When the segment 190 is swung downwardly about 40 deg., the collar 380 comes into engagement with the collar 400 and pulls the rod 390 to close the valve 280 and shut off the compressed air. The valve 280 is then opened to admit air to the other end of the cylinder 270 and the piston rod 260 and rack 250 are retracted to raise the bender plate 170 to horizontal position again. When the bender plate is brought back to horizontal position the collar 380 is brought against the collar 410 and the rod 390 is pushed to the right to close the valve 280 and shut off the air supply. The work is now unclamped and fed along to bring an adjacent unbent portion of the edge of the work under the bender face 170. The work is again clamped and the air valve 280 opened to again swing down the segment 190 and bend the flange. The operations of oscillating the bender and feeding the work are repeated until the entire edge to be flanged, or a portion thereof, is bent down. This bending of the flange by the downward oscillations of the bender of about 40 deg. from the horizontal, constitutes the first step in the bending operation. This step in the bending operation corresponds to the first step of the bending operation as described under the operation of the machine disclosed in said McCabe patent, the only difference being that in said patent the segment 19 is oscillated through an angle of about 30 deg., whereas in the machine of the present invention, the segment 190 is oscillated through an angle of about 40 deg. Because of the resiliency of the material to be flanged, the flange springs back somewhat, so that after this first step in the flange bending operation, the flange is set at an angle somewhat less than 40 deg. The amount that the material will spring back, of course, will vary for different materials, and flanging machines embodying the present invention which are designed to operate on certain kinds of material may be designed to compensate for any amount of springing back of the material. However, for the sake or more clearly illustrating and describing the invention, the illustrated embodiment shows a machine capable of operating upon material of such resiliency that the flange springs back a little less than 10 deg. after each step in the bending operation. The arc of movement of the bender plate which corresponds to the first step in the bending operation is indicated by the heavy line *a* in Fig. 8. After the segment 190 is moved downward for the last bending oscillation of the first step, the lever 290 is swung to the right in Fig. 1, and the slide bar 340 is forced down. This brings the dog 300 into the recess 310 and locks the segment in the position indicated by L in Fig. 8. The downward movement of the slide bar 340 also throws the rack 250 out of engagement with the segmental gear 240 and brings the lugs 501 and 502 into engagement so that the toe of the dog 500 is brought into the path of the collar 380. The valve 280 is now opened to admit air to the cylinder 270 and moves the rack 250 to the right. Since the dog 500 is in the path of the collar 380 the air will be automatically cut off when the collar 380 strikes the dog 500. The handle 290 is then thrown to the left and the rack 250 and segmental gear 240 brought into mesh and the dog 300 released from the segment 190. The bender plate is still in the position indicated by L in Fig. 8. The valve 280 is opened and the rack 250 moved to the left to move the bender plate down to the position indicated by M in Fig. 8. The arc of movement of the bender face of this first downward movement of the second step of the bending operation is indicated by the dotted line *b* in Fig. 8. The valve 280 is of course closed by the contact of the collar 380 with the collar 400 when the bender plate is brought to the position M. The valve 280 is then opened in the other direction and the rack 250 moves to the right to swing the bender segment upwardly. Since the dog 500 is now out of the path of the collar 380, the valve 280 will not be automatically closed until the collar 380 strikes the collar 410. When the collar 380 strikes the collar 410 the bender plate is arrested in the position indicated by N in Fig. 8. It is to be noted that the bender plate at N is inclined at about 30 deg. to the horizontal so that the work may be freely moved along, because the flange will not have sprung back more than 10 deg. from the position L to which it was carried by the bender plate during the oscillations of the first bending step. The work is now unclamped and fed along, and the entire flange, or the portion thereof which was bent down during the first step, is bent through a further angle. This constitutes the second step in the bending operation, the arc of oscillation of 40 deg. of the bender segment being indicated by the heavy line *c* in Fig. 8.

After the last bending oscillation of the second step is completed, the segment 190 is locked in the position M by throwing the lever 290 to the right to bring the dog 300 into the locking recess 370, to disengage the rack 250 from the segmental gear 240, and to bring the lugs 501 and 502 into contact to move the hinged dog 500 into the path of the collar 380. The valve 280 is

then opened to move the rack 250 to the right where it will be arrested by the cutting off of the air, due to the contact of the collar 380 with the toe of the dog 500. The handle 290 is then moved to the left to mesh the rack and gear and unlock the bender segment 190. The segment is still in the position indicated by M in Fig. 8. The valve 280 is again opened, and the rack 250 moved to the left to swing the bender face plate to the position O of Fig. 8. The arc of the first downward movement of the bender during this the third step in the bending operation, is indicated by the dotted line *d* in Fig. 8, and is an arc of 30 deg. The valve 280 is then opened and the rack 250 moved to the right until the collar 380 contacts with the collar 410 whereupon the bender plate will be arrested in the position indicated by P in Fig. 8. The work is now unclamped and fed along and the bender oscillated between the positions P and O through the arc of 40 deg. indicated by the heavy line *e* in Fig. 8. The feeding of the work and the oscillations of the bender are repeated until the flange is completely bent. It is to be noted that the position O of the bender plate at the end of its bending oscillations during the third step is about 10 deg. to the left of the vertical V in Fig. 8. This carries the material about 10 deg. beyond a right angle and thus allowance is made for the springing back of the flange after the last bending operation, so that with material of such resiliency that the flange springs back about 10 deg., the flange will be set in a position at about right angles to the plate of material upon which the flange is formed.

In the foregoing description it will be noted that the bender segment 190 is swung through an arc of about 40 deg. during each of the bending oscillations *a*, *c*, *e*. During these bending oscillations the dog 500 is in a raised position so that the collar 380 travels between the collar 400 and the collar 410 in automatically shutting off the air. In other words, the distance along the rod 390 between the collars 400 and 410 is equal to a reciprocation of the rack 250 which will impart a movement of 40 deg. to the bender segment 190. When the dog 500 is in the path of the collar 380 the distance through which the collar can travel is shortened. The length of the dog 500 is such that the ratio of the distances between the collar 400 and the dog 500 and between the collar 400 and the collar 410 respectively is about as 3 is to 4, so that while the path of the collar 380 between the collars 400 and 410 represents, as illustrated in Fig. 9, an arc of movement of about 40 deg. of the bender segment, the path of movement of the collar 380 between the collar 400 and the dog 500 represents an arc of movement of the bender segment of about 30 deg.

To recapitulate, with reference particularly to Fig. 8:—The bender plate is oscillated through an arc *a* of 40 deg. during the first step of the flange bending operation. The bender is then locked in the position L and the rack 250 shifted back on the segmental gear 240. Since the dog 500 is now in the path of the collar 380, the rack 250 is moved to the right through a distance corresponding to 30 deg. of the movement of the bender segment. The rack and gear are then brought into engagement and the rack 250 moved to the left through the arc *b* to the position M, an arc of 30 deg., since the collar 380 travels from the position in which it was arrested by the dog 500 to the collar 400. The bender is therefore shifted forwardly through an angle of 30 deg. which is 10 deg. less than the 40 deg. angle of the flange-bending oscillations, for the purpose of repositioning the bender preparatory to oscillating the bender for the second step of the flange-bending operation. The bender plate is now repeatedly oscillated through the arc *c* between the positions M and N to perform the second step in the flange bending operation. The position N, from which the bender plate is moved as an initial position during all of the bending oscillations of the second step after the first downward movement *b* of the bender plate, is 10 deg. back of the position L or the position at the forward extremity or end of the oscillations of the first step in the bending operation. In other words, the oscillations of the bender plate during the first and second steps of the bending operation overlap by the angle of 10 deg. between the positions L and N. This overlapping of the oscillatory movements of the bender plate allows the flange to spring back any distance up to 10 deg. without interfering with the free feeding of the work during the second step of bending. After the second step of bending is completed, the bender segment is locked in the position M, the rack and gear disengaged, and the rack moved to the right a distance corresponding to a 30 deg. movement of the gear, after which it is again brought into mesh with the segmental gear. The first downward movement *d* is through an arc of 30 deg. to the position O. All of the subsequent movements during the third step in bending are oscillations of 40 deg. through the arc *e* between the positions O and P. The oscillations *e* of the third step in the bending overlap the oscillations *c* of the second step by the angle of 10 deg. between the positions M and P, so that the work may be fed along during the third step in the bending. The bender plate is carried to the position O beyond the vertical to compensate for

the springing back of the completed flange.

In Fig. 9 the amplitudes of the strokes of the rack 250 are indicated in degrees of the angular movements or strokes of the segment 190. When the segment is oscillated, as during the repeated bending strokes of the successive bending steps, the collar 380 is reciprocated back and forth between the collars 400 and 410 through the distance marked 40 deg. in Fig. 9, which corresponds to the arcs *a*, *c* and *e* of Fig. 8. When the rack and gear are disengaged and the rack is moved to the right, the collar 380 moves from the collar 400 until it strikes the dog 500, at which point the rack is arrested after it has traveled the distance marked 30 deg. When the rack and gear are again engaged, the collar 380 is moved to the left from the position at which it was arrested by the dog 500 until it strikes the collar 400, at which point the rack is arrested after it has traveled through the distance marked 30 deg. in Fig. 9, which corresponds to the arcs *b* and *d* of Fig. 8.

While in the illustrated embodiment of the invention the oscillations of the three successive steps of bending are shown overlapping by an angle of about 10 deg., it is obvious that they may be caused to overlap by either a greater or a smaller angle by suitably proportioning the parts, particularly the position of the collar 410 on the rod 390 and the length of the dog 500.

In order to facilitate the easy handling of the work, a work handling table or bench indicated generally by the reference numeral 600 is provided. The work table comprises a bracket 601 bolted to the front of the machine and having outwardly extending flanges 602 which carry the work supporting member or slide 604 and an end gage post 605 which are both mounted to slide on the bench, and held in position by suitable clamping screws 606. The end gage post 605 is for use in flanging cylinders, but when circular plates are to be flanged, it is removed from the work supporting bench. The work supporting slide 604 has the general shape of an inverted U, and has in its upper or bridge portion a socket in which a pin 607 is adapted to be placed. On either side of the U are formed laterally projecting wings 609 to which two sector plates 610 are pivoted at 611. The sector plates 610 bear at their upper corners rollers 612 and are provided with slots 614 through which clamping bolts 616 pass, so that the sector plates 610 may be swung up and clamped. When a circular plate, as, for instance, a boiler head plate, is to be flanged, the pin 607 is placed in its socket and a small hole is drilled through the center of the plate to receive the pin 607, so that a plate 620, as shown in Fig. 4, is pivoted about the pin 607. The slide 614 is adjusted on the bench to bring the edge of the plate in between the clamping plates 30 and 50 and under the bender 170. The sector plates 610 are swung down so that the rollers 613 act as leveling supports for the plate which is swung about the pin 607. When a cylinder is to be flanged, the pin 607 is removed and the sector plates 610 are swung up, so that the rollers 612 act as side supports for the cylinder. The end gage post 605 is brought against the outer end of the cylinder to hold the end which is to be flanged the proper distance under the bender plate 170. The rollers 612 allow the cylinder to be turned to feed it.

Means are provided for heating the material to be flanged without removing it from the machine. Such means is illustrated as a blast heater 625 and is shown as heating the edge of a circular plate 620. The compressed air and gas are led through pipes 626 and 627 to the heater 625, which is supported on an arm 630 pivotally mounted upon a supporting post 632 beneath the work supporting slide 604. A hood 634 is provided to be placed over the edge to be heated to direct the flame over the top of the plate. In flanging a circular plate a portion of its edge is heated and then swung into the flanging machine where the heated portion is flanged. The plate is then swung around and an adjacent part of its edge heated and the plate again swung around to bring the heated part in the flanging machine. The entire edge of the plate is thus flanged over by successive heating and flanging operations. Since only a portion of the edge is heated at one time, the cold edge of the plate may be grasped by the workman in handling the plate.

The invention is not limited to the construction illustrated in the drawings, but may be embodied in other forms within the scope of the following claims.

1. A flanging machine, having, in combination, means for clamping the work, a bender, and means for oscillating the bender through a predetermined angle to bend a flange and for shifting the position of the bender forward through a predetermined angle to re-position the bender preparatory to again oscillating the bender to further bending the flange, comprising mechanism acting automatically to limit the angle through which the bender is shifted to an angle less than the angle of its flange bending oscillation, substantially as described.

2. A flanging machine, having, in combination, means for clamping the work, a bender, means for actuating the bender to bend a flange in a plurality of steps operating to impart to the bender a number of flange-bending oscillations of predetermined amplitude during each flange-bending step

and to shift the position of the bender forward between the successive steps to re-position the bender and comprising mechanism acting automatically to limit the distance through which the bender is shifted to a distance less than the amplitude of the flange-bending oscillation of the next preceding step, so that the flange-bending oscillations of proximate steps will overlap, substantially as described.

3. A flanging machine, having, in combination, a work clamp arranged to clamp the work while the material is being bent and to release the work so that it may be fed to present other portions of the material to the bending mechanism, and bending mechanism comprising a bender and means for repeatedly oscillating the bender to operate on different portions of the material to partially bend the flange and for shifting the bender forwardly having provision for automatically limiting the distance through which the bender is shifted to less than the amplitude of the bending oscillations for the purpose of re-positioning the bender preparatory to again oscillating the bender to further bend the flange, substantially as described.

4. A flanging machine, having, in combination, means for clamping the work, a bender, and means for shifting the bender angularly forward an aliquot part of the angle through which the flange is to be set and for angularly oscillating the bender while in its successive shifted positions, comprising mechanism acting automatically to so limit the angles through which the bender is shifted and oscillated, that the angle through which the bender is shifted is less than the angle through which it is oscillated, substantially as described.

5. A flanging machine having, in combination, means for clamping the work, a bender, a segmental gear on the bender, a rack, means for engaging and disengaging the rack and gear, means for reciprocating the rack comprising a cylinder and a piston, a motive fluid supply, means for admitting the motive fluid to the cylinder including a valve, and valve-operating means comprising a member adapted to be engaged by the rack when the rack and gear are engaged for closing the valve and a member adapted to be engaged by the rack when the rack and gear are disengaged for closing the valve before the rack is reciprocated sufficiently to bring it into engagement with the first-named member, substantially as described.

6. A flanging machine having, in combination, means for clamping the work, a bender, a segmental gear on the bender, a rack adapted to operatively engage the gear, means for engaging and disengaging the rack and gear, means for reciprocating the rack including a piston and a cylinder, a motive fluid supply, means for admitting the motive fluid to the cylinder including a valve, and valve-operating means comprising a stop adapted to be engaged by the rack when the rack and gear are engaged for closing the valve at the end of the normal stroke of the rack and a stop adapted to be engaged by the rack when the rack and gear are disengaged for closing the valve before the rack has reached the end of its normal stroke, substantially as described.

7. A flanging machine having, in combination, means for clamping the work, a bender, a segmental gear on the bender, a rack, means for engaging and disengaging the rack and gear, means for reciprocating the rack including a cylinder and a piston, a motive fluid supply, means for admitting the motive fluid to the cylinder including a valve, valve-operating means comprising two stops adapted to be engaged by the rack, one at either extremity of its stroke, for closing the valve at either extremity of the piston stroke when the rack and gear are engaged and a stop adapted to be engaged by the rack before the rack reaches one extremity of its stroke for closing the valve before the piston has reached one extremity of its stroke when the rack and gear are disengaged, substantially as described.

8. A flanging machine having, in combination, means for clamping the work, a bender, a segmental gear on the bender, a rack, means for engaging and disengaging the rack and gear, means for reciprocating the rack including a cylinder and a piston, a motive fluid supply, means for admitting the motive fluid to the cylinder including a valve, valve-operating means comprising a rod having two collars adapted to be engaged by a collar on the rack at the two extremities of the stroke of the rack when the rack and gear are engaged for closing the valve at the two extremities of the normal piston stroke and a dog pivoted to said rod arranged to be brought into the path of the collar on the rack by the disengagement of the rack and gear and adapted to be engaged by the collar on the rack before the rack has reached one extremity of its normal stroke for closing the valve before the piston has reached one extremity of its normal stroke, substantially as described.

9. A flanging machine, having, in combination, means for clamping and flanging the work, and means for presenting the work to said clamping and flanging means comprising a work bench having a work supporting member mounted thereon, work engaging pieces pivoted to opposite sides of said member and adapted to be swung up to engage opposite sides of a cylinder placed in the machine and to be swung down to the level of the top of said work supporting member when a plate is placed

in the machine, and means for locking said work engaging pieces in position, substantially as described.

10. A flanging machine, having, in combination, means for clamping and flanging the work, and means for presenting the work to said clamping and flanging means comprising a work bench having a work supporting slide mounted thereon having a recess adapted to hold a pin to form a pivotal support for a flat plate, work engaging plates pivoted to opposite sides of the slide and adapted to be swung up and engage opposite sides of a cylinder placed in the machine and to be swung down to the level of the top of said work supporting slide when a flat plate is placed in the machine, and means for locking said work engaging plates in position, substantially as described.

11. A flanging machine having, in combination, means for clamping the work, a bender, a driven member connected to the bender, a power-operated driving member adapted to be engaged with successive portions of the driven member, means for engaging and disengaging the driven and driving members, and means operating when said members are engaged to move the driving member through a predetermined distance to move the bender to bend a flange on the work and operating when said members are disengaged to shift the driving member relative to the driven member and comprising mechanism acting automatically to limit the distance through which the driving member is shifted when the members are disengaged to a distance less than the distance through which the driving member is moved when the members are engaged, whereby the bender is shifted in position through a distance less than the distance through which it is moved in bending the flange, substantially as described.

12. A flanging machine having, in combination, means for clamping the work, a bender, a toothed driven member connected to the bender, a toothed driving member, means for engaging and disengaging the toothed members, and power-operated means for moving the driving member, comprising mechanism acting automatically to limit the movement of the driving member when the toothed members are disengaged to a movement of less amplitude than when the toothed members are engaged, substantially as described.

13. A flanging machine having, in combination, means for clamping the work, a bender, a segmental gear connected to the bender, a rack, means for engaging and disengaging the gear and rack, and means for imparting strokes of predetermined amplitude to the rack when the gear and rack are engaged to oscillate the bender to bend a flange on the work and for imparting a stroke to the rack when the gear and rack are disengaged to shift the relative positions of the gear and rack, comprising mechanism acting automatically to limit the stroke of the rack when the gear and rack are disengaged to a stroke of less amplitude than the stroke of the rack when the gear and rack are engaged, substantially as described.

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Witnesses:
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."