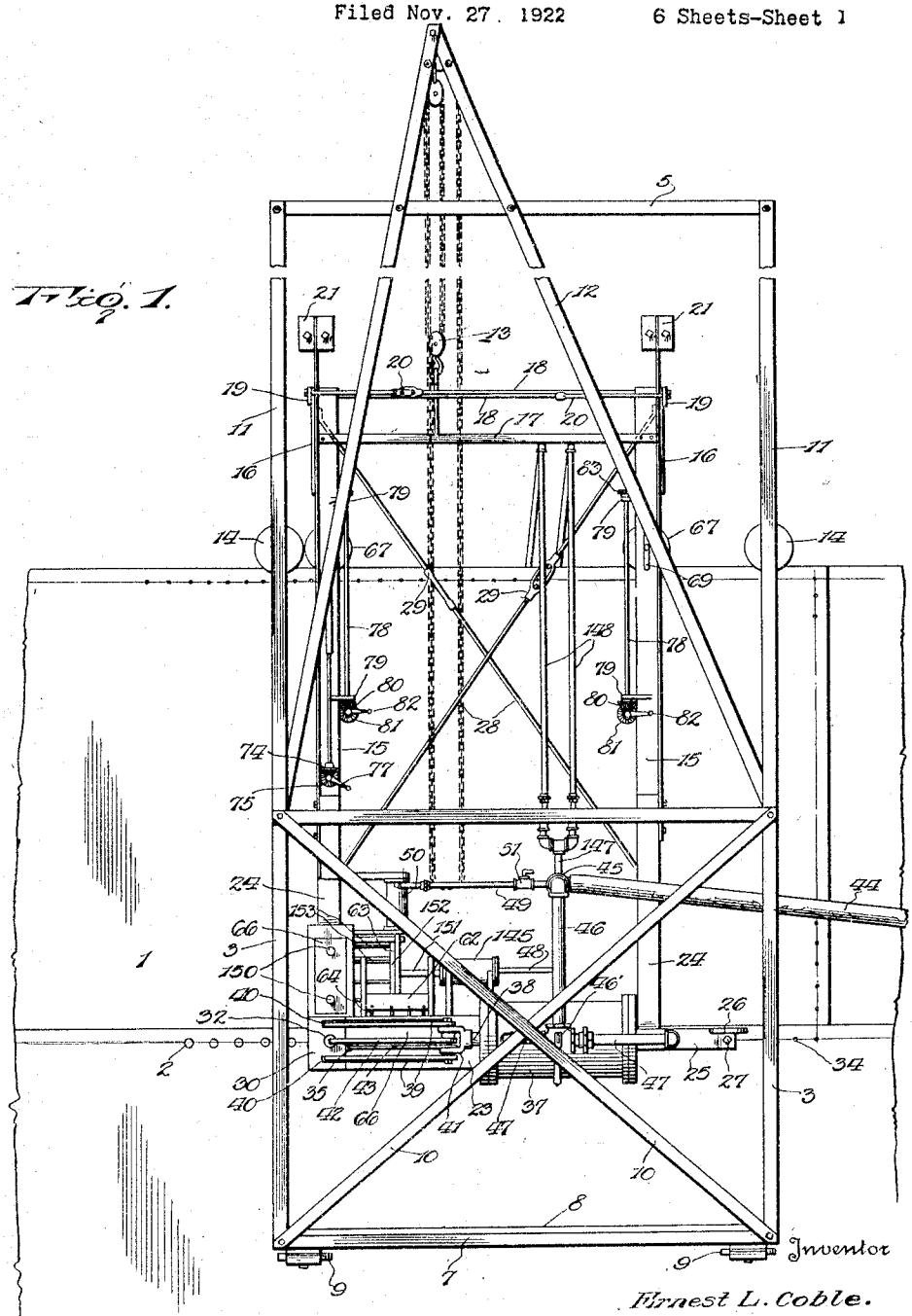
April 29, 1924. 1,491,902

E. L. COBLE

RIVETER

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Fig. 1.



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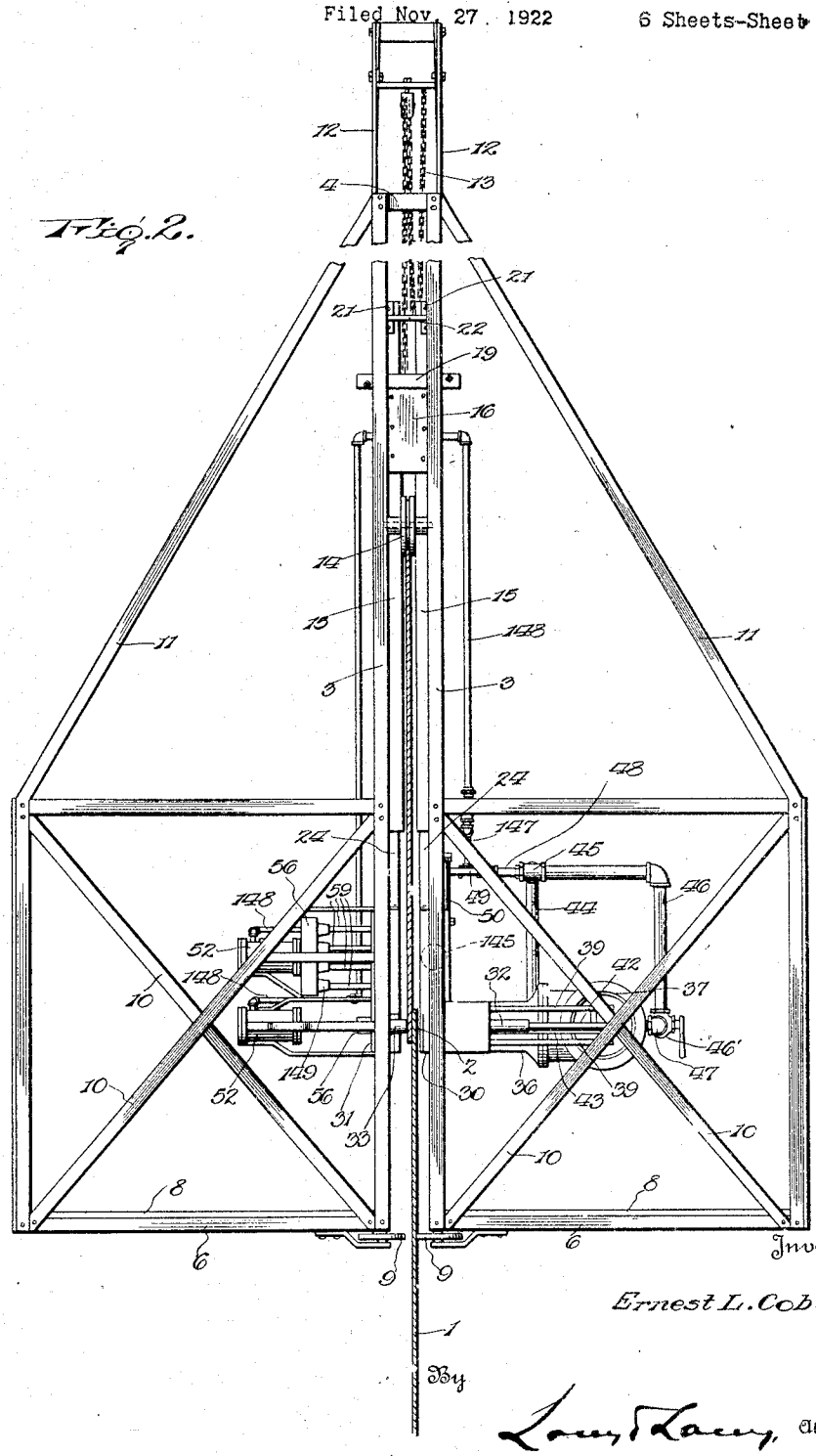
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FIG. 2.



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RIVETER

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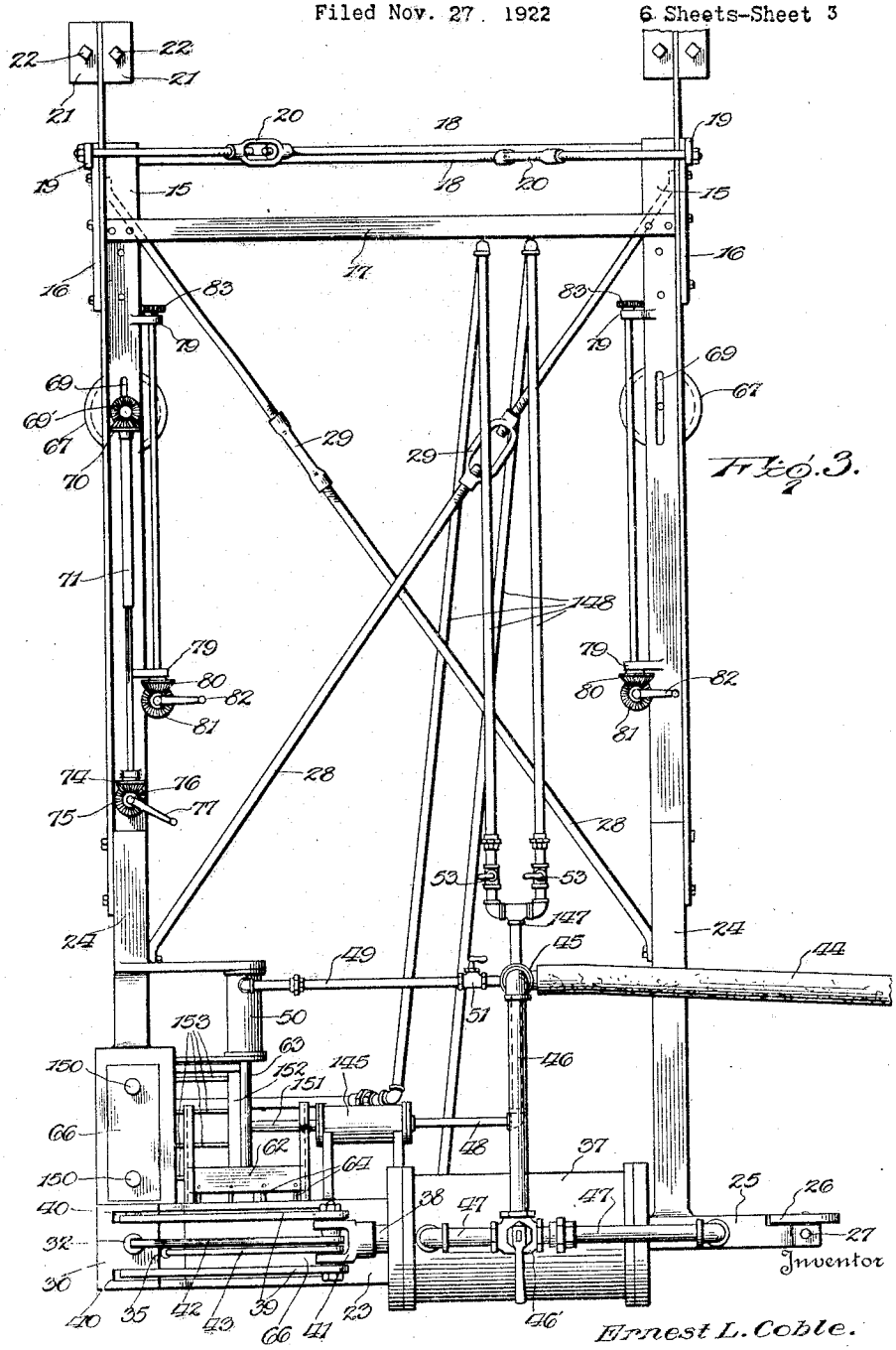


FIG. 3.

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RIVETER

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FIG. 4.

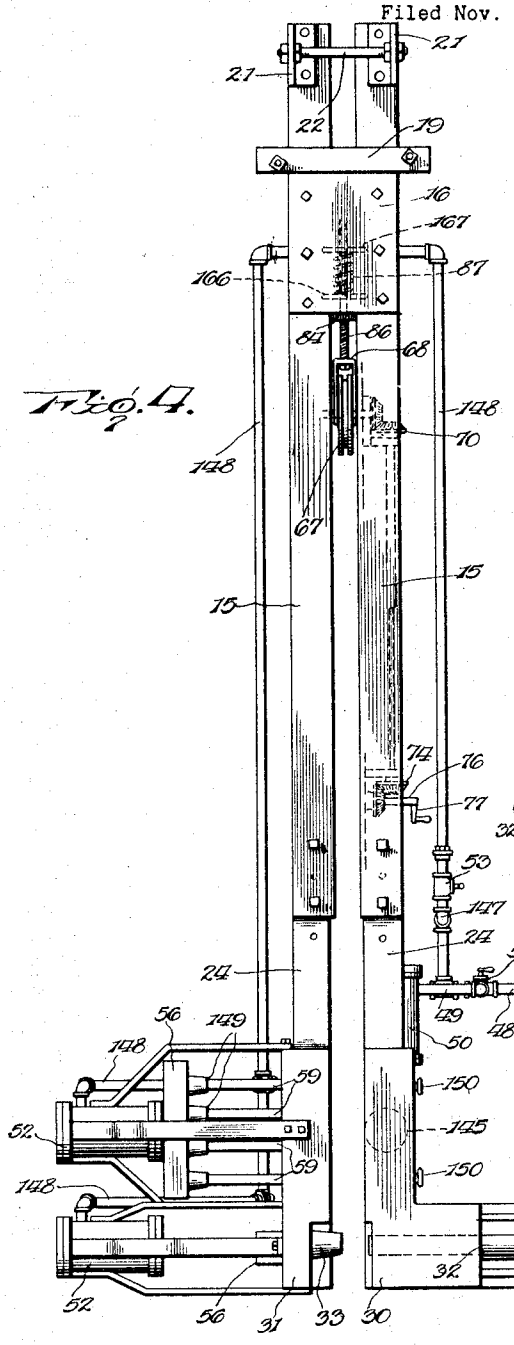
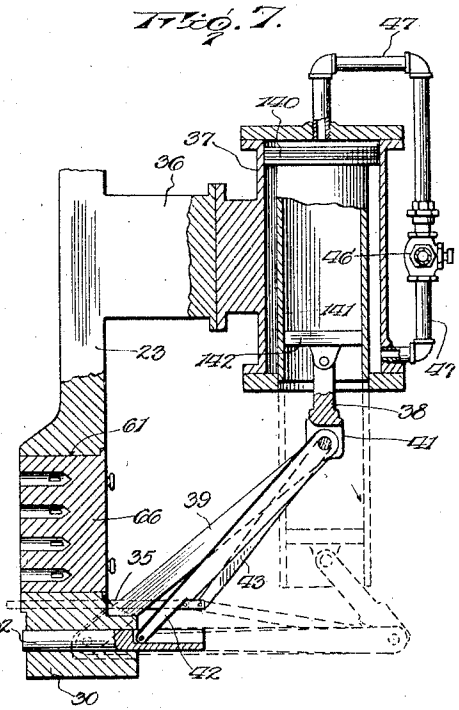


FIG. 7.



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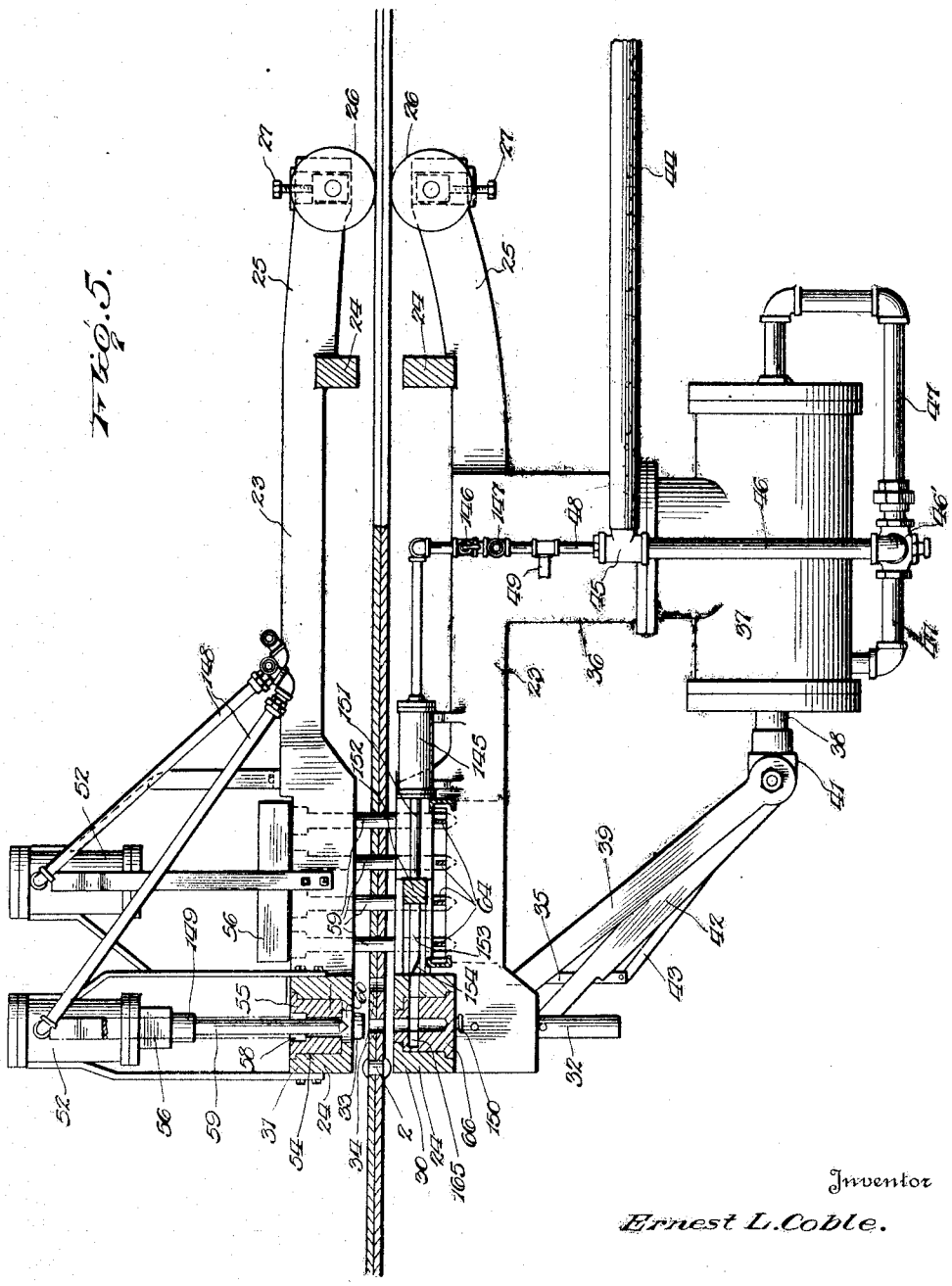
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RIVETER

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Fig. 5.



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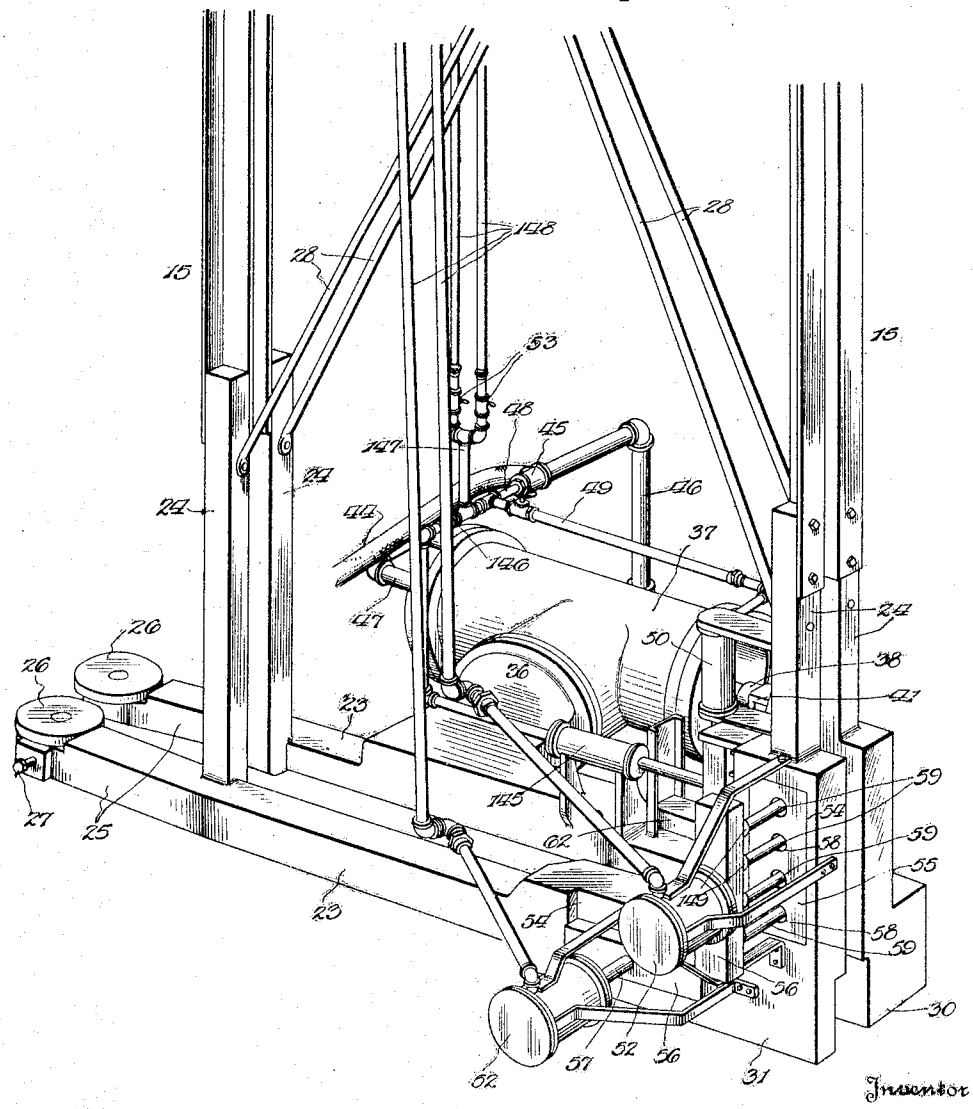
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Filed Nov. 27, 1922

6 Sheets-Sheet 6

Fig. 6.



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Patented Apr. 29, 1924. 1,491,902

UNITED STATES PATENT OFFICE.

ERNEST L. COBLE, OF ALLIANCE, OHIO.

RIVETER.

Application filed November 27, 1922. Serial No. 603,700.

To all whom it may concern:

Be it known that I, ERNEST L. COBLE, a citizen of the United States, residing at Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Riveters, of which the following is a specification.

This invention relates to riveting machines and has for its object the provision of an apparatus which will be lighter, smaller and less costly than apparatus now employed without losing any efficiency. My machine is intended more particularly for use in riveting the plates of oil storage tanks, and one object of the invention is to provide an apparatus which will be supported on the upper edge of the plate being riveted, in such a manner that it may travel along said edge as the work proceeds. Another object of the invention is to provide means whereby the plates will be held closely together and the formation of burs upon the rivets between the opposed surfaces of the plates will be avoided. Another object of the invention is to provide means whereby the machine may be fed a distance corresponding to the space between adjacent rivet holes after each rivet is finished so that the rivet-compressing jaws will be properly located to act upon a succeeding rivet. Other objects of the invention are to provide an apparatus which may be readily adjusted to the height of the plate to be riveted which may be operated by any form of power and preferably by fluid pressure, and to provide means whereby the power applied will be utilized most advantageously and a high compressive force exerted upon the rivet. All these stated objects, and other objects which will appear incidentally in the course of the following description, are attained in the use of such an apparatus as is illustrated in the accompanying drawings, and the invention resides in certain novel features which will be particularly pointed out in the claims following the description.

In the drawings:—

Figure 1 is a side elevation of my improved apparatus in position for work;

Fig. 2 is an end elevation, the plates to be riveted being in vertical section;

Fig. 3 is an enlarged side elevation of the riveting machine removed from the cage shown in Figs. 1 and 2;

Fig. 4 is an enlarged end elevation of the riveting machine;

Fig. 5 is a plan view of the lower portion of the machine with parts of the frame in horizontal section;

Fig. 6 is a perspective view of the lower portion of the riveting machine, and

Fig. 7 is an enlarged longitudinal section through the main power cylinder and the parts actuated directly therefrom.

In the drawings, I have shown a portion of an oil storage tank at 1, and it will be readily noted and understood that the tank is composed of metal plates set on edge to the desired height, one above another and also arranged in courses to form a circular reservoir. The edges of adjacent or abutting plates slightly overlap and rivets 2 are inserted through and upset against the opposite faces of the plates to permanently secure them together, the vertical seams being preferably arranged to break joint. The use of my apparatus will effect such close contact between the opposed surfaces of the plates that the joints may be calked more easily than heretofore. In carrying out my invention, I employ cages consisting of uprights 3 disposed at opposite sides of the plates 1 to be riveted and connected at their upper ends by cross bars 4 so as to be rigidly joined and prevented from lateral collapse. The upper ends of the uprights are also connected by longitudinally extending beams 5 and the lower ends are connected by sills 6 and 7 disposed transversely and longitudinally respectively of the frame or cage and supporting platforms 8 upon which the workmen may stand or move about. On the under sides of the platforms or the beams 7 are carried rollers 9 which are adapted to ride upon the outer surfaces of the plates 1 and thereby prevent swaying of the cages toward or from the plates. The platforms 8 are held against collapse by braces 10 which are secured to the platforms and to the uprights 3 and may be arranged in any convenient or preferred manner to attain the desired rigidity and strength in the structure. Hangers 11 extend from the upper outer corners of the brace structure to the upper extremities of the uprights so that the outer portions of the platforms 8 will be firmly supported. I also secure to the uprights 3 and the upper longitudinal beams 5 derrick members 12 which project above the upper end of the cage or scaffold and support a chain-tackle hoisting mechanism, indicated at 13, by the

use of which the riveting mechanism may be raised and lowered so that the rivet-compressing or upsetting devices may be caused to operate upon the rivets in the vertical seams of the tank or reservoir. At a proper point in the height of the uprights 3, I mount thereon the grooved rollers 14 which ride upon the upper edge of the plates to be riveted so as to support the structure and permit it to be moved along the plates as the work progresses.

The frame of the riveting machine comprises pairs of standards 15 which are disposed with one member of each pair at each side of the tank structure, connecting plates 16 being secured to the members of each pair of standards near the upper extremities thereof so as to prevent spreading of the same, and a beam or brace 17 is also secured to the standards at each side of the tank structure near the upper extremities thereof so that separation or spreading of the standards longitudinally of the structure will be prevented. I further provide for the necessary rigidity of the structure by employing braces or connecting rods 18 which are extended diagonally between the upper extremities of the standards 15 and have their ends secured in cross bars 19 disposed against the standards immediately above the connecting plates 16. These braces 18 are fitted with turnbuckles 20 whereby any desired tension may be attained in the braces and spreading of the upper ends of the frame will be positively prevented. I also provide at the extreme upper ends of the standards, brackets 21 and adjusting bolts 22 fitted in the said brackets and disposed transversely of the frame so that a very firm strong and rigid frame will be produced. The lower ends of the standards 15 are connected by frame members 23, and these frame members are preferably cast or molded integral with upright portions 24 which are bolted rigidly to the lower ends of the upper portions of the standards 15 which are constructed of angle bars, as shown most clearly in Fig. 6. The standard members 15 may, of course, be provided with a plurality of bolt holes to facilitate adjustment of the frame to plates of different heights. The said frame members 23 are extended beyond one pair of standards 15 and uprights 24 and are equipped at the extremities of the said extended portions, which are indicated by the numeral 25, with rollers 26 disposed upon vertical axes and arranged with their peripheries in contact with the plates to be riveted. The rollers are preferably mounted in bearings which are slidably fitted to the ends of the extensions or arms 25 and are held in a set position by screws or bolts 27 mounted in the arms and bearing against the slidable journal boxes in which the rollers are carried. By this arrangement, I am enabled to adjust the rollers to the thickness of the plates to be acted upon and also obtain any desired pressure against the plates so that the plates will be held firmly in contact and the tendency of the plates to separate prior to the finishing of the rivet will be overcome. Rigidity in the frame members is further attained by the use of the diagonally disposed braces 28 which are secured at their lower ends to the uprights 24 and at their upper ends to the standards 15, turnbuckles 29 being interposed in the said braces, as shown clearly in Figs. 1 and 3, so that the braces may be put under any required tension. The adjustable bracing connections exert their force obviously in various directions so that the frame will effectually withstand the strain applied to it and will not be sprung so as to bring the jaws too close together to permit the insertion of a plate between them.

The frame members 23, at the ends remote from the extensions or arms 25, are constructed to constitute jaws 30 and 31 which carry the elements acting directly upon the rivet, a plunger 32 being slidably mounted in the jaw 30 and arranged in axial alinement with an anvil 33 formed on or secured to the jaw 31. When the parts of the apparatus are in proper position, the plunger 32 and the anvil 33 will be axially alined with openings 34 in the plates 1 and pressure is applied to the plunger 32 so that it will be forced against the end of a rivet inserted in said openings and the rivet will be thereby compressed between the plunger and the anvil in an obvious manner. A holding plunger 35 is also slidably mounted in the jaw 30 adjacent the plunger 32, and this holding plunger 35 is actuated by the pressure of the main piston to press the plates 1 together alongside the rivet which is to be upset so that there will be no space between the plates and, consequently, the formation of intermediate spacing burs upon the rivet cannot occur, the plates being held together in such intimate contact by the finished rivet that leakage cannot occur and packing will be unnecessary. That frame member 23 which is constructed to present the jaw 30 is also constructed with a lateral arm 36 which supports a longitudinally disposed main cylinder 37 containing a piston from which a piston rod 38 extends through the adjacent head of the cylinder to be pivotally connected at its outer free end with the links 39 which extend to the jaw 30 and are pivoted within recesses 40 formed in the upper and lower sides of the same respectively. The links 39, as shown most clearly in Fig. 3, are disposed above and below a yoke 41 formed on the end of the piston rod 38 and within the said yoke is pivotally mounted one end of a lever

42 which has its opposite end fitted within a recess or chamber in the outer end of the plunger 32 whereby the lever may rock within the said recess and exert pressure upon the plunger to force the same to or withdraw it from the rivet. A lever 43 is also pivotally mounted within the yoke 41 and this lever 43 is pivotally attached to the holding plunger 35, the arrangement of the parts being such that the plunger 35 will be forced against the adjacent plate 1 and carry it into intimate contact with the overlapping plate just prior to the actuation of the upsetting plunger 32.

Preferably, the apparatus will be operated by compressed air which may be brought from a distant source of supply through a hose or flexible pipe 44 to a coupling 45 from one side of which extends a pipe 46, the said pipe 46 being equipped with a coupling 46′ containing a four-way valve whereby its communication with branches 47 may be controlled, the said branches 47 leading to the respective ends of the cylinder 37 so that the pressure may be applied to either side of the piston head 140 therein according to the direction in which it is desired to have said piston travel. By employing a four-way valve in the coupling 46′, a single valve will suffice to admit pressure to one end of the cylinder and at the same time establish exhaust from the opposite end of the cylinder so that the movement of the piston will be positive and unretarded in either direction. Upon referring to Fig. 7, it will be noted that the piston comprises a head 140, of proper diameter to fit snugly but slidably in the cylinder, and a cylindrical piston shell 141 extending from the head through an open end of the cylinder, the shell being concentric with the cylinder and packing of any suitable character being provided to prevent leakage at the open end of the cylinder. The piston rod 38 is pivotally connected to a cross bar 142 near the open end of the shell 141. On the working stroke, the pressure fluid is admitted through the closed end or head of the cylinder and acts upon the entire area of the piston head while upon the return stroke the fluid is admitted to the annular space between the cylinder and the piston shell and acts only upon that area of the piston head which closes one end of said space. Power is thus saved on the return stroke during which no work is done, and the open-end construction of the piston and cylinder amply accommodates the lateral motion of the piston rod.

A pipe 48 extends from the coupling 45 in the opposite direction to the pipe 46, and a branch 49 leads from the pipe 48 into one end of a vertically disposed cylinder 50 which is supported in any convenient manner upon the adjacent upright 24, the flow to and from the said cylinder being controlled by a two-way valve 51 fitted in the branch 49 at any convenient point. The pipe 48 extends inwardly beyond the branch 49 and is carried downwardly and then forwardly to enter one end of a horizontally disposed cylinder 145 which is disposed below the cylinder 50 and supported in any convenient manner upon the adjacent portion of the frame, the flow to said cylinder being controlled by a valve 146. Between the branch 49 and the valve 146, a Y-coupling 147 is fitted in the pipe 48 and from this coupling, pipes 148 rise to a height sufficient to clear the plates 1 and are then carried across the plane of the said plates and down at the opposite side of the same. The pipes 148 enter the outer ends of horizontally disposed cylinders 52 which have their axes disposed at a right angle to the adjacent frame member and are supported in any convenient manner therefrom, two-way valves 53 being fitted in the pipes 148 at any convenient point so as to control the flow to and exhaust from the cylinders 52, as will be readily understood. A crosshead 56 is secured to the outer end of the piston rod 57 extending from the piston in each cylinder 52 through one end of the said cylinder, one of said crossheads being disposed vertically and the other crosshead horizontally, as best shown in Fig. 6. The frame member carrying the cylinders 52 is chambered, as indicated at 54, to receive blocks 55, and openings 58 are formed through these blocks to guide and support pins 59 projecting from the crossheads 56. The frame is constructed with slots or openings 60 alined with the openings 58 and adapted to permit the ends of the pins 59 to pass to and through the openings 34 in the plates 1, as shown clearly in Fig. 5. It will be readily noted that the blocks 55 and the series of openings 58 therethrough are alined with the anvil or die 33, one block with its series of openings being in the vertical plane of the anvil and the other block with its series of openings being in the horizontal plane of the anvil. When the machine is working on a horizontal seam, the horizontal series of pins is active and the vertical series of pins remain at rest in retracted position, and vice versa. All the pins are provided with annular shoulders 149 to limit their projecting movement and the openings 58 are correspondingly formed so that the pins will be held to rectilinear paths, will be properly guided to and through the openings 34, and will come to rest in proper position to be engaged by the locking keys to be presently described. The pins will be provided in interchangeable sets so that pins corresponding in size and spacing to the size and spacing of the rivet holes may be employed, and the blocks 55 are removable and interchange-

able so as to conform to the pins which may be in use.

The frame member carrying the jaw 30 is provided with a slot or chamber 61 extending longitudinally and opening through the rear side of the frame member, as shown in Fig. 7, and the cylinder 50 is disposed vertically over the said slot or chamber 61. A crosshead 62 is carried by the lower end of the piston rod 63 extending from the lower end of the cylinder 50, and this crosshead 62 carries a series of keys 64 corresponding in number and relative arrangement to the pins 59 so that, when the keys are lowered, they will pass through slots formed longitudinally in the pins 59 near the extremities of the same, as shown clearly in Fig. 5. When the pins 59 are driven through the openings 34 in the plates 1, they will properly center the riveting mechanism so that the anvil 33 and the plunger 32 will be accurately alined with the rivet which is to be upset or compressed and withdrawal of the pins will be prevented by the insertion of the keys 64 through the ends of the pins. The keys 64 as well as the pins 59 are, of course, to be provided in such sizes and in such spaced relation as is necessary to correspond to the diameters and spacing of the rivet holes, and I, therefore, employ blocks 66 which are fitted in the openings or chambers 60 and are removable through the outer sides of the frame members, these blocks being provided in such numbers as may be necessary and interchangeable so that the pins, the keys, and the blocks may be readily arranged as may be necessary to meet the requirements presented by the particular plates to be riveted. The blocks may be provided with any convenient form of handle, such as knobs 150, to facilitate their insertion and withdrawal.

It will be noted that the keys 64 controlled from the cylinder 50 are vertically disposed to engage the horizontal series of pins 59 and are active when the machine is working on a horizontal seam. The cylinder 145 is disposed horizontally but, otherwise, is similar to the cylinder 50, and through the piston rod 151 and crosshead 152 controls the keys 153 which are disposed horizontally in a vertical series and engage the vertical series of pins 59. All the keys are flat-sided so that they will be prevented from turning and their ends are tapered, as shown at 154, whereby they may readily enter the slots in the pins 59. The blocks 66 are constructed with passages therethrough, as shown at 165, to guide the several pins and keys.

Rollers 67 are provided between the standards 15 below the connecting plates 16 and are adapted to run upon the upper edges of the uppermost plates 1, as shown in Fig. 1 and as will be readily understood. These rollers are carried in yokes 68 and have their axles engaged in vertical slots 69 in the standards whereby they may be adjusted vertically so as to accommodate the apparatus to plates of various vertical dimensions. The axle of one roller 67 is extended through the side of the standard 15 where it is equipped with a beveled pinion 69′, said pinion meshing with a pinion 70 on the upper end of a telescopic shaft 71 which is disposed vertically and mounted in suitable bearings provided upon the adjacent standard 15. At its lower end, the shaft 71 is equipped with a beveled pinion 74 meshing with a pinion 75 carried by a stub shaft 76 mounted in the adjacent standard 15 and equipped at its outer end with a crank handle 77. The crank handle 77 permits the shaft 76 to be manually rotated and rotation of the said shaft will be transmitted to the pinion 69′ and the axle of the roller 67 so that the roller will be caused to rotate and thereby roll upon the upper edge of the uppermost plate 1 so that the machine will be moved away from the rivet which has just been completed and be brought into position to act upon a succeeding rivet. To effect vertical adjustment of the apparatus, I provide shafts 78 which are disposed vertically upon the standards 15 and mounted in suitable bearing brackets 79 projecting from said standards, the said shafts being provided at their lower ends with beveled pinions 80 which mesh with similar pinions 81 carried by horizontally disposed shafts suitably mounted upon the adjacent standards. The axles of the pinions 81 are equipped with crank handles 82 whereby rotation may be imparted thereto. The upper ends of the shafts 78 are equipped with spur pinions 83 meshing with similar pinions 84 which are held against endwise movement by suitable bearing lugs on the adjacent standards 15. These pinions 84 have internally threaded hubs which receive and are engaged by the threaded rods 86, which rods have their lower ends swiveled in the respectively adjacent yokes 68, as will be readily understood, so that, when the shafts 78 are rotated through the gears 81 and 80, the gears 83 and 84 will be likewise rotated and the rods 86 moved upwardly or downwardly, thereby raising or lowering the rollers 67, the axles of which slide in the slots 69. The distance between the rollers 67 and the frame members 23 will thus be increased or decreased as circumstances may demand and the device consequently adjusted to the vertical dimension of the plates upon which it is to act. It frequently happens that the plates vary in their vertical dimensions a fraction of an inch, which variation does not affect their suitability for use in the tank to be built, but unless compensated for, this variation will affect the

adjustment of the rivet-upsetting plunger. I, therefore, provide a spring 87 which is arranged around the rod 86 between an abutment bar 166, which is swiveled upon the rod and has its ends slidably engaged upon the standards, and an upper bar 167, which is fixed to the standards and through which the rod plays loosely. The passage of the pins 59 through the rivet holes in the plates of the tank will effect a slight downward movement of the frame members which compresses the spring 87 if the plate should happen to be a trifle higher than the dimension for which the apparatus has been adjusted. When the rivets have been upset and the apparatus has moved onto the next succeeding plates, the spring 87 will expand so as to restore the normal relation of the parts.

In using the apparatus, the scaffold or cage is brought into proper position upon the upper edge of the plates and is moved along the same as the work progresses, as will be readily understood. The working mechanism is also supported on the upper edges of the plates and inasmuch as the upper end of the frame of the working mechanism is connected with the cage or scaffold by the block and tackle mechanism 13, travel of the said working apparatus along the plates will be imparted to the supporting scaffold or cage so that they will move together, travel being effected by rotation of the crank 77 whereby the roller 67 will be caused to roll, as hereinbefore described. When the rivet-compressing or upsetting elements are in the proper working position, the pins 59 are driven through the rivet holes 34 in the plates and will enter the die block 66, the movement of the pins being limited by the crosshead 56 coming into contact with the outer side of the adjacent frame member or jaw 31. The keys 64 are then driven down through the ends of the pins and the plates to be riveted are thereby brought into intimate contact and the mechanism placed in proper position to act upon the rivet. The plungers 35 and 32 are then actuated so as to hold the plates in contact immediately adjacent the rivet to be upset and compress or upset the rivet so that the plates will be secured. The mounting of the plungers is such that the holding plunger 35 will be brought against the plates prior to the operation of the plunger 32, and the said plunger 32 will at first move rapidly without exerting much force and, as the links 39 near a position in alinement with the plunger, will move more slowly but exert great force upon the rivet so that the same will be completely upset without being fractured. The plungers are then withdrawn and the keys and pins retracted successively, after which the entire apparatus is moved along the plates away from the finished rivet a distance equal to the space between successive rivet holes and another rivet then inserted and upset. Any preferred form of power may be employed to actuate the working parts, but I prefer to employ compressed air because of its efficiency and the ease with which it may be controlled. All of the working cylinders may be provided with inlet and exhaust ports in a well-known manner, but I prefer to provide coil springs in one end of each of the cylinders 50, 52, and 145, working against the fluid pressure applied to the piston through the opposite ends of the cylinders. This arrangement is a well-known expedient and requires less piping than when the fluid pressure is admitted alternately to the opposite ends of the cylinder.

My apparatus is very compact and minimizes the number and size of the parts so that the weight is very materially less than the weight of machines now in use for the same purpose and it may, therefore, be produced at a less cost and more easily and expeditiously manipulated. By its use, the plates are held in intimate contact during the riveting operation so that there are no voids between the opposed surfaces of the plates and leakage in the finished tank will be avoided. It will, of course, be understood that the main cylinder 37 and the parts cooperating therewith may be disposed vertically but they will more generally be arranged horizontally, as shown. When working on a vertical seam, the lowermost rivet will be upset first and the machine will then be raised step by step through manipulation of the block and tackle mechanism so as to be brought into proper position to act upon the rivets in the successively higher rivet holes.

Having thus described the invention, what is claimed as new is:

1. An apparatus for the purpose set forth comprising frame members constructed to straddle and travel along the upper edges of the plates to be joined, means carried by said frame members to hold the plates in contact, means carried by said frame members for upsetting a rivet, and means mounted on said frame members for effecting travel of the same.

2. An apparatus for the purpose set forth comprising frame members constructed to straddle plates to be joined, rollers mounted in said frame members to bear upon and travel along the plates, means carried by said frame members for riveting the plates together, means on the frame members for effecting rotation of the said rollers, and means on the frame members to effect vertical adjustment of the same.

3. An apparatus for the purpose set forth comprising frame members arranged at op-

posite sides of the plates to be joined, working mechanism carried by said plates, extensible tension bars secured to and extending diagonally between the upper ends of the frame members whereby to prevent spreading of the same, rigid connecting plates secured to the upper ends of the frame members, and means mounted on the frame members for effecting travel of the same along the plates to be joined.

4. An apparatus for the purpose set forth comprising a pair of frame members each including standards and frame bars connecting the lower ends of the standards and supporting work-performing elements, connections between the upper ends of the standards at the opposite sides of the plates whereby lateral spreading of the standards will be prevented, beams connecting the upper ends of the standards at each side of the plate resisting longitudinal separation of the standards, and extensible brace bars disposed diagonally between the standards at each side of the plates and secured to the same.

5. In an apparatus for the purpose set forth, the combination of scaffolds disposed at opposite sides of plates to be joined, connections between the upper ends of the scaffolds, rollers mounted in the upper portions of the scaffolds to ride upon the upper edges of the plates to be joined, horizontally disposed rollers at the bottoms of the scaffolds adapted to bear against the opposite faces of the plates, frame members carried by said scaffolds, means for supporting said members upon the upper edges of the plates and permitting travel of the same along the plates, and work-performing elements carried by the lower ends of said frame members.

6. In an apparatus for the purpose set forth, the combination of frame members constructed to be disposed at opposite sides of the plates to be joined, means for supporting said frame members on the upper edges of the plates and permitting travel thereof along the plates, extensions at the lower end of the frame members projecting longitudinally therefrom, rollers mounted on said extensions to bear against the opposite faces of the plates to be joined, and work-performing elements carried by the lower ends of said frame members.

7. In an apparatus for the purpose set forth, the combination of supporting frames, means for mounting said frames for travel along the edges of plates to be joined, pins mounted in the lower end of one frame member to extend through the rivet holes in the plates to be joined and enter the companion frame member, locking keys mounted on said companion frame member to secure said pins, co-operating rivet-engaging jaws on said frame members, and means for actuating the pins, the keys and the rivet-engaging jaws.

8. In an apparatus for the purpose set forth, the combination of companion frame members constructed to straddle and be supported on plates to be joined, means carried by said members to effect travel along the plates, means carried by said frame members to maintain the same at rest at the point where work is to be performed, a work-performing plunger mounted in one of the frame members, an anvil carried by the opposite frame member in alinement with the plunger, and means for actuating said plunger whereby to perform work and join the plates.

9. In an apparatus for the purpose set forth, the combination of frame members, means for supporting said frame members at opposite sides of plates to be joined, means for effecting travel of the frame members along the plates, co-operating means carried by said frame members to secure the same in a set position, a holding plunger mounted in one of the members adapted to force the plates together immediately adjacent a rivet to be upset, and co-operating elements carried by the frame members adjacent said holding plunger to upset a rivet inserted through the plates.

10. In an apparatus for the purpose set forth, the combination of jaws adapted to be supported at opposite sides of plates to be joined, centering pins mounted in one of said jaws and movable transversely thereof to pass through the plates to be joined and enter the opposite jaw, locking keys mounted on the said opposite jaw and movable through the ends of the pins, a holding plunger mounted in the last-mentioned jaw adjacent the end thereof, and rivet-upsetting elements carried by said jaws adjacent said holding plunger.

11. In an apparatus for the purpose set forth, the combination of companion jaws adapted to be supported at opposite sides of plates to be joined, co-operating means carried by said jaws to lock the same in working position on the plates, an anvil on one jaw, a plunger alined with said anvil and slidably mounted in the companion jaw, an actuating member mounted for movement longitudinally of the jaw, links pivoted at their opposite ends to the jaw and to said actuating member, and a lever pivoted at one end to said actuating member and having its other end engaged in the said plunger.

12. A riveter comprising frame members constructed to straddle and be supported on the plates to be riveted, means carried by the frame members to effect travel thereof along the plates, and means carried by the frame members to upset a rivet inserted through the plates.

13. An apparatus for the purpose set forth comprising frame members constructed to straddle plates to be joined, rollers mounted in said frame members to bear upon and travel along the plates, means carried by said frame members for riveting the plates together, and means on the frame members for effecting rotation of the said rollers.

14. A riveter comprising frame members constructed to straddle plates to be riveted, centering pins mounted on one frame member and arranged in a series corresponding to the rivet holes in the plates to be riveted, means on said frame member to drive said pins through the rivet holes, keys on the coacting frame member in a series corresponding to the pins, and means on said coacting frame member to drive the keys through the pins whereby to hold the frame members to the plates and the plates in contact while a rivet is upset.

15. In an apparatus for the purpose set forth, the combination of jaws adapted to be supported at opposite sides of plates to be joined, centering pins mounted in one of said jaws and movable transversely thereof to pass through the plates to be joined and enter the opposite jaw, locking keys mounted on said opposite jaw and engageable with the pins, and rivet-upsetting elements carried by the jaws.

In testimony whereof I affix my signature.

ERNEST L. COBLE. [L. S.]