

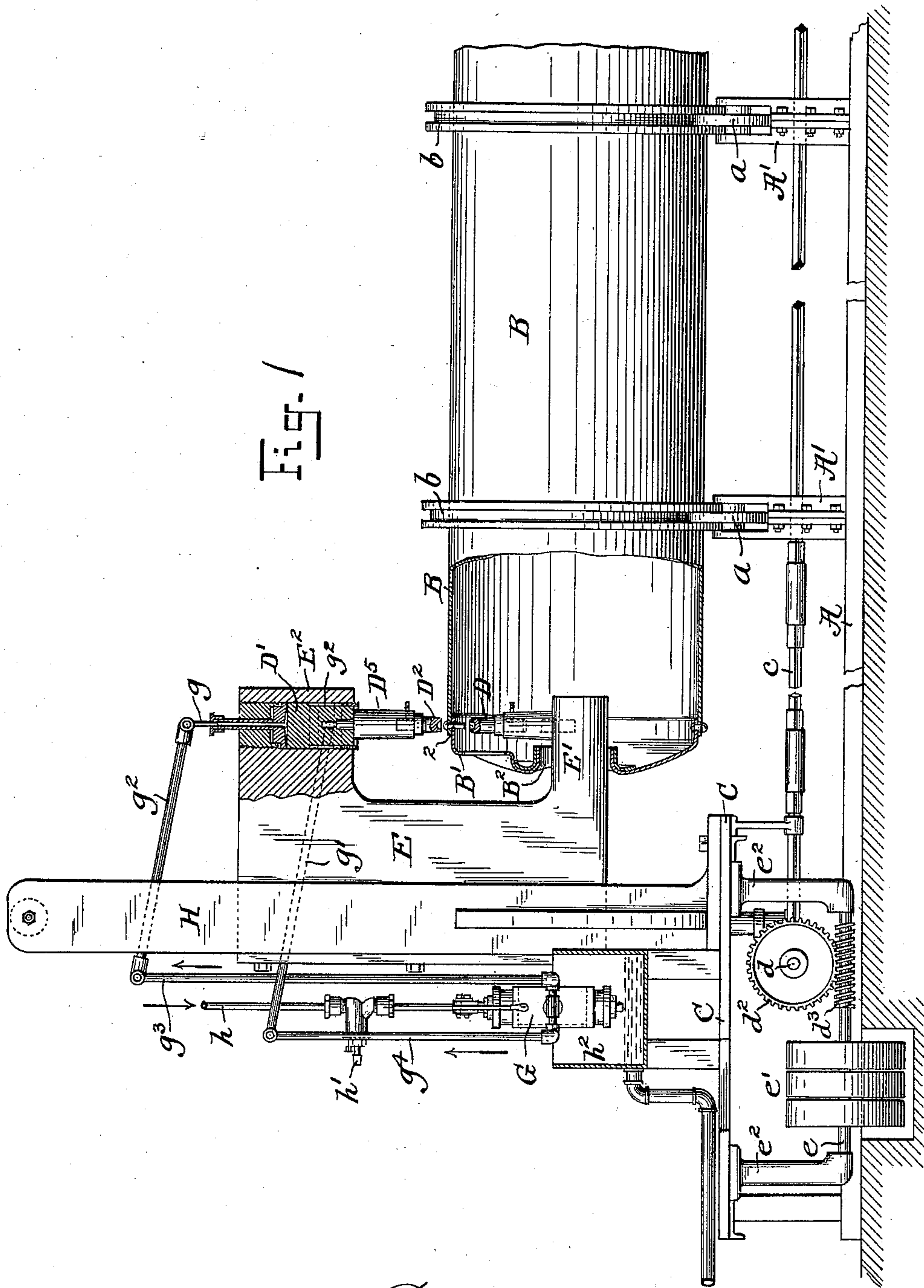
(No Model.)

4 Sheets—Sheet 1.

C. P. HIGGINS.
RIVETING MACHINE.

No. 594,472.

Patented Nov. 30, 1897.



Witnesses
Chas. Hanemann
J. H. Graham

Campbell P. Higgins, Inventor.
By his Attorneys
H. M. Dorland

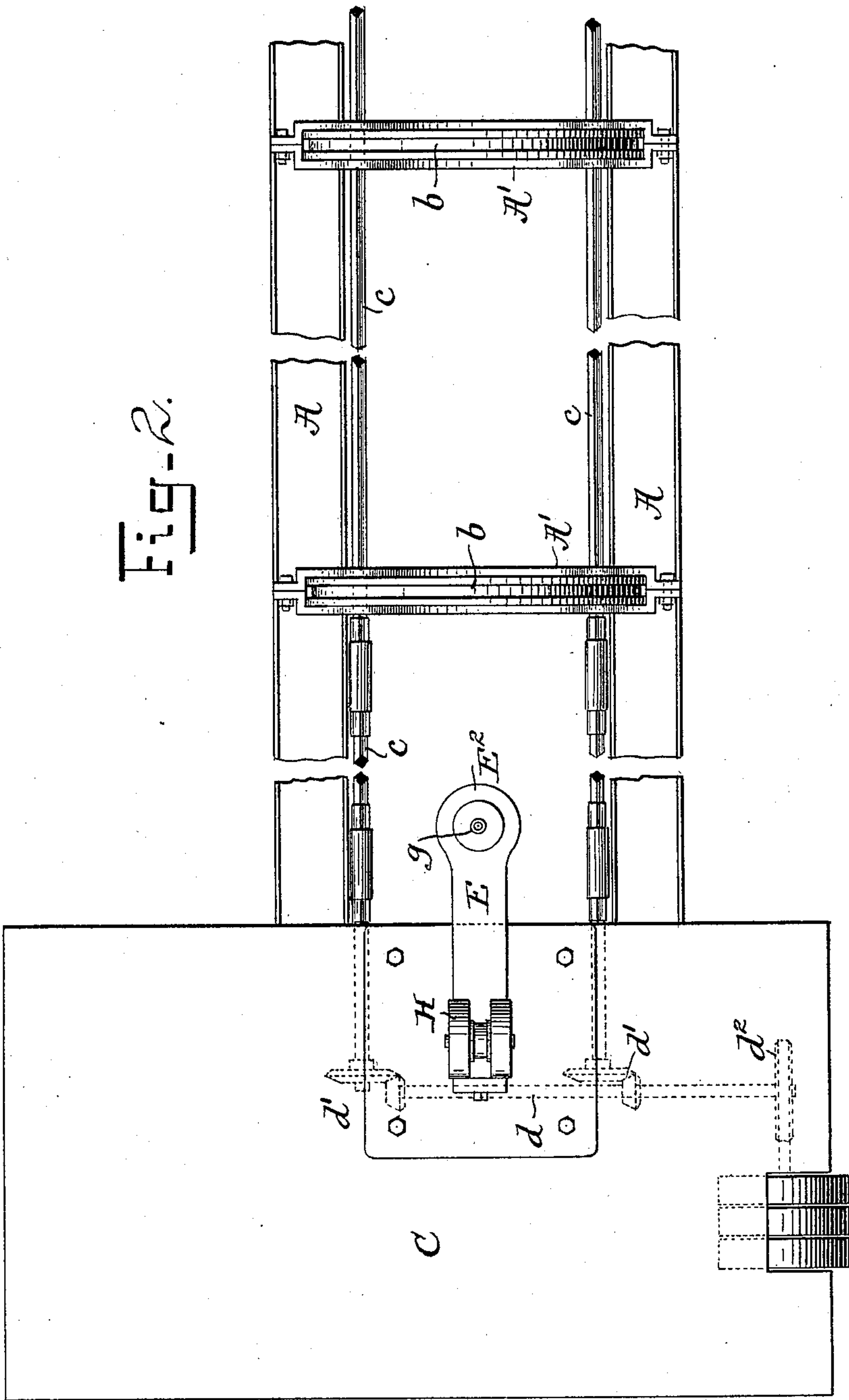
(No Model.)

4 Sheets—Sheet 2.

C. P. HIGGINS.
RIVETING MACHINE.

No. 594,472.

Patented Nov. 30, 1897.



Witnesses
Chas. Hanemann
J. M. Frazer

Campbell P. Higgins Inventor
By L. Attorney *Har M. Forbes*

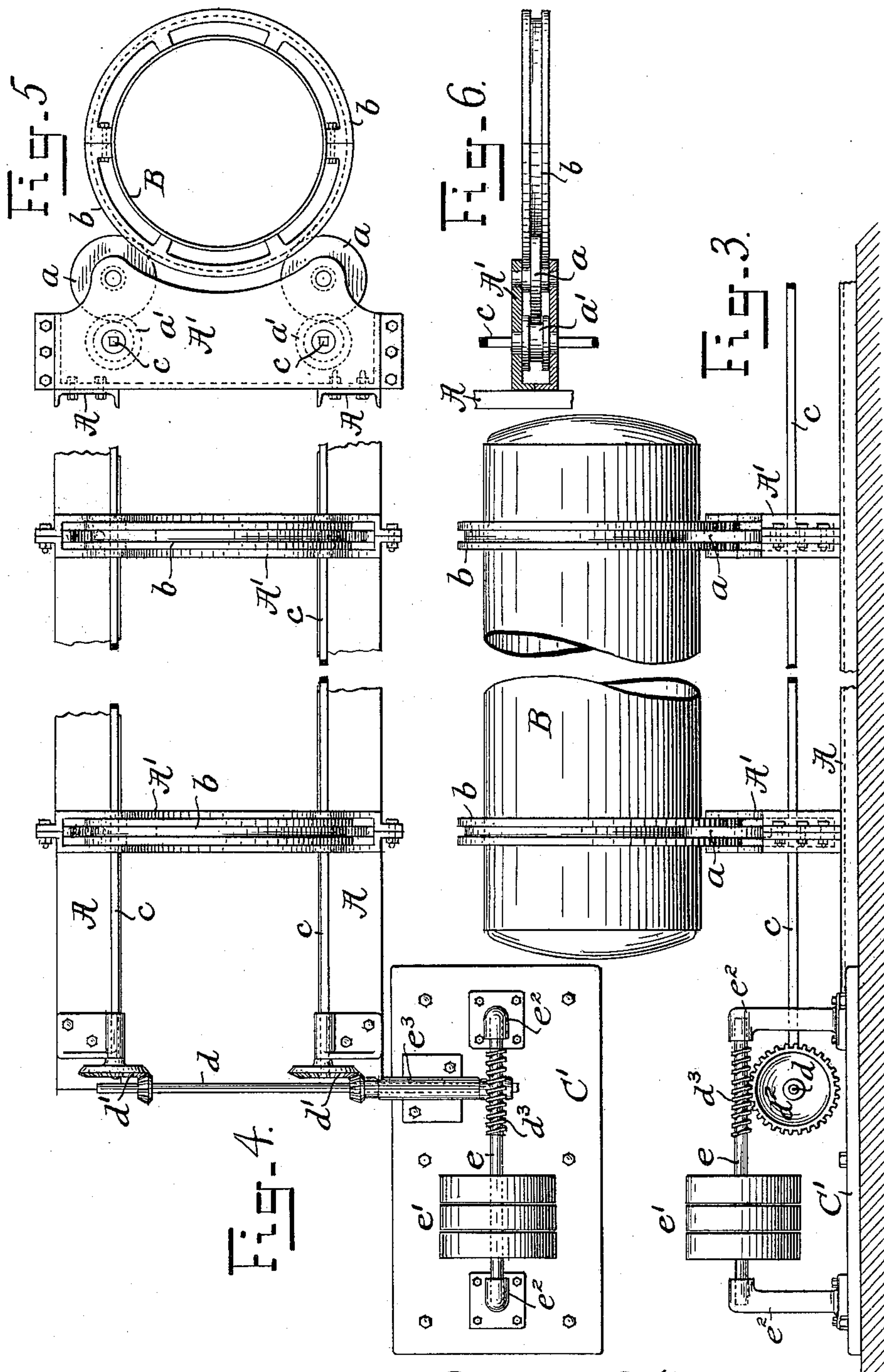
(No Model.)

4 Sheets—Sheet 3.

C. P. HIGGINS.
RIVETING MACHINE.

No. 594,472.

Patented Nov. 30, 1897.



Witnesses
Chas. Hanemann.
Eugl. Graham

Campbell P. Higgins Inventor
By L. Attorney
Ras H. Forbes

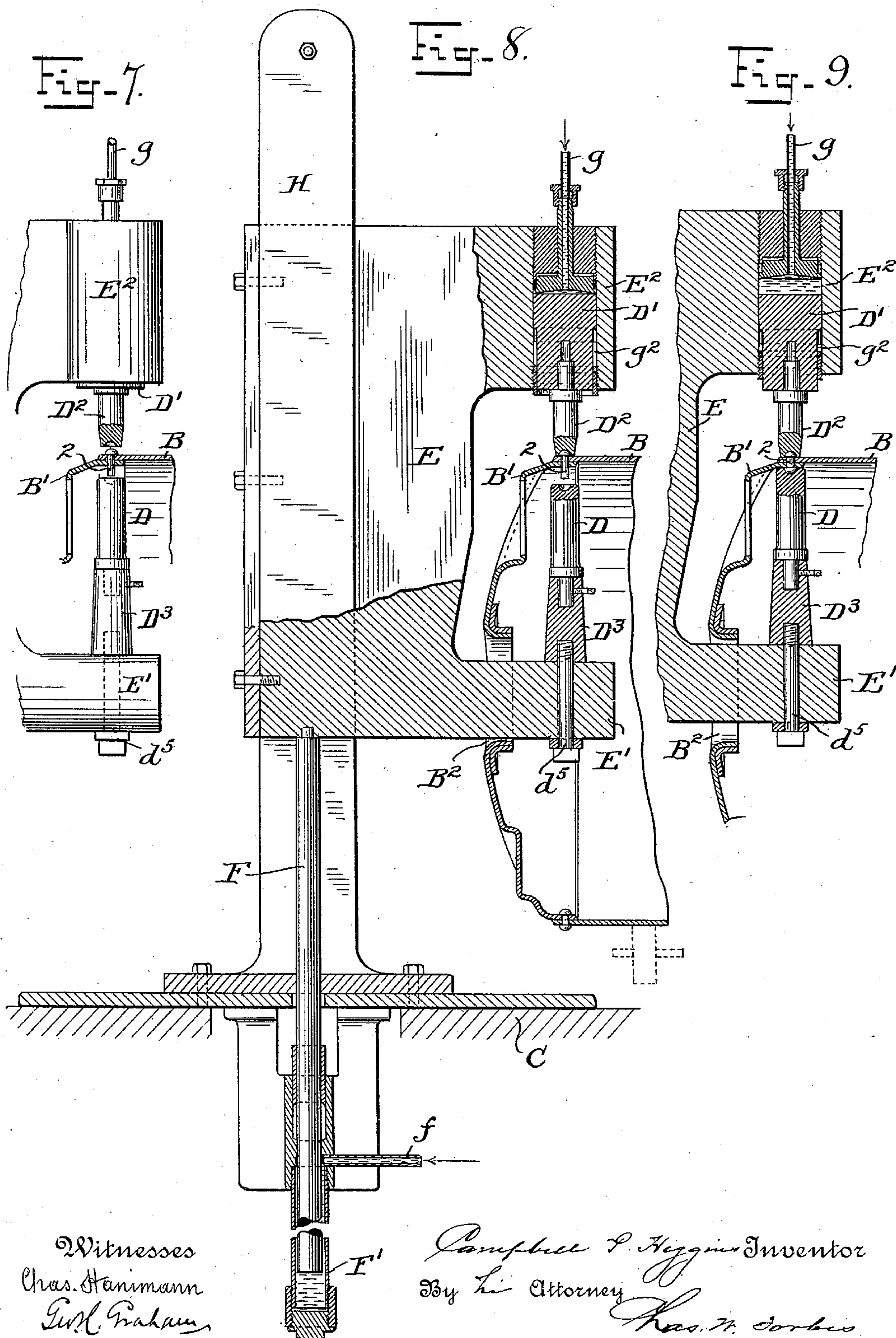
(No Model.)

4 Sheets—Sheet 4.

C. P. HIGGINS.
RIVETING MACHINE.

No. 594,472.

Patented Nov. 30, 1897.



Witnesses
Chas. Hanemann
E. H. Graham

Campbell P. Higgins Inventor
By his Attorney
Hos. H. Forbes

UNITED STATES PATENT OFFICE.

CAMPBELL P. HIGGINS, OF ROSELLE, NEW JERSEY.

RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 594,472, dated November 30, 1897.

Application filed March 13, 1897. Serial No. 627,396. (No model.)

To all whom it may concern:

Be it known that I, CAMPBELL P. HIGGINS, a citizen of the United States, residing at Roselle, in the county of Union, State of New Jersey, have invented certain new and useful Improvements in Riveting-Machines, of which the following is a specification.

The present invention is applicable to the riveting of the end or head of a drum or cylinder to a drum or other structure, and is more especially applicable thereto where the end or head to be riveted in place is provided with a manhole and where a comparatively short reach of the die is only required.

The object of the invention is to provide a hydraulic apparatus adapted for easy and quick manipulation and wherein one of the riveting-dies may be supported within the drum through the manhole of the end or head to be riveted, and, furthermore, to provide means for operating the riveting-dies in opposition one to the other; and to these ends the improvements consist in the novel structures and combinations of parts hereinafter set forth.

In the accompanying drawings, which illustrate a practical embodiment of the invention, Figure 1 is a side elevation of the improvement with a drum and its head in place, some of the parts and a portion of the drum being shown in section. Fig. 2 is a plan view thereof, the drum being omitted and its support foreshortened. Figs. 3 and 4 are respectively side and plan views of the drum-support and its rotating means, showing a slight modification of said means. Fig. 5 is an end view of Fig. 4, and Fig. 6 is an elevation of one of the drum-supporting rings and its rotating and supporting rolls with their support in section. Figs. 7, 8, and 9 are enlarged vertical sectional details of the riveting mechanism in different positions with the drum and its head in position in process of being riveted together.

Referring particularly to Figs. 1 and 2, the structure or framework embodies a pair of horizontal beams A, resting on a suitable foundation and carrying two or more transverse supports A', each forming bearings for a pair of rolls α , supporting and frictionally

engaging a grooved drum-carrying ring b , which, as seen in Fig. 5, consists of two half-portions firmly bolted together around the drum B to be operated upon, the transverse supports A', with the carrying-ring b , being arranged at such distance apart as to properly carry the drum, so that it, with the rings, may be rotated with ease. The roll-bearings α , Figs. 5 and 6, are each in turn frictionally engaged by a grooved driving-roll α' , mounted to rotate in the transverse supports and driven from any suitable source of power, as by a longitudinally-arranged polygonally-shaped rod c , extending one on each side of the transverse supports and through like-shaped perforations in the driving-rolls, each rod engaging all the driving-rolls on its side of the structure. In the present instance the rods c are rotated from a transverse counter-shaft d through bevel-gearing d' , applied to the end of each rod and to the counter-shaft, the latter carrying a worm-wheel d^2 , engaging a worm d^3 on a driving-shaft e , the latter having fast and loose pulleys e' for receiving motion from some driver, (not shown,) whereby the motion of the driving-shaft may be reversed and stopped, as desired, from which it will be understood that the drum B may be rotated step by step to bring successive rivets into place to be riveted.

The foundation also supports, contiguous to the horizontal beams A, a bed-plate C, from which rises an upright or standard H, affording a supporting-guide for the vertically-movable die-carrying head E. The bed-plate also supports from its under side the bearings e^2 for the driving-shaft e , as well as other parts of the apparatus to be described.

Instead of locating the worm-wheel d^2 and its carrying counter-shaft above the worm of the driving-shaft, as in Figs. 1 and 2, these parts may be arranged as in Figs. 3 and 4, the worm-wheel d^2 and the counter-shaft being supported below the worm d^3 and its carrying driving-shaft e , the latter and the counter-shaft being held in bearings $e^2 e^3$, respectively, rising from a bed-piece C'.

The die-carrying head E is provided with a lower horizontally-projecting arm E', carrying the lower rivet-die D and adapted to en-

ter the manhole B² of the end of a head B', that is to be riveted to the drum B, and with another projection providing a cylinder E² for the piston plunger or ram D', carrying the upper rivet-die D², the two dies being vertically in line. Both dies are of substantially the same shape, each having a cup-shaped recess in its end, the recess in the lower one for shaping the rivet-head and the upper one for receiving the formed head at one end of the rivet. Each die has a reduced shank, the lower one removably fitting a socket in a detachable support D³, fast to the arm E' by a screw-bolt d, and the upper one tightly but removably fitting a socket in the lower end of the piston D'. The lower die D and its support D³ are removed from the arm E' when it is entered through the manhole in the head B' and are afterward connected to said arm within the drum B for the riveting operation and after said operation are removed to permit the withdrawal of the arm from the manhole. When only one of the heads to be riveted to the drum has a manhole, of course the attendant is sent into the drum before the projecting arm E' is entered through the manhole in the head to adjust the lower die and its support thereon, and he remains in the drum to remove said die and its support at the finish of the riveting operations. The head B' being in place on the end of the drum B, the rivets 2 are introduced from the outside through the holes already provided in the head and drum.

35 The position of the vertically-moving head E on its support H is controlled by a plunger or ram F, extending downward from the under side of the head into a hydraulic cylinder F' of the usual construction, fluid under pressure being conveyed to said cylinder by the pipe f. The cylinder E², above the piston carrying the upper die D², is also supplied with fluid-pressure by a pipe g, which, acting upon the large upper area of the piston, depresses said piston and its die against the head of the rivet 2, and another pipe g' leads fluid-pressure to the recess g² below the piston to raise it and the die when desired.

In the operation of the apparatus as thus far described the parts occupy the position shown in Fig. 7 during the step rotation of the drum B and its head B' to bring a rivet 2 into position. Fluid-pressure is then admitted to the upper side of the piston D' to carry its die against the formed head of the rivet, as in Fig. 8. Fluid-pressure is afterward admitted to the cylinder F' to raise the head E and the lower die D, bringing the latter forcibly against the blank end of the rivet to head it. During this upper pressure of the lower die in forming the inner head on the rivet the pressure upon the larger area of the piston continues, so that the upper die D² is kept constantly exerting a downward force on the outer head of the rivet to hold the rivet in place, the upper area of the piston

being sufficiently in excess of the area of the lower end of the plunger F of the head E to effect this result.

Upon the completion of the riveting of a single rivet the fluid-pressure is allowed to escape from the cylinder F' to allow the head E to descend a short distance. Pressure is also relieved from the upper area of the piston D' and fluid-pressure is admitted by the pipe g' to the recess on the under side of the piston to raise it and lift its die from the head of the rivet, thus bringing the parts back into the position seen in Fig. 7, whereupon the drum and its head may be rotated another step to bring another rivet in place to be riveted.

The control of the fluid-pressure entering and exhausting from the upper and lower sides of the piston D' may be had by any suitable valve device, as G, (represented in outline, Fig. 1,) the construction of which valve forms no part of the present invention. It is sufficient to say that the fluid-pressure supply enters the valve-casing by the pipe h, past a stop-valve h', and the exhaust fluid from the valve-casing enters a small tank h², supported by the base-plate C, to overflow or escape therefrom by the pipe h³. To permit the free vertical movements of the head E, the connection between the pipe g and the casing of the valve device G is had by a swivel-jointed pipe g², communicating with the upper end of a pipe g³, leading from the casing of said valve device, and the pipe g' is similarly jointed, one end to the cylinder portion of the head E and the other to the upper end of a pipe g⁴, also leading from said valve device, all as represented in Fig. 1.

The length of the dies or of their supports will vary according to the diameter of the drum being riveted, and in some instances the upper die D² instead of being carried directly by the piston or plunger may be carried by an intermediate piece, as D⁵ in Fig. 1.

What is claimed is—

1. In a riveting-machine, the combination of a vertically-movable head, a relatively-fixed die carried by said head, an opposed die carried by the head and movable relatively thereto, means for moving the head and dies and other means for moving the movable die with respect to the head and other die, as set forth.

2. In a riveting-machine, the combination, of a vertically-movable head carrying diametrically-opposed riveting-dies, a hydraulic cylinder and ram for raising the head and dies, and a hydraulic cylinder and plunger supported by the head, said plunger carrying one of said dies, as set forth.

3. In a riveting-machine, the combination of a vertically-movable head, a relatively-fixed die carried by the head, an opposed die movably supported in and carried by said head, means for moving the movable die into contact with the rivet and holding it in contact,

and means for moving the head and other die in opposition to the opposed die and with less force, as set forth.

4. In a riveting-machine, the combination
5 of a vertically-movable head having two projecting arms one adapted to project through the manhole of a drumhead and to hold a riveting-die within the drum and the other arm

provided with a hydraulic cylinder and plunger and outer die, and a hydraulic cylinder 10 and ram for moving the head, as set forth.

CAMPBELL P. HIGGINS.

Witnesses:

CHAS. W. FORBES,
S. V. WALKER.