E. F. BEUGLER.

HOOP EXPANDING AND FLARING MACHINE.

APPLICATION FILED MAR. 26, 1915.

1,153,480.

Patented Sept. 14, 1915.

2 SHEETS—SHEET 1.

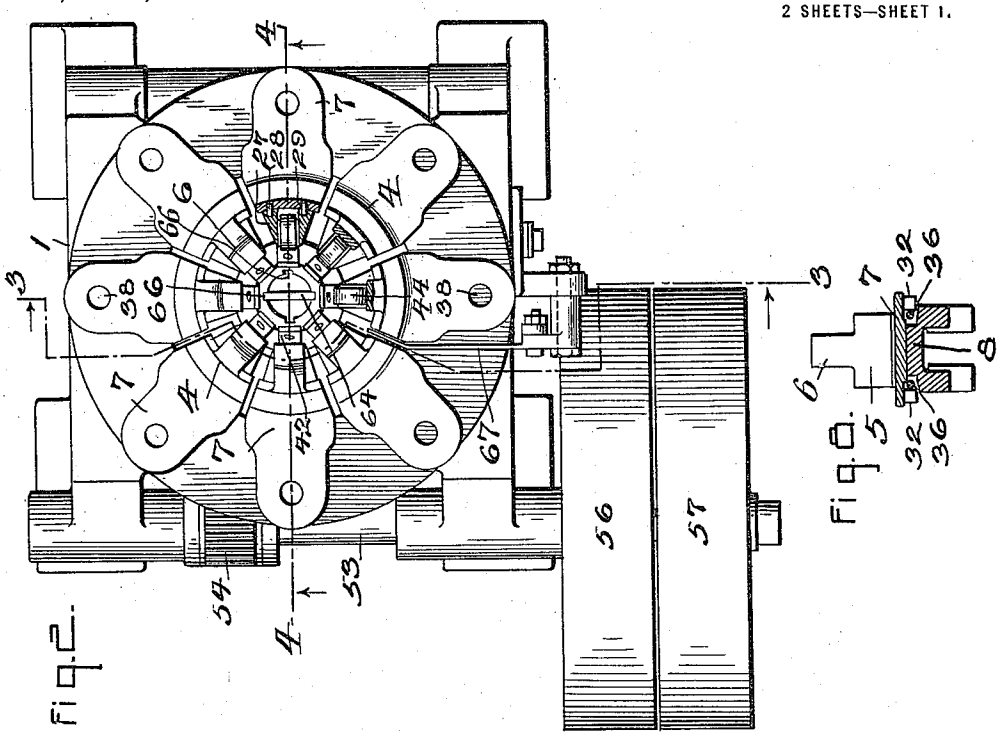


Fig. 2.

Fig. 3.

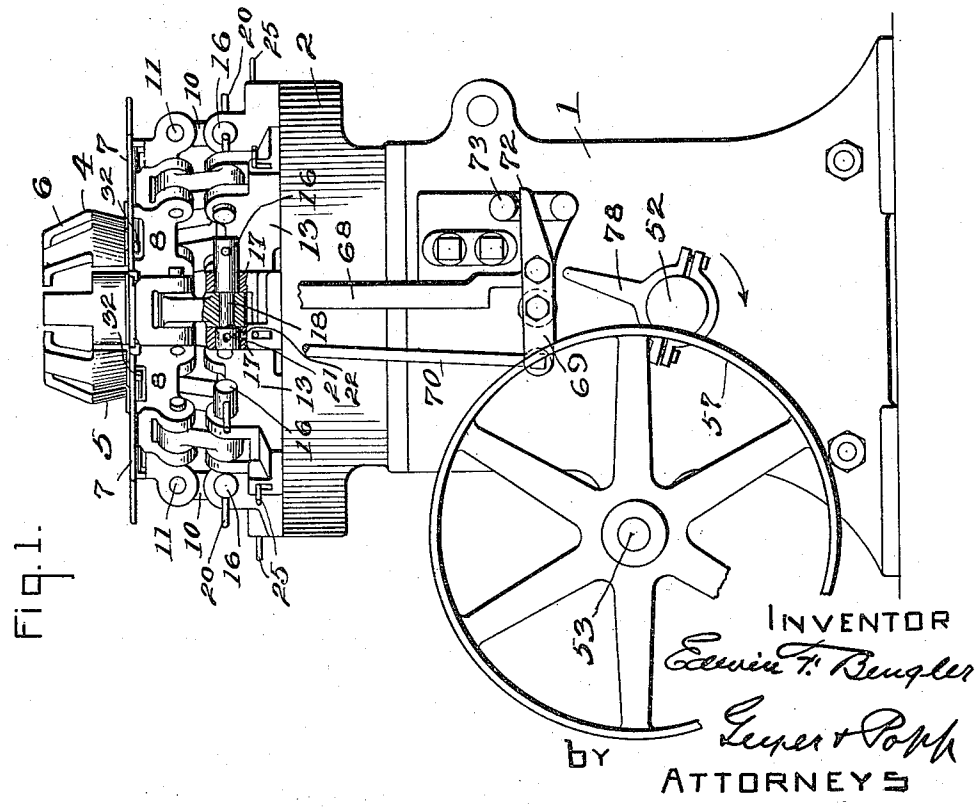


Fig. 1.

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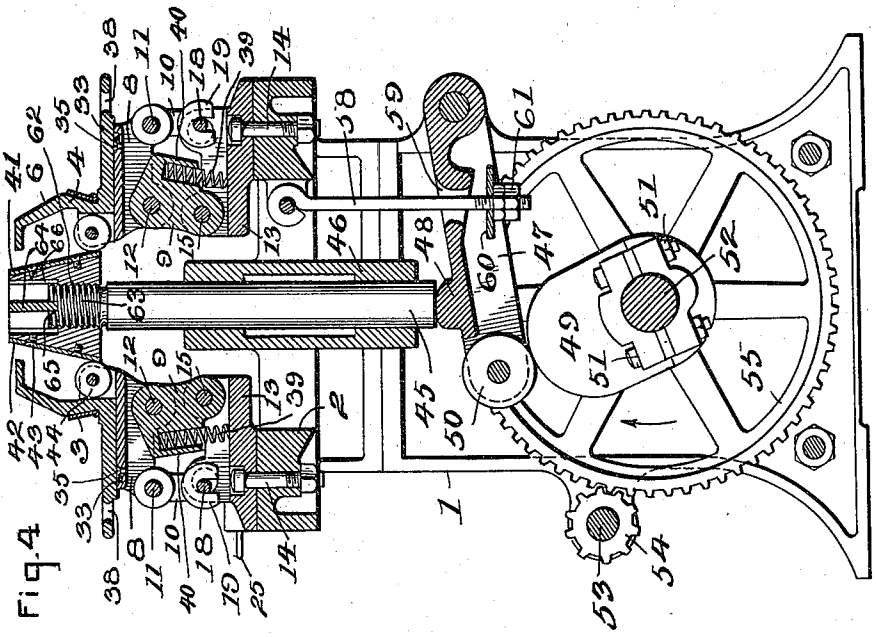


Fig. 4.

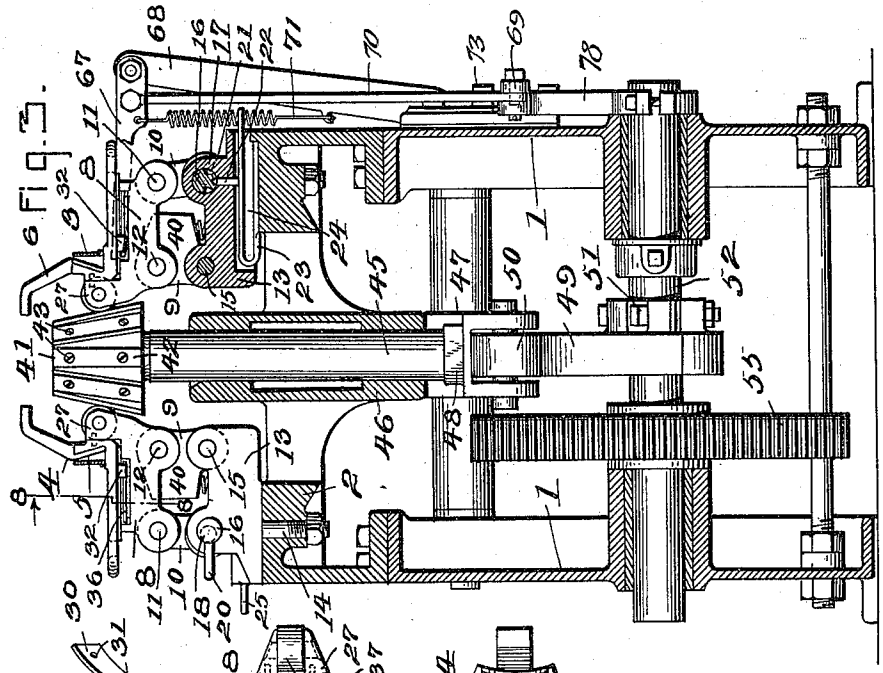


Fig. 5.

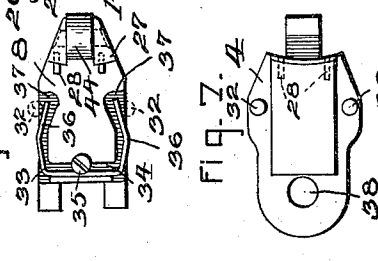


Fig. 6.

Fig. 7.

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HOOP EXPANDING AND FLARING MACHINE.

1,153,480. Specification of Letters Patent. Patented Sept. 14, 1915.

Application filed March 26, 1915. Serial No. 17,219.

To all whom it may concern:

Be it known that I, EDWIN F. BEUGLER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Hoop Expanding and Flaring Machines, of which the following is a specification.

This invention relates to a machine for expanding and flaring metal barrel hoops after the same have been made up in cylindrical form and thereby adapt these hoops to be driven upon the cone-shaped ends of barrels.

The objects of this invention are to provide a machine for this purpose in which the partially formed cylindrical hoops may be placed upon the formers without liability of the workman injuring his fingers during this operation; to permit of readily and quickly interchanging the formers and also adjusting the actuating mechanism of the same for the purpose of adapting the machine for expanding and flaring different sizes of hoops; also to provide improved means for movably supporting the formers, so that during the normal operation of the machine the same will move only radially in planes at right angles to the axis about which the formers are arranged; to provide simple and efficient means for quickly adjusting the position of the formers for varying the angularity of the jaws or bearing faces which engage with the hoops without varying the diameter of the hoops; to improve the means for operating the spreading cone which actuates the formers; and to provide simple and efficient means for automatically ejecting the finished hoops from the machine.

In the accompanying drawings: Figure 1 is a side elevation, partly in section, of my improved hoop expanding and flaring machine. Fig. 2 is a top plan view thereof, partly in section. Fig. 3 is a fragmentary vertical longitudinal section taken approximately on line 3—3, Fig. 2. Fig. 4 is a vertical transverse section taken on line 4—4, Fig. 2. Fig. 5 is a perspective view of the washer or filling piece forming part of the means for varying the size of the machine in order to adapt the same for operating on hoops of different diameters. Fig. 6 is a top plan view of one of the carriages supporting one of the formers. Fig. 7 is a detached bottom plan view of one of the formers. Fig. 8 is a fragmentary vertical section taken on line 8—8, Fig. 3.

Similar characters of reference indicate corresponding parts throughout the several views.

The main frame of the machine may be of any suitable construction to support the various working parts of the machine but as shown in the drawings the same preferably comprises two upright side pieces 1, 1, and a top plate or table 2 connecting the upper ends of the side pieces.

Arranged in an annular row above the top of the frame and about a vertical axis are a plurality of dies or formers which are adapted to receive the metal hood 3 after the same has been made up in a cylindrical form and expand and flare the same into conical form. Each of these formers may be variously constructed to perform its work but in its preferred form the same preferably comprises an upright jaw 4 having an outwardly inclined and horizontally curved bearing face 5 on its outer side which is adapted to engage with the inner side of the hoop to be expanded and flared, an inwardly inclined guide arm 6 projecting upwardly and inwardly from the upper end of the jaw, and a horizontal supporting base or arm 7 projecting outwardly from the lower end of said jaw. The several formers are so actuated that during the normal operation of the machine the same move radially toward and from the axis of the machine about which the row of formers is arranged and in planes which are at right angles or substantially so to this axis. While the formers are in their innermost position relatively to each other the several jaws thereof form an upwardly flaring contracted cone of comparatively small diameter which permits the previously prepared cylindrical metal hoop to be easily placed around these jaws by the workman, as shown in Fig. 3. While applying this cylindrical hoop to the formers the workman need only drop the same upon the inclined guide arms 6 which together form an upwardly tapering cone, whereby the hoop is directed by these arms around the jaws and thereby prevents the fingers of the workman from being caught between the formers and the hoop which

otherwise would be liable to happen if the workman were obliged to place the hoop directly around the jaws of the formers. The hoops are arrested in their downward movement and supported in a position opposite the jaws or bearing faces of the formers by engagement of the lower edge of the hoop with the upper surface of the supporting bases adjacent to the jaws thereof, as shown in Fig. 3. After a hoop has been thus applied to the formers the latter are spread apart so as to increase the diameter of the cone formed by the several jaws of the formers whereby the bearing faces of the latter are caused to engage the inner side of the hoop and not only expand it but also flare the same upwardly, as shown in Fig. 4. The several formers are now again contracted to permit of removing the finished hoop and replacing the same by another unfinished hoop.

Although various means may be employed for supporting the several formers in such manner that they move radially and in planes at right angles to the axis about which they are arranged, those shown in the drawings have been found satisfactory in practice and are therefore preferred. As there shown 8 represents a plurality of radially movable carriages each of which supports one of the formers by engaging its upper side with the underside of the base of the respective former.

9, 10 represent a plurality of pairs of upright supporting links, each pair consisting of an inner member 9 and an outer member 10 which are pivotally connected at their upper ends by fixed pivots or hinge pins 11, 12 with the inner and outer ends of one of the carriages on the underside thereof so that upon rocking these links in a vertical plane the respective carriage and the former mounted thereon will be moved radially toward and from the axis of the machine. 13 represents a plurality of supporting bases or blocks which are arranged in an annular row upon the table or top of the frame around the axis of the machine and each detachably secured thereto by means of an upright bolt 14. One of these supporting bases is arranged below each pair of supporting links and the lower end of each inner link 9 is pivotally connected with the inner end of the companion supporting base by means of a fixed pivot or hinge pin 15. The lower end of each outer supporting link 10 is, however, connected with the outer part of the companion supporting base by means of a pivot or hinge pin which is adjustable vertically for the purpose of permitting the angle of the conical bearing face of the companion former jaw to be changed to suit the conicity which it is desired to give the barrel hoop in order to fit the barrel upon which the same is to be placed. This adjustable pivot may be constructed in various forms, but as shown in Figs. 1, 3 and 4 the same preferably comprises an adjusting rock shaft, arbor or spindle 16 which is journaled at its opposite ends in bearings 17 on the outer part of the companion supporting base and provided between its ends with an eccentric, wrist or crank 18 which is straddled by a fork 19 arranged at the lower end of the outer supporting link of the companion carriage. The length of the inner and outer members of each pair of supporting links is the same so that when they are swung outwardly and inwardly during the operation of the machine the carriage and the former supported thereby always remain in parallelism. Upon turning the adjusting shaft 16 so as to raise its crank or eccentric pivot 18 more or less the former will be tipped accordingly for changing the angle of its jaw face relative to the radial line of movement of the carriage. When the position of the face of the jaw has been thus adjusted the angle of the same is practically not varied in different positions of the former during the operation of the machine but remains the same throughout the radial travel of the former, so that the conicity of the former jaws is not varied after the same has once been adjusted, this being due to the fact that the formers during their radial movement relatively to the axis of the machine are always supported in parallelism, or substantially so, to a plane at right angles to the axis of the machine by the several pairs of links which form part of the means which support the formers.

In order to permit the movable pivot of each of the outer links to be readily adjusted and held in its adjusted position one end of each of the rock shafts 16 is provided with a handle 20 for turning the same and the periphery of the opposite end of this shaft is provided with a plurality of locking recesses 21 which are arranged in a row circumferentially of this shaft, and a vertically movable locking pin 22 is provided which is guided in the lower part of the adjacent shaft bearing 17 and held with its upper end yieldingly in engagement with one or the other of these locking recesses by means of a spring 23 arranged in a pocket 24 formed in the underside of the companion supporting base and engaging with the lower end of this locking pin, as shown in Fig. 3. This spring is preferably constructed in the form of a hair pin or the letter U and has one of its arms projecting beyond the outer side of the frame, as shown at 25 so that the same may be readily depressed for lowering the locking pin out of engagement from the adjusting rock shaft preparatory to turning this shaft in order to adjust the respective former to suit the angle at which it is desired to place the face of its jaw. After the

adjusting rock shaft 16 has been turned to the desired position the spring 23 is again released so as to move the locking pin into the adjacent recess of this shaft and hold the same against displacement.

For the purpose of enabling this machine to be adapted to expand and flare hoops which vary considerably in diameter, means are provided whereby the several formers may be adjusted radially to a limited extent on the carriages and also to enable one set of formers of a certain size to be conveniently and quickly replaced by another set of formers of another size. For this purpose the inner end or part of each former adjacent to its jaw and base engages with an abutment 27 projecting upwardly from the inner end of the companion carriage so that when the latter is moved outwardly the former is compelled to move with the same. Transverse displacement of the former relatively to its carriage is preferably prevented by one or more dowel pins 28 secured horizontally at their inner ends in the outer face of this abutment and engaging with their outer ends in corresponding openings 29, 29 formed in the inner end or part of the former, as shown in Figs. 2, 6 and 7. Means are also provided whereby the former is capable of a limited radial adjustment on the carriage and also detachably connected therewith. Part of the means for effecting the radial adjustment of the former on its carriage comprises a washer or filling piece 30 which is adapted to be placed between the inner end of the former and the outer side of the abutment so that the former is held at a greater distance from the axis of the machine when this filling piece is present than when the same is absent. This filling piece is provided with one or more openings 31 corresponding with the position of the dowel pins 28, which latter are adapted to engage these openings and hold the filling piece against displacement when the same is inserted between the former and the abutment of the carriage. By employing filling pieces of different thicknesses or a varying number of filling pieces of the same thickness, it is possible to vary the diameter of the cone which is formed by the several former jaws to suit the diameter of hoop required within certain limits.

The means for detachably connecting each former with its carriage are preferably so constructed that this connection is of a frictional character and capable of permitting the former to be adjusted to the various positions which the former may assume relatively to the carriage when filling pieces or washers of different numbers or thicknesses are placed between the former and the abutment. The preferred construction of this means, which are best shown in Figs. 3, 4, 6, 7 and 8, comprises two downwardly projecting retaining or holding lugs 32 arranged on the underside of each former adjacent to its opposite longitudinal edges, and a U-shaped gripping spring arranged between the base of the former and the companion carriage and having its cross bar 33 secured in a transverse groove 34 in the upper side of the outer part of the respective carriage by means of a screw 35 while its legs 36 project inwardly from said cross bar and into longitudinal recesses 37 formed on opposite longitudinal sides of the carriage. The legs of this spring are deflected outwardly at their central parts so that their inner ends converge inwardly and press outwardly against the opposing inner sides of the retaining lugs 32 to hold the former frictionally in place on the companion carriage. This also permits of shifting the former radially to a limited extent on the carriage without loosening the grip of the spring legs 36 on said retaining lugs. Furthermore, these frictional connections between the formers and the carriages permit of readily replacing one set of formers of a certain size by another set of formers of another size. In order to facilitate the removal of the formers from their carriages the outer ends of the bases of the several formers are provided with eyes or openings 38 for the reception of a tool for this purpose, which openings may also serve to string one set of formers together or assemble them on a rod for keeping the same together while they are not in use.

Any suitable means may be provided for causing the several former supporting carriages and the parts associated therewith to move radially, the means for this purpose shown in the drawings being satisfactory and constructed as follows: 39 represents a plurality of return springs each of which bears with its lower end against one of the base blocks 13 while its upper end bears against the bottom of a pocket formed in an outwardly projecting arm 40 formed on the upper outer part of the inner member of one pair of links. This spring is constantly under compression and tends to turn the inner link of each pair in a direction for moving the companion carriage and the parts associated therewith inwardly toward the axis of the machine. The outward movement of several carriages for causing the hoop on the formers to be expanded and flared preferably comprises a vertically movable spreading cone or head 41 which tapers upwardly and which is movable vertically in line with the axis of the machine. The face of this spreading cone is provided with a plurality of inclined wearing plates 42 of steel or similar durable material which are detachably secured to the spreading cone by screws 43 or otherwise and each of which is adapted to bear against an anti-friction roller 44 mounted on the

abutment 27 of one of the supporting carriages, as shown in Figs. 3 and 4. As the spreading cone descends into its lowermost position the several formers and associated parts are moved inwardly by means of the return springs 39 so that the formers as a set are contracted to permit of removing a finished hoop therefrom and apply an unfinished hoop thereon. As the spreading cone ascends and the downwardly enlarging part of the same engages with the rollers 44 of the carriages and moves the same radially outward, the formers are spread and enlarged in diameter as a set, whereby the inclined faces of the jaws of the formers by engaging with the inner side of the hoop cause the latter to be expanded and also flared upwardly, as shown in Fig. 4. This vertical or axially reciprocating movement of the spreading cone is preferably effected by means which comprise a vertically reciprocating shifting rod or plunger 45 which is guided with its central part in a tubular guideway 46 arranged centrally on the frame and supports the spreading cone at its upper end, a vertically rocking lifting arm 47 pivoted at one end on the main frame and provided between its ends on its upper side with a bearing lug 48 which engages with the lower end of the shifting rod, and a rotatable lifting cam 49 which engages with an anti-friction roller 50 on the free end of the lifting arm, as shown in Figs. 3 and 4. During each rotation of the cam its high part lifts the rock arm 47, shifting rod 45 and cone and causes spreading of the formers, and as the low part of this cam is presented to the rock arm 47 the latter as well as the shifting rod and spreading cone descend by gravity.

For convenience of manufacture, the cam 49 is preferably made in two sections which are clamped by means of bolts 51 against opposite sides of a countershaft 52 which is journaled in suitable bearings in the lower part of the main frame. Power may be transmitted to this shaft by any suitable means, for instance, by a driving shaft 53 journaled horizontally in suitable bearings on the main frame and provided with a gear pinion 54 which meshes with a gear wheel 55 on the cam shaft and also provided with tight and loose pulleys 56, 57 around which a driving belt is adapted to pass.

In order to avoid the necessity of finishing the entire face of the lifting cam 49 and permit of confining its finish to the high part thereof which does the actual work of spreading the formers, means are provided for limiting the descent of the lifting arm 47 together with the parts mounted thereon, so that the anti-friction roller 50 of this arm does not engage with the lower or receding part of this cam. The preferred means for this purpose which are shown in Fig. 4, comprise a vertical stop rod 58 which is connected at its upper end with the top of the main frame and passes with its lower part through an opening 59 in the lifting arm and a stop collar or shoulder 60 resting upon adjusting screw nuts 61 on the lower part of the stop rod and adapted to engage with the underside of the lifting arm. By adjusting the screw nuts 61 the lowermost position of the lifting arm, in which the same is arrested by the stop collar 60, may be adjusted to suit the size of the hoop which is being expanded and flared and also other conditions and still prevent the lifting arm from following the lowest part of the cam. By this means the low part of the cam need not be finished inasmuch as the same does not engage with the anti-friction roller 50 and it also permits of a period of rest for the formers while the same are in their innermost position at which time the finished hoop may be removed from the machine and the operator apply a new hoop to the formers without liability of injuring the workman.

The coarse adjustment of the machine for expanding a hoop to a particular size is effected by selecting a set of formers of the most suitable dimensions and then mounting the same upon the carriages either with or without one or more filling pieces or filling pieces of different thicknesses interposed between the formers and the abutments of the carriages. The fine adjustment of the formers is produced by shifting the position of the spreading cone or head on the shifting rod. This is preferably effected by providing the center of the spreading cone with an internally screw threaded opening 62 which receives an external screw thread 63 formed on the upper end of the shifting rod. By turning the shifting rod relatively to the cone, the position of these parts relatively to each other in a vertical direction is varied, so that the effect of the cone on the formers may be advanced or retarded whereby the size of the hoop produced by the machine may be regulated accordingly. While turning the shifting rod, the spreading cone is held against rotation by reason of the several anti-friction rollers 44 of the carriages engaging with the flat faces of the wearing plates.

In order to hold the spreading cone and shifting rod in position one relatively to the other after adjustment, a key 64 preferably in the form of a flat plate is provided. This key in its operative position has its lower edge engaged with a transverse slot or notch 65 formed in the upper end of the shifting rod while its opposite ends engage with one or another pair of locking grooves 66 formed lengthwise in the upper part of the bore or opening in the spreading cone. While the adjustment between the shifting rod and spreading cone is being effected the

key is removed and at this time the shifting rod may be turned by applying a wrench of suitable construction to the notched upper end of this rod. After adjustment, the key is re-applied to the shifting rod and spreading cone so as to hold these parts against relative rotation, as shown in Figs. 2 and 4.

In order to increase the capacity of the machine, means are provided for automatically ejecting the finished hoop from the formers and thereby clearing the latter, so that the workmen can quickly apply a new unfinished hoop thereon. While various means may be employed for this purpose, it is preferable to employ those which are shown in the drawings and which comprises an upper vertically swinging ejector arm 67 pivoted at its outer end on a bracket 68 forming part of the main frame and projecting normally between two adjacent carriages and formers, so that its inner end terminates underneath the place where a part of the hoop is located. 69 represents a vertically-swinging actuating arm pivoted on the lower part of the main frame and connected by a connecting rod 70 with the ejecting arm. The ejecting arm and actuating arm are yieldingly held in their depressed or lowered position by means of a spring 71 connecting the ejecting arm with the bracket 68, the movement of these arms in a downward direction being limited by means of a stop lug or tail 72 formed on the actuating arm and adapted to engage with a stop lug or shoulder 73 on the adjacent part of the main frame. 78 represents a rotary ejecting cam or tappet mounted on the outer end of the cam shaft 52 and adapted during each rotation to engage its high part with the underside of the actuating arm. As the actuating arm is lifted by the high part of the ejector cam, this movement is transmitted by the rod 70 to the ejector arm and the latter is in turn lifted between the adjacent carriages and formers and engages the underside of the finished hoop, so that the latter is stripped upwardly from the jaws and guide arms and thrown to one side of the machine, leaving the latter clear and ready for receiving the next following unfinished hoop from the operator.

This improved hoop expanding and flaring machine is very efficient in operation, the same can be operated easily and without danger of injuring the workmen, the same can be readily adjusted for operating upon different sizes of hoops and also producing flares on the hoops of different angles without affecting the size of the hoops and the same can also be operated with a minimum of expenditure of power and minimum wear on the different working parts.

I claim as my invention:

1. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which is provided with an outwardly facing forming jaw adapted to engage with the inner side of a hoop, and means for moving said formers in planes at right angles to the axis about which said row of formers is arranged comprising a plurality of pairs of swinging links each pair having two of their corresponding ends mounted on a support while their other corresponding ends are operatively connected with one of said formers.

2. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which is provided with an outwardly facing forming jaw adapted to engage with the inner side of a hoop, and means for moving said formers in planes at right angles to the axis about which said row of formers is arranged comprising a plurality of pairs of swinging links each pair having two of their corresponding ends mounted on a support while their other corresponding ends are operatively connected with one of said formers, and a spreading cone movable axially within said row of formers and operatively related to the same.

3. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which is provided with an outwardly facing forming jaw adapted to engage with the inner side of a hoop, and means for moving said formers in planes at right angles to the axis about which said row of formers is arranged comprising a plurality of pairs of swinging links each pair having two of their corresponding ends mounted on a support while their other corresponding ends are operatively connected with one of said formers, a spreading cone movable axially within said row of formers and operating to move the same outwardly, and a spring operating on a link of each pair for moving said formers inwardly.

4. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages, and means for mounting each of said formers on one of said carriages comprising an upwardly projecting abutment arranged at the inner part of each carriage and engaging with the inner part of one of said formers, and dowels arranged between the opposing faces of said abutments and formers.

5. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages, and means for mounting each of said formers on one of said carriages comprising an upwardly projecting abutment arranged at the inner part of each carriage

and engaging with the inner part of one of said formers, and filling plates adapted to be inserted between said followers and abutments.

6. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages, and means for detachably connecting one of said formers with each of said carriages comprising an abutment arranged on the inner part of the carriage and engaging with the inner part of the companion former, two retaining lugs projecting downwardly from opposite parts of the former, and a U-shaped spring secured with its cross bar to said carriage and adapted to engage its legs frictionally with said pins.

7. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of hoop, a plurality of radially movable carriages, and means for detachably connecting one of said formers with each of said carriages comprising an abutment arranged on the inner part of the carriage and engaging with the inner part of the companion former, two retaining lugs projecting downwardly from opposite parts of the former, and a U-shaped spring secured with its cross bar to said carriage and having its legs deflected outwardly at the central parts thereof and engaging adjacent their free ends with the opposing sides of said lugs.

8. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages each supporting one of said formers, an axially movable spreading cone operating against the inner parts of said carriages, an axially movable shifting rod, and means for adjustably connecting said cone and rod comprising a screw threaded opening formed in said cone and receiving an externally threaded part of said rod, and a locking key adapted to engage with locking seats in the end of said rod and the bore of said cone.

9. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages each supporting one of said formers, and a plurality of pairs of links, each pair operatively connecting one of said carriages with a relatively fixed support.

10. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages each supporting one of said formers, a plurality of pairs of links each pair being pivotally connected at one of their corresponding ends with the inner and outer parts of one of said carriages, and a base to which the other corresponding ends of each pair of links are pivotally connected.

11. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages each supporting one of said formers, a plurality of pairs of links each pair being pivotally connected at one of their corresponding ends with the inner and outer parts of one of said carriages, a base to which the other corresponding ends of each pair of links are pivotally connected, and a spring interposed between an arm on the inner link of each pair and the adjacent part of said base.

12. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a pair of links which pivotally support each former, and means for shifting one link of each pair independently of the other.

13. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages each supporting one of said formers, a plurality of bases, a plurality of pairs of links, one member of each pair being connected by fixed pivots with the companion carriage and base while the other member of said pair is connected at one end by a fixed pivot with one of said coöperating parts, and an adjustable pivot for the other end of the last mentioned link mounted eccentrically on the other one of said cooperating parts.

14. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages each supporting one of said formers, a plurality of bases, a plurality of pairs of links, one member of each pair being connected by fixed pivots with the companion carriage and base while the other member of said pair is connected at one end by a fixed pivot with said carriage, and a rotatable adjusting shaft journaled on the companion base and having an eccentric or crank on which the other end of the last mentioned link is pivotally mounted.

15. A hoop expanding and flaring ma-

chine comprising an annuar row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages each supporting one of said formers, a plurality of bases, a plurality of pairs of links, one member of each pair being connected by fixed pivots with the companion carriage and base while the other member of said pair is connected at one end by a fixed pivot with said carriage, a rotatable adjusting shaft journaled on the companion base and having an eccentric or crank on which the other end of the last mentioned link is pivotally mounted, and means for locking said adjusting shaft in different rotary positions.

16. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, a plurality of radially movable carriages each supporting one of said formers, a plurality of bases, a plurality of pairs of links, one member of each pair being connected by fixed pivots with the companion carriage and base while the other member of said pair is connected at one end by a fixed pivot with said carriage, a rotatable adjusting shaft journaled on the companion base and having an eccentric or crank on which the other end of the last mentioned link is pivotally mounted, and means for locking said adjusting shaft in different rotary positions, comprising a locking pin guided on said base and adapted to engage with one or another of a plurality of locking recesses formed in a circumferential row on said shaft, and a spring mounted on said base and engaging with said pin for holding the same yieldingly in its operative position.

17. A hoop expanding and flaring machine comprising an annular row of formers, a spreading cone for moving said formers outwardly, a shifting rod connected with said cone, a rock arm engaging said rod, a rotatable cam engaging with said arm, and means for preventing the rock arm from engaging the low part of said cam.

18. A hoop expanding and flaring machine comprising an annular row of formers, a spreading cone for moving said formers outwardly, a shifting rod connected with said cone, a rock arm engaging said rod, a rotatable cam engaging with said arm, and means for preventing the rock arm from engaging the low part of said cam comprising a stop rod mounted at its upper end on a fixed support and provided at its lower end with a stop which is adapted to engage said rock arm.

19. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, and means for ejecting the hoop from said formers, comprising an ejector arm pivoted at its outer end on a fixed support and adapted to project with its inner end inwardly between two formers and engage underneath the hoop on the formers.

20. A hoop expanding and flaring machine comprising an annular row of radially movable formers each of which has an outwardly facing jaw adapted to engage the inner side of a hoop, and means for ejecting the hoop from said formers, comprising an ejector arm pivoted at its outer end on a fixed support and adapted to project with its inner end inwardly between two formers and engage underneath the hoop on the formers, an actuating rock arm, a connecting rod connecting said ejector arm and actuating arm, and a rotating cam engaging with said actuating arm.

EDWIN F. BEUGLER.

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