

1,297,819.

Fig. 1.

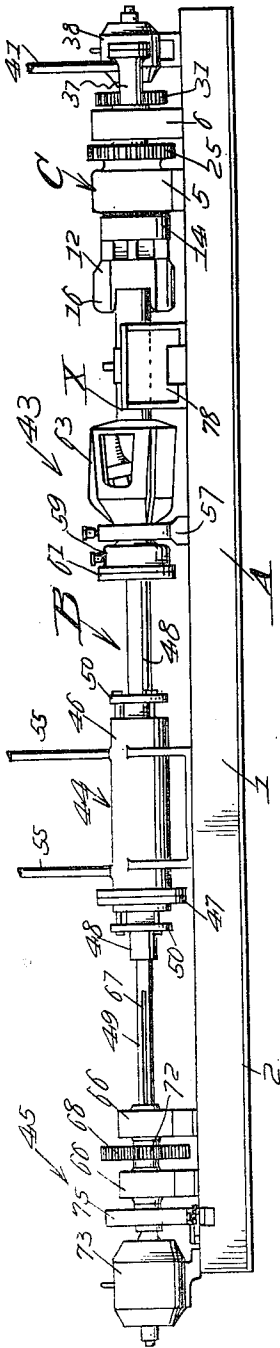


Fig. 2.

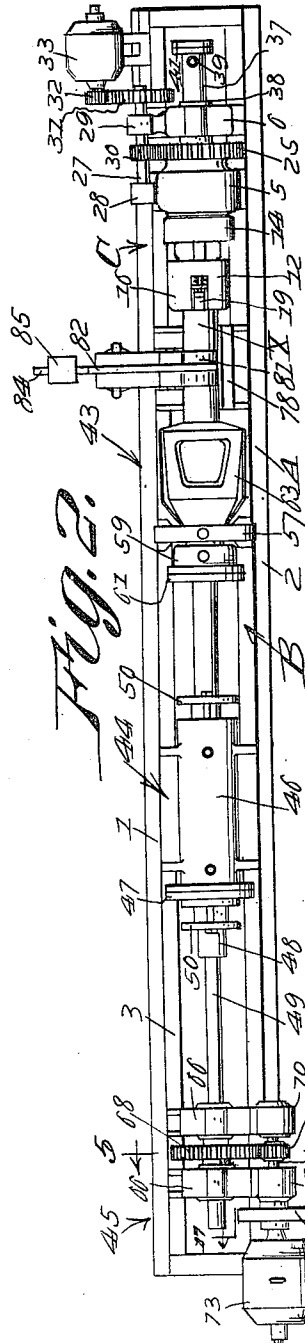


Fig. 3.

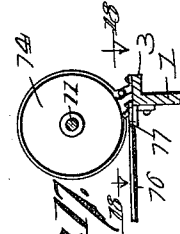
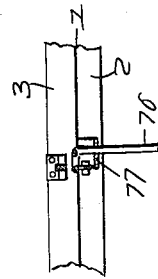
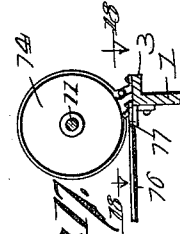


Fig. 5.



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Patented Mar. 18, 1919.

5 SHEETS—SHEET 2.

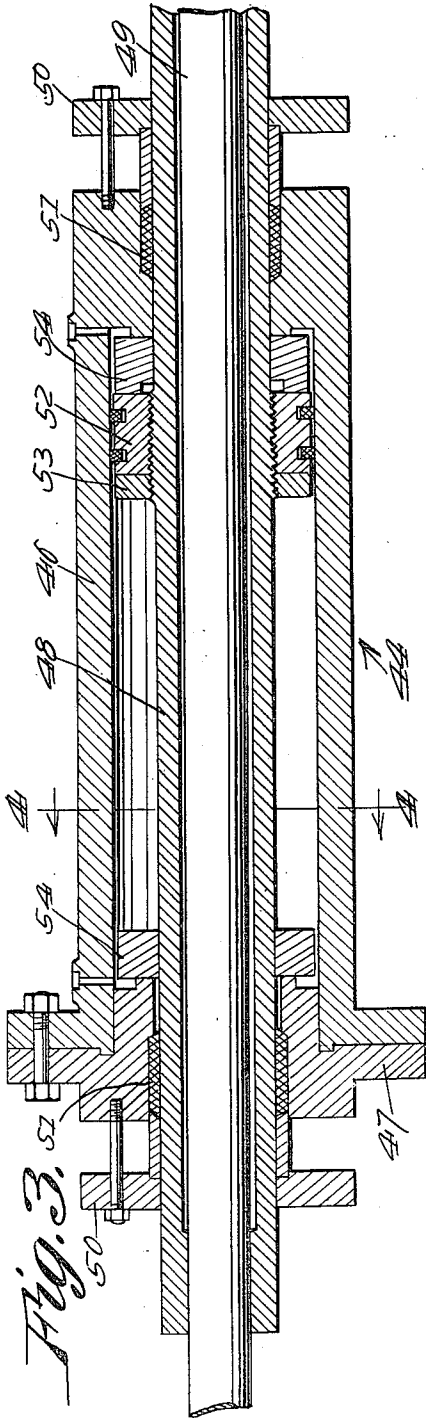


Fig. 3.

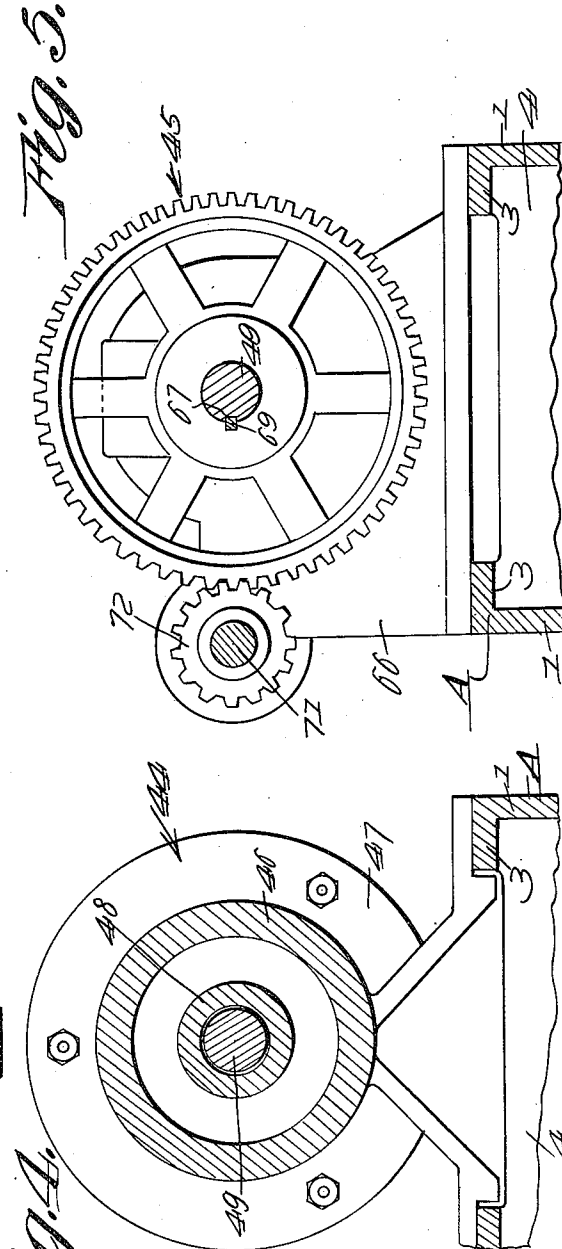


Fig. 4.

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NOSE FORMING MACHINE.
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5 SHEETS—SHEET 3.

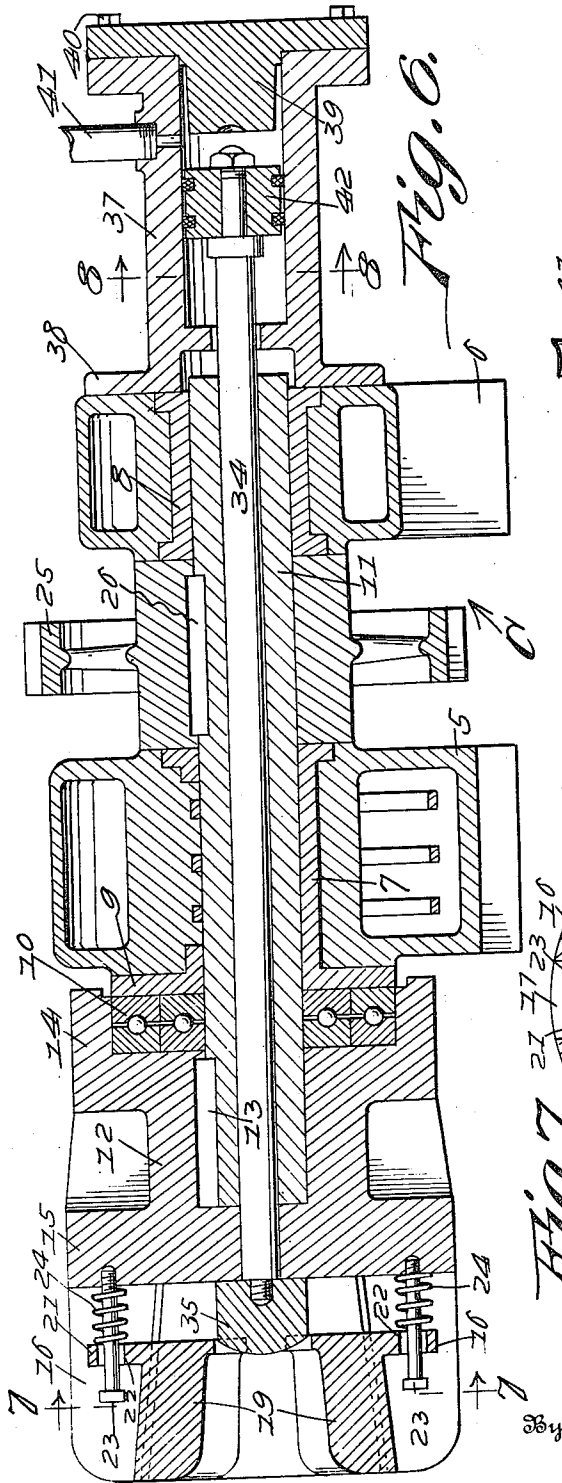


Fig. 6.

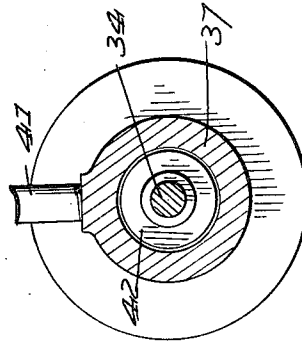


Fig. 8.

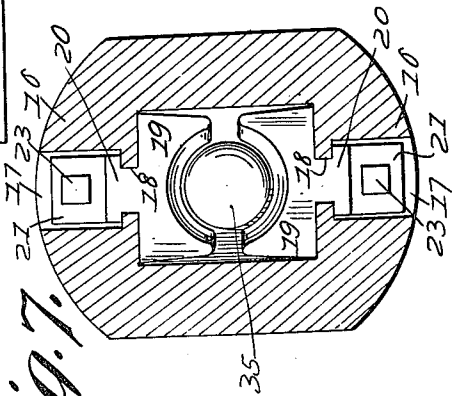
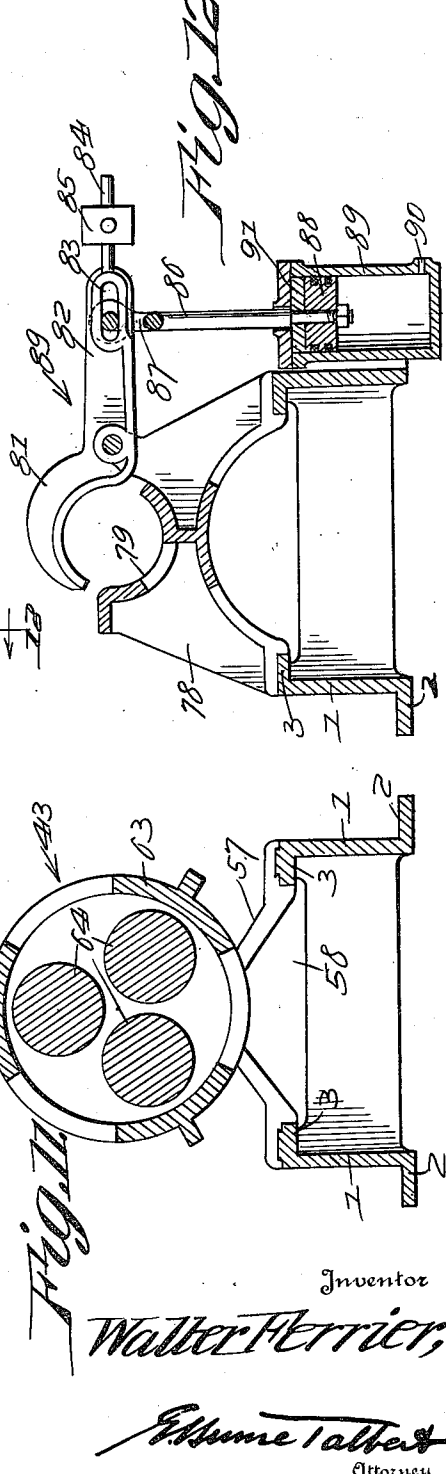
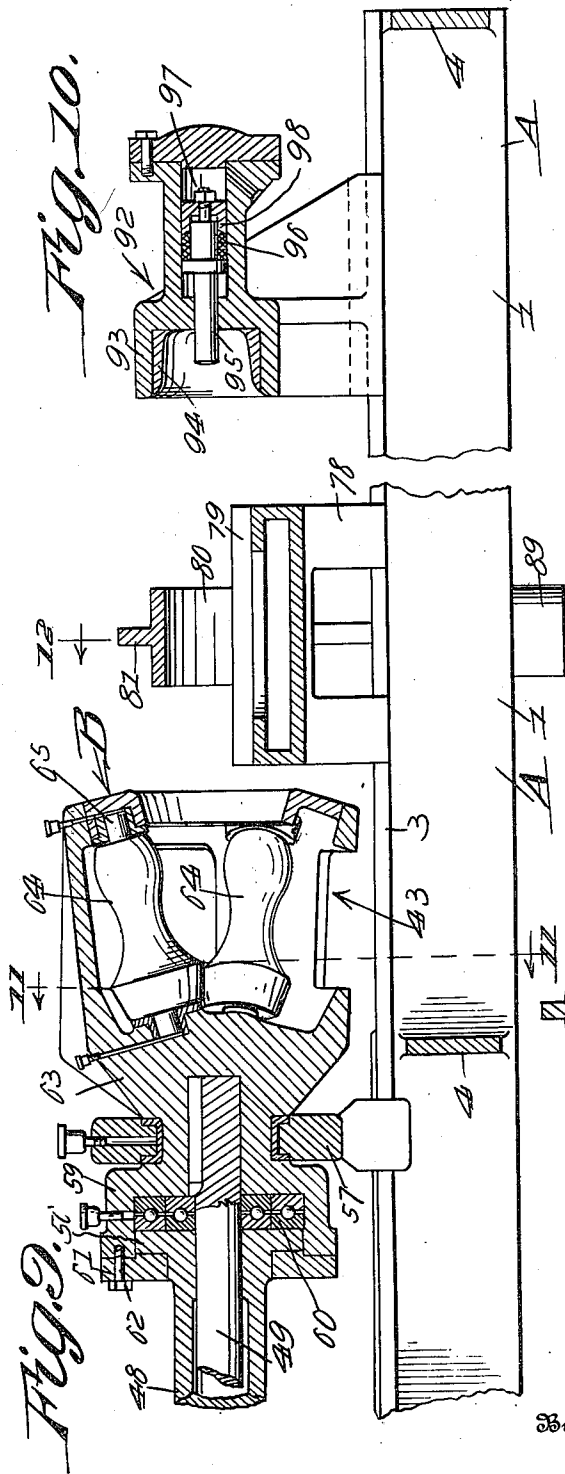


Fig. 7.

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Patented Mar. 18, 1919.

5 SHEETS—SHEET 5.

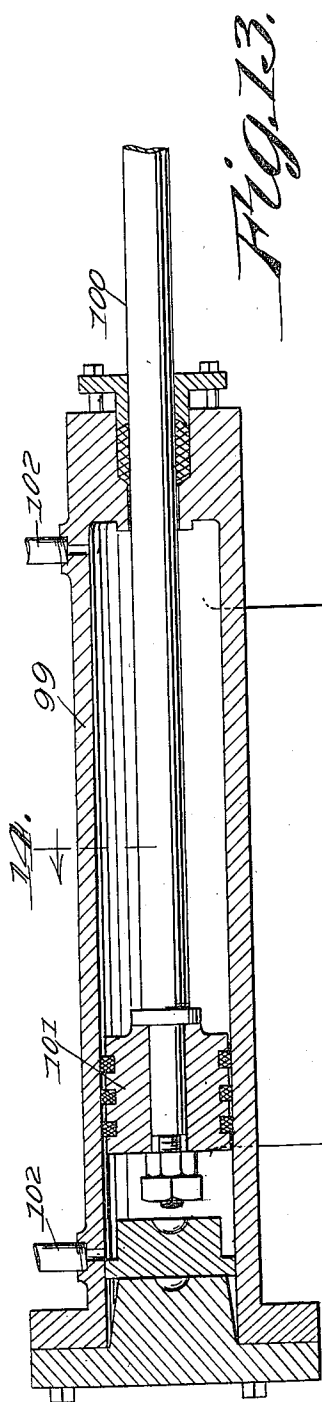


Fig. 13.

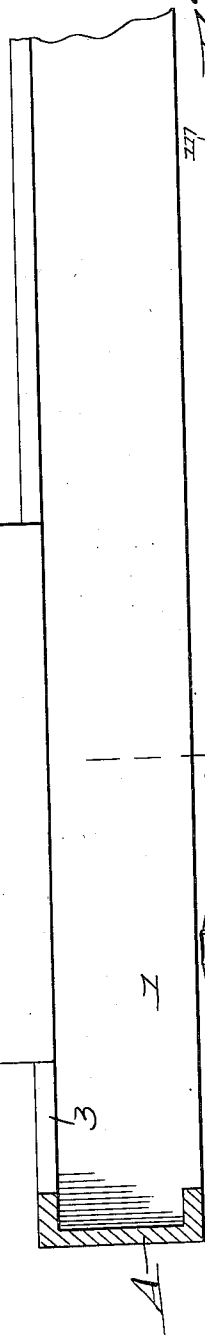


Fig. 14.

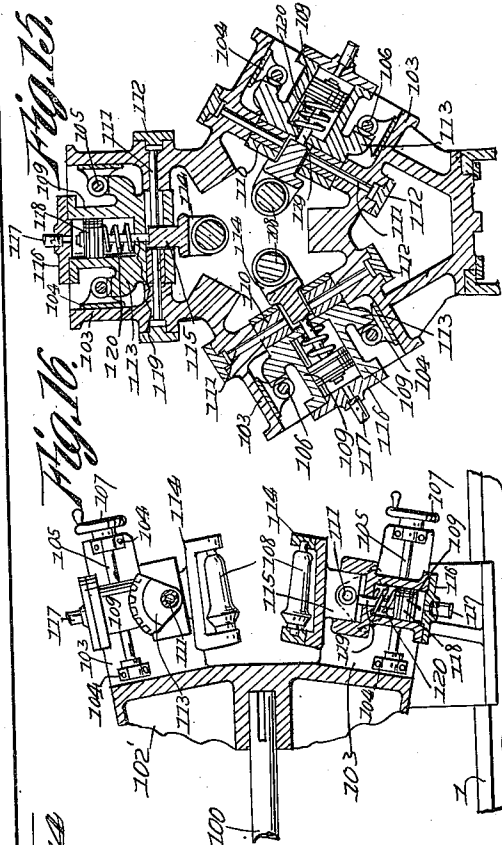


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UNITED STATES PATENT OFFICE.

WALTER FERRIER, OF WILMINGTON, DELAWARE.

NOSE-FORMING MACHINE.

1,297,819.

Specification of Letters Patent. Patented Mar. 18, 1919.

Application filed December 21, 1917. Serial No. 208,320.

To all whom it may concern:

Be it known that I, WALTER FERRIER, a citizen of the United States, residing at Wilmington, in the county of New Castle and State of Delaware, have invented new and useful Improvements in Nose-Forming Machines, of which the following is a specification.

The invention is designed for the principal purpose of providing a machine for quickly and effectively forming a nose on a tube, tank or the like.

A further purpose of the invention is to provide a machine of this character having a nose-forming head and a chuck mechanism, both mounted on a common bed, and both being capable of rotary movement.

A still further purpose is to provide a fluid pressure means to effect longitudinal movement of the nose-forming head.

A still further purpose is to provide a chuck for holding a cylinder or tank while a nose is being formed thereon, the chuck being of such construction that the increasing pressure of the nose-forming head results in increased clamping effort by the chuck.

A still further purpose of the invention is to provide means for driving the chuck and the nose-forming head in opposite directions, so that a relatively fast movement of the nose-forming head over a tank having the nose formed thereon may be had with a comparatively slow rotary movement of the nose-forming head.

A still further purpose is to provide means for retaining the nose forming head against angular movement without depriving it of its longitudinal movement, so that the tank or tube being operated upon may be rotated or spun by the chuck. This for the purpose of enabling the machine to be employed for the nose forming operation on relatively large tanks where the movement of the nose forming head and the chuck as before mentioned would make too great a relative movement between the tank and the nose forming head.

A still further purpose is to provide means for limiting the longitudinal movement of the nose-forming head to a prescribed length.

A still further purpose is to provide a supplementary work support to be carried on

the bed of the machine between the chuck and the nose-forming head.

A still further purpose is to provide a work ejecting means in conjunction with the chuck.

A still further purpose seeks the provision of a machine of this character which may be conveniently operated by a single workman, since the driving means and the nose forming head advancing means are operated by devices whose means of control can be concentrated at one point.

The drawings illustrate and the specification describes a preferred embodiment of the invention and modifications of the nose forming mechanism and the chuck mechanism, but to none of these forms is the invention to be restricted. Further use in practice may suggest certain desirable changes or alterations and the right is claimed to make any, in so far as they may be compatible with the spirit of the annexed claims.

The same numerals of reference designate the same parts throughout the several figures of the drawings, wherein:

Figure 1 is a view in side elevation of the preferred embodiment of the invention,

Fig. 2 is a top plan view,

Fig. 3 is a longitudinal sectional view of the fluid pressure mechanism for advancing the nose forming head,

Fig. 4 is a section on the line 4—4 of Fig. 3,

Fig. 5 is a section on the line 5—5 of Fig. 2,

Fig. 6 is a longitudinal sectional view through the chuck and its attendant operating mechanism,

Fig. 7 is a section on the line 7—7 of Fig. 6,

Fig. 8 is a section on the line 8—8 of Fig. 6,

Fig. 9 is a longitudinal sectional view showing a modification of the nose forming head,

Fig. 10 is a longitudinal sectional view of the modified form of chuck,

Fig. 11 is a section on the line 11—11 of Fig. 9,

Fig. 12 is a section on the line 12—12 of Fig. 9,

Fig. 13 is a longitudinal sectional view of the ram used in conjunction with the nose forming head of Fig. 9,

Fig. 14 is a section on the line 14—14 of Fig. 13.

Fig. 15 is a central vertical sectional view of the preferred form of nose forming head.

Fig. 16 is a section on a line 16—16 of Fig. 15.

Fig. 17 is a section on a line 17—17 of Fig. 2.

Fig. 18 is a section on a line 18—18 of Fig. 17.

Referring to the drawings, and particularly to the preferred embodiment of the invention, there is shown a bed A on which is mounted the nose forming mechanism B and the chuck mechanism C. The bed A is cast preferably in one piece consisting of the longitudinal side pieces 1, with the outwardly extending base flanges 2 to form a suitable base by which the bed may be supported. At the upper longitudinal edges, the side pieces 1 are intumed, forming the ways 3 on which all the mechanism hereinafter described is mounted. As is usual with such structure, the bed A is formed with transversely disposed strengthening ribs 4 which connect and are integral parts of the longitudinal side pieces 1.

Beginning with the chuck mechanism, there are provided the pedestals 5 and 6, in the former of which there is a bearing bushing 7, and in the latter, a bearing bushing 8, each being held in its respective pedestal in any suitable way. The bearing 7 at the front end terminates in a plate 9 which acts as a wearing plate for the ball bearing 10, which is designed to take care of the thrust imposed upon the chuck by the operations of the nose forming head. Journaled in the bearings 7 and 8, there is a hollow shaft 11 and at the forward end of this shaft, the chuck is carried, the body 12 of the chuck being secured against angular movement on the shaft by the key 13. The chuck body 12 at its rear is so formed that there is provided an annular flange 14 which surrounds the ball bearing 10. The face plate 15 of the chuck is made an integral part of the body and has projecting from its front face and at diametrically opposite sides thereof, the arms 16, the facing sides of which lie in converging planes, these lower sides converging from the free ends of the arms toward the face plate 15. The arms 16 on their outer sides are provided with the relatively wide recesses 17 from which narrow slots 18 open onto the inner sides of the arms. These slots and recesses are provided for the purpose of holding the chuck jaws 19 on the backs of which are formed the ribs 20 which are T-shaped in cross section, the T-shaped ribs slidably engaging in the said slots and recesses. The design provides for the backward movement of the jaws 19 with respect to the arms 16, and since the inner faces of the latter con-

verge in the manner before described, the said backward movement operates to move the jaws toward each other. The jaws are each provided with an upstanding ear 21 positioned at the rear of the rib 20, and these upstanding ears have formed therein, holes 22 which are relatively large diameter as compared with the headed studs 23 which pass through them and which connect with the base plate 15 by effecting threaded engagement with the latter. Springs 24 surround the studs 23 and are carried between the ears 21 and the face plate 15. The springs tend normally to keep the jaws positioned at the forward ends of the arms 16 and therefore operate to keep the jaws extended to the position for gripping the greatest diameters of work within their capacity. The heads of the studs 23 act as a limiting means for the movement of the jaws 19.

The chuck is designed for rotary movement and to that end, there is provided a spur gear 25 which is mounted on the hollow shaft between the bearing brackets 5 and 6. This spur gear is secured against angular movement on the shaft by means of the key 26. A countershaft 27 is journaled in bearings formed in brackets 28 and 29 which are integral lateral projections of the pedestals 5 and 6 respectively. This countershaft carries a pinion 30 which meshes with a spur gear 25. It also carries a spur gear 31 at its rear end, and this latter spur gear meshes with a pinion 32 attached to the shaft of a motor 33, the latter being carried on the bed A on which it is attached in any suitable manner. It will be observed that the rotary movement of the motor 33 serves to communicate rotary movement to the chuck through the instrumentality of the two gear couples and the countershaft 27.

The shaft 11 carries within its longitudinal bore, an ejecting rod 34 commonly known as a kickout rod. This rod is mounted for sliding movement within the shaft and through the face plate 15, a central hole being provided in the latter to permit the ejecting rod to enter between the chuck jaws, the ejecting rod receiving a detachable head 35 at the end where it projects through the base plate. The rod is designed primarily for longitudinal movement to eject work from the chuck, and this movement is obtained by means of an appropriate fluid pressure device carried at the rear of the pedestal 6. This fluid pressure device comprises a cylinder 37 with a flanged base 38 by means of which it is attached to the pedestal. At the free end, the cylinder is closed by an appropriate head 39 which is secured in place on the cylinder by means of cap screws 40. The cylinder is designed to receive water or air under pressure or steam which is admitted to the cylinder through a

pipe 41, the latter being controlled by a three-way valve (not shown). The rear end of the ejecting rod 34 is designed to receive a piston head 42 against which the water, or air or steam admitted to the cylinder acts.

The nose forming mechanism B comprises a nose forming head 43, a ram 44 and driving mechanism 45. The ram 44 comprises a cylinder 46 with a detachable head 47 at its rear end. Passing slidably through the cylinder, there is a plunger rod 48 provided with a central longitudinal bore in which it carries the shaft 49, the latter connecting with the nose-forming head 43 and the driving mechanism 45. At either end of the cylinder, there is provided a gland 50 which secures packing 51 in place to provide against leakage of the fluid admitted into the cylinder for operating the plunger rod. The plunger rod is moved by the pressure of the operating fluid upon the piston 52 which is held on the plunger rod by means of threads formed thereon and a lock nut 53 set up against the piston. Filler rings 54 are carried in either end of the cylinder and in surrounding relation to the plunger rod. These filler rings are designed to receive the impact of the piston and are employed for the purpose of limiting the stroke of the piston. Water or air under pressure or steam is admitted into either end of the cylinder for the operation of the piston by means of pipes 55 which are controlled preferably by three-way valves, (not shown). The forward end of the plunger rod 48 terminates in an annular flange 56 by means of which it connects with the nose-forming head 43, the latter being rotatably mounted in a bearing pedestal 57 which is slidably mounted on the bed A, this pedestal resting upon the ways 3 and having a web 58 connecting its two supporting legs, the web projecting underneath the flanges forming the ways. Thus the pedestal 57 is maintained on the bed, but in such a manner that it may be moved longitudinally along the bed. The body of the nose forming head is reduced in diameter where it is journaled in the bearing pedestal 57, but behind this bearing pedestal, the body is enlarged into a cup 59, which receives the thrust ball bearing 60 and the flange 56 of the plunger rod 48. A ring 61 in surrounding relation to the plunger rod is secured to the cup at the open end by means of cap screws 62, the ring operating to attach the plunger rod to the nose forming head with the ball bearing 60 interposed between the two to care for the thrust imposed upon the head in the nose forming operation.

The nose forming head shown in Figs. 1, 2 and 9, while not the preferred form, is found convenient for the finishing operation, where other machines equipped with the preferred form of head shown in Fig.

15 perform the operations preliminary to the finishing operation. This finishing head comprises a body of which the cup 59 and housing 63 are parts, these two portions of the body being connected by the reduced portion which is journaled in the pedestal 57. The housing 63 is open at its forward end to permit the entrance therein of the tube or tank being operated upon. The housing supports the nose forming rolls 64 which are mounted for rotating movement with respect to the housing, being provided with trunnions 65 for this purpose. The axes of rotation of the nose forming rolls are arranged in the form of a trihedral angle, the axes approaching each other from the open forward end to the rear end of the housing.

The shaft 49 extends forward with the plunger rod 48 and effects connection with the body of the nose forming head 43 to which it is fixedly secured.

The nose forming head is given its rotary movement by means of the driving mechanism 45, the latter comprising forward and rear pedestal bearings 66 in which the rear end of the shaft 49 is journaled, the latter being extended to the rear a sufficient distance for this purpose. The shaft 49 is provided with a spline 67 extending from its rear end to a point a specified distance therefrom. Between the two pedestal bearings 66, there is mounted on the shaft 48, a spur gear 68 which carries a key 69 slidably engaging the spline 67. This gear is thus secured against angular movement on the shaft, but will permit longitudinal movement of the shaft, as is necessary when the ram advances the nose forming head. The pedestals 66 both carry lateral projecting members 70 provided with bearings in which a shaft 71 is journaled, the latter carrying a pinion 72 which meshes with the spur gear 68. The shaft 71 is driven by a motor 73 whose shaft is common with the former shaft. The motor is mounted on the bed A on which it is supported in any suitable manner. Between the rear bearing pedestal 66 and the motor, the shaft 71 carries a fly wheel 74 designed to take care of the intermittent strains imposed upon the motor by the nose forming operation.

When it is desired to hold the nose forming head stationary, as is sometimes the case, there is provided a brake band 75, which is adapted to grip the fly wheel 74 on its periphery when the band is drawn tight around the fly wheel by the movement of the hand lever 76, there being a toothed rack 77 with whose teeth the lever can be made to engage to hold the band 75 in either tight or loose contact with the fly wheel.

An intermediate work support is provided for tubes or tanks being operated upon and this work support comprises a body 78 which

is fixedly secured on the ways 3 of the bed A and is provided on its top face with a semi-circular depression 79 formed to the radius of the tank or tube being operated upon. Piv-
 5 otally mounted on one side of the body 78, there is a lever 80 having an arcuate arm 81 which is designed to grip the tube or tank supported by the body 78 in the depression 79. The lever 80 is also provided with the
 10 straight arm 82 having an elongated slot 83 formed therein and having also a smaller extending arm 84 on which a weight 85 is carried, the latter being designed for adjustment longitudinally along the arm 84. The
 15 lever 80 is operated by a ram movable either by hydraulic or pneumatic pressure or steam, and this ram comprises a plunger rod 86 formed at its upper end with a fork 87, the free ends of whose legs are intumed and enter the slot 83. At its lower end, the
 20 plunger rod 86 receives a piston 88 which is interior to and movable vertically in a cylinder 89, the latter as well as the plunger being mounted vertically on one side of the
 25 bed A, and the cylinder receiving its operating fluid through an inlet port 90 with which a suitable pipe is connected for transmitting the fluid to the cylinder. As is the case with the other hydraulic members of the machine,
 30 the cylinder 89 is provided with a filler ring 91 to limit the upward movement of the piston.

It is obvious that the admission of fluid under pressure to the cylinder 89 will operate to effect a gripping operation on the
 35 part of the lever 80 with the tube or tank held in the body 78; it is obvious also that when the pressure of the fluid in the cylinder is relieved as it would be in the case of the operation of the three-way valve which
 40 is designed to admit the fluid to the cylinder (the valve being not shown) that the weight 85 will operate to raise the arcuate arm 81 from the work held in the body 78, thus permitting the removal of the work therefrom. The weight is adjustable along
 45 the arm 84 to permit the proper counterbalancing effort to be obtained.

In Fig. 10, there is shown a modified form
 50 of chuck 92. This chuck is designed for stationary mounting on the bed A when the invention is so constructed that only the nose forming head is made to rotate. The chuck is provided with stationary jaws 93
 55 with roughened inner faces 94 which are designed to engage and hold the tank when it is forced in between the jaws by the operation of the nose forming head. The chuck is also provided with an ejecting rod 95
 60 which carries a piston 96 movable in a cylinder 97 which is made a part of the chuck, the operating fluid being admitted to the cylinder through an inlet 98 formed therein.

When it is desired to rotate the chuck

alone, the invention may be reconstructed to
 65 have the nose forming head advancing means in the form shown in Fig. 13. When reconstructed along this plan, a cylinder 99 is appropriately supported on the bed A
 70 and in place of the shaft 48, the nose forming head is connected directly to a plunger 100 which enters the cylinder 99 and connects with a piston 101 therein, fluid for the operation of the piston being admitted to the cylinder at either end by pipes 102.
 75 Where the invention is constructed according to the modification shown in Fig. 13, the plunger rod 100 is secured against angular movement in a bearing pedestal similar to the bearing pedestal 57 which, of course, is
 80 designed to be positioned close to the nose forming head with which it moves longitudinally along the bed A as a result of movement imparted to it by the piston 101.

The preferred form of nose forming head,
 85 shown in Figs. 15 and 16 is used preferably with the advancing means shown in Fig. 13, since it is used to better advantage when held stationary. The head comprises a face
 90 plate 102 which is secured against both angular and longitudinal movement on the free end of the plunger rod 100. This face plate carries on its face and disposed at angular
 95 distances 120 degrees apart the housing members 103 which are made preferably integral parts of the face plate, the housing members having only side walls which connect one with the side wall of the adjacent
 100 housing member where these side walls come together in the vicinity of the center of the face plate. On the inside of each housing and on the opposite side walls thereof, there are mounted forward and rear bearing
 105 brackets 104, in which shafts 105 are journaled, these shafts carrying substantially at their longitudinal centers, the worms 106, and further carrying at their forward ends, where they project beyond the housing, the
 110 hand wheels 107 by means of which the shafts may be turned.

Each of the housings 103 is designed to support a nose forming roll 108, and its attendant mechanism, this attendant mechanism comprising a fluid pressure cylinder
 115 109 in diametrically opposite sides of which bearing bushings 110, made preferably of bronze, are inserted. These bearing bushings receive for pivotal engagement therewith, the pintles 111 which are inserted
 120 through appropriate holes formed in opposite side walls of the housing 103 and are held in place therein by screw caps 112 which close the holes through which the
 125 pintles are inserted. The cylinder is adapted for pivotal movement on these pintles, so that the nose forming roll may have the axis of its rotation varied with respect to the face plate, and various angular positions

of the roll are obtained through worm arcs 113 formed integrally with the cylinder 109, these worm arcs meshing with the worms 106. The roll 108 is provided with trunnions to permit its being rotatably mounted in a yoke 114, the yoke having a projection 115 on its back which slidably enters an aperture formed in the closed end of the cylinder 109, the latter being formed with a relatively great thickness of stock at the closed end, and the aperture conforming in shape to the cross sectional shape of the projection, which is other than round, so that there may be no relative angular movement of the yoke with respect to the cylinder. The cylinder 109 is closed by a cap 116 provided at its center with a hole with which a pipe 117 connects, this pipe being designed to admit water or air under pressure or steam into the cylinder, wherein any one of these that is employed may exert a pressure on the piston 118 to force the yoke radially in toward the axis of rotation of the face plate. The piston 118 is connected to the projection 115 of the yoke by means of a plunger rod 119 which is suitably attached to both, but a spiral spring 120 surrounds the plunger rod and is compressed between the piston and the closed end of the cylinder. This spring tends normally to keep the piston near the open end of the cylinder, and thereby normally keeps the nose forming roll its farthest distance away from the center of the face plate. Obviously the three nose forming rolls 108 will be moved toward each other by the admission of water or air under pressure or steam into the cylinders 109. Also, it is apparent that the axes of the nose forming rolls may have their planes of rotation changed by the manipulation of the hand wheels 107, since the turning of these wheels will result in the movement of the cylinders on their pivotal connections with the pintles 101.

In the operation of the invention, it is only necessary to describe the preferred embodiment, since the modified form, in the matter of operation, will be readily apparent from the description of the preferred form. The tube or tank X on which the nose is to be formed is placed first in the body 78 of the supplementary work support. If both the chuck member and the nose forming head are to be rotated, the lever 80 is adjusted just close enough to the tank to permit the latter to be rotated in the work support. Both the motors 73 and 33 are then started, their direction of rotation being such that the chuck and the nose-forming head will rotate in opposite directions. The admission of fluid under pressure to the cylinder 46 at the rear end then serves to advance the piston 52 toward the forward end of the cylinder and to move the nose-

forming head up against the end of the tank X on which the nose is to be formed. This operation results in forcing the bottom of the tank in between the jaws 19 of the chuck, thus forcing the jaws backward with the result of increasing the bite of the jaws because of their consequent movement toward each other. Since the chuck and the nose-forming head rotate in opposite directions, the tank is moved relatively fast with respect to the nose-forming head with a comparatively slow rotary movement of the latter, and the nose-forming rolls carried in the head are enabled to form the end of the tank into the desired shape. It will be noted that as the pressure of the nose forming head increases as a result of the forward movement imparted by the ram 44, the bite of the chuck is increased, thus providing for an increased hold on the tank with increased strain imposed by the advancing of the nose forming head.

The operation upon the tank having been completed, the nose forming head is moved backward by the admission of fluid under pressure to the forward end of the cylinder 46, when the piston 62 and with it, the nose forming head are moved backward away from the tank. Thereafter, the tank may be ejected from the chuck by the admission of fluid into the cylinder 37, the fluid acting upon the piston 42 to move the ejecting rod 34 against the bottom of the tank, thus forcing it from the chuck when the jaws 19 are moved to their normal position under the action of the springs 34.

In the event that the machine is to be used for forming the nose on tanks or tubes which are of larger diameter than it would be advisable to spin at such a speed as that at which the smaller tanks are spun, the brake band 75 may be tightened on the fly wheel 74 by the proper operation of the lever 76. Thus the nose forming head will be held against rotary movement, but it may be advanced toward the tank to be operated upon in the usual way. When the nose forming head is thus held against rotary movement, the relative movement between the tank and the head is reduced in velocity, since the tank turns only as fast as it is moved by the chuck.

When the preferred form of nose forming head shown in Figs. 15 and 16 is used, it is preferably with that form of ram shown in Fig. 13. The cylinders 109 are connected to a source for furnishing water or air under pressure or steam. Then as the nose forming head is being fed forward by the ram, the rolls 108 are moved radially in against the tank on which the nose is being formed. After the completion of the nose forming operation, the rolls 108 are moved back to their former position by the action

of the springs 120, these springs acting of course after the release of the pressure behind the pistons 118.

This preferred form of nose forming head is particularly adaptable for the preliminary forming of the nose, since the axes of the rolls may be changed as desired and since the rolls are movable toward and away from each other.

While the invention is shown and described as a nose forming machine, it is obvious that it may be employed for all sorts of forming operations of similar character, simply by the employment of forming rolls of a proper conformation.

The invention having been described, what is claimed as new and useful is:—

1. In a machine of the character described, a bed, a nose forming head mounted thereon, a chuck member also mounted on the bed, means for moving the nose forming head toward the chuck member, and a hydraulic work ejecting medium connected with the chuck member.

2. In a machine of the character described, the combination with a bed, of a nose forming head mounted for rotary and longitudinal movement upon the bed, driving means having positive connection with the nose forming head, a chuck member mounted also upon the bed, driving means having positive connection with the chuck member, and a hydraulic work ejecting medium connected with the chuck member.

3. In a machine of the character set forth, the combination with a bed, of a nose forming head mounted for rotary and longitudinal movement upon the bed, driving means positively connected with the nose forming head, a chuck member also mounted upon the bed, driving means positively connected with the chuck member, means combined with the chuck member for increasing its bite upon a piece of work when the nose forming head operating thereupon increases its pressure upon said work, and a hydraulic work ejecting medium connected with the chuck member.

4. In a machine of the character described, the combination with a bed, of a nose forming head, a cylinder mounted upon the bed, a hollow plunger rod having one end connected to the nose forming head so that the latter may be permitted an angular movement on the plunger rod, a piston movable in the cylinder and connected with the plunger rod at an intermediate point on the latter, a shaft positively connected with the nose forming head and being slidable through the plunger rod and through the cylinder, driving means positively connected with said shaft, a chuck member also mounted upon the bed, driving means positively connected with the chuck member, and means for con-

necting the two ends of the cylinder to a fluid pressure supply whereby fluid under pressure may be admitted to either end of the cylinder to move the nose forming head toward or away from the chuck member.

5. In a machine of the character described, the combination with a bed, of a nose forming head, a cylinder mounted upon the bed, a hollow plunger rod having one end connected to the nose forming head so that the latter may be permitted an angular movement on the plunger rod, a piston movable in the cylinder and connected with the plunger rod at an intermediate point on the latter, a shaft positively connected with the nose forming head and being slidable through the plunger rod and through the cylinder, driving means positively connected with said shaft, a chuck member also mounted upon the bed, and means for connecting the two ends of the cylinder to a fluid pressure supply whereby fluid under pressure may be admitted to either end of the cylinder to move the nose forming head toward or away from the chuck.

6. In a machine of the character described, the combination with a bed, of a nose forming head, a cylinder mounted upon the bed, a plunger rod slidably entering the cylinder at one end of the latter, the plunger rod being connected with the nose forming head so that the latter may be permitted angular movement thereon, a plunger movable longitudinally within the cylinder and connected to the plunger rod, a shaft positively connected with the nose forming head and rotatably mounted within the plunger rod and passing slidably through the rear end of the cylinder, driving means positively connected to the shaft and yet permitting the longitudinal movement of the latter, means for braking and locking the driving means, a chuck member also mounted upon the bed, driving means for the chuck member, means for connecting the two ends of the cylinder to a source of fluid pressure supply to permit the admission of fluid under pressure into either end of the cylinder, and means carried by the chuck member for increasing its bite upon a piece of work when the said work is being operated upon by the nose forming head and the latter is being moved toward the chuck member.

7. In a machine of the character described, the combination with a bed, of a nose forming head, a cylinder mounted upon the bed, a plunger rod slidably entering the cylinder at one end of the latter, the plunger rod being connected with the nose forming head so that the latter may be permitted angular movement thereon, a plunger movable longitudinally within the cylinder and connected to the plunger rod, a shaft positively connected with the nose forming head and rota-

ably mounted within the plunger rod and passing slidably through the rear end of the cylinder, driving means positively connected to the shaft and yet permitting the longitudinal movement of the latter, a chuck member also mounted upon the bed, driving means for the chuck member, means for connecting the two ends of the cylinder to a source of fluid pressure supply to permit the admission of fluid under pressure into either end of the cylinder, and means carried by the chuck member for increasing its bite upon a piece of work when the said work is being operated upon by the nose forming head and the latter is being moved toward the chuck member.

8. In a machine of the character described, the combination with a bed, of a nose forming head mounted for rotary and longitudinal movement upon the bed, driving means positively connected with the nose forming head, a chuck member also mounted upon the bed, fluid pressure member for effecting the longitudinal movement of the nose forming head toward and away from the chuck member, and a hydraulic work ejecting medium combined with the chuck member.

9. In a machine of the character described, the combination with a bed, of a nose forming head mounted for rotary and longitudinal movement upon the bed, driving means positively connected with the nose forming head, a chuck member also mounted upon the bed, driving means positively connected with the chuck member, a hydraulic ram for moving the nose forming head toward and away from the chuck member, the ram embodying a plunger, and filler rings carried in the ram and engageable by the plunger for limiting the longitudinal movement of the latter.

10. In a machine of the character described, the combination with a bed, of a nose forming head mounted upon the bed, nose forming rolls carried by the head and having a hydraulic radial feed, means for shifting the axes of rotation of the nose forming rolls, a chuck member also mounted upon the bed, and driving means for the chuck member.

11. In a machine of the character described, the combination with a bed, of a nose forming head mounted upon the bed, nose forming rolls carried by the head, a hydraulic radial feed for the rolls to move them toward or away from each other, a chuck member also mounted upon the bed, and driving means for the chuck member, a rod slidably mounted in the chuck member, and means for moving the said rod longitudinally to cause it to eject from the chuck member any work held thereby.

12. In a machine of the character described, the combination with a bed, of a

nose forming head mounted upon the bed, nose forming rolls carried by the head, a hydraulic radial feed for the nose forming rolls, means for shifting the axes of rotation of the nose forming rolls, a chuck member also mounted upon the bed and driving means for the chuck member.

13. In a machine of the character described, the combination with a bed, of a nose forming head mounted upon the bed, nose forming rolls carried by the head, a hydraulic radial feed for the nose forming rolls, manually operable means for shifting the axes of rotation of the nose forming rolls, a chuck member also mounted upon the bed, driving means for the chuck member and a hydraulic longitudinal feed for the nose forming head.

14. In a machine of the character described, the combination with a bed, of a nose forming head mounted upon the bed, a chuck member also mounted upon the bed, driving means for the chuck member, an intermediate work support carried by the bed between the chuck member and the nose forming head, a hydraulic longitudinal feed for the nose forming head, a hydraulic gripping arm for the intermediate work support, and a hydraulic kick-out carried by the chuck member and comprising a longitudinally movable bar operable by hydraulic pressure to eject finished work from the chuck member.

15. In a machine of the character described, the combination with a bed, of a nose forming head mounted upon the bed, a chuck member also mounted upon the bed, means for rotating the chuck member, an intermediate work support carried by the bed between the nose forming head and chuck member, a hydraulic longitudinal feed for the nose forming head, a hydraulic gripping arm for the intermediate work support, and gripping members carried by the chuck member whose bite upon a piece of work increases as the longitudinal movement of the nose forming head increases longitudinally the pressure upon the said work, a longitudinally movable bar carried by the chuck member, and means for operating said bar whereby it may be made to eject work from the chuck member.

16. In a machine of the character described, the combination with a bed, of a nose forming head mounted upon the bed, a chuck member also mounted upon the bed, means for rotating the chuck member, an intermediate work support carried by the bed between the nose forming head and the chuck member, a hydraulic longitudinal feed for the nose forming head, a hydraulic gripping arm for the intermediate work support, gripping members carried by the chuck member and having means for increasing their

bite upon a piece of work as the pressure longitudinally from the nose forming head increases upon the said work, and a hydraulic kick-out carried by the chuck member.

- 5 17. In a machine of the character described, the combination with a bed, of a nose forming head mounted for rotary and longitudinal movement upon the bed, driving means for the nose forming head, a chuck
10 member also mounted upon the bed, means

for effecting the longitudinal movement of the nose forming head toward and away from the chuck member, a longitudinally movable element carried by the chuck member so that it may be made to engage work 15 carried thereby, and means operatively connected with said element whereby it may be made to eject work from the chuck member.

In testimony whereof I affix my signature.

WALTER FERRIER.