No. 881,165. PATENTED MAR. 10, 1908.

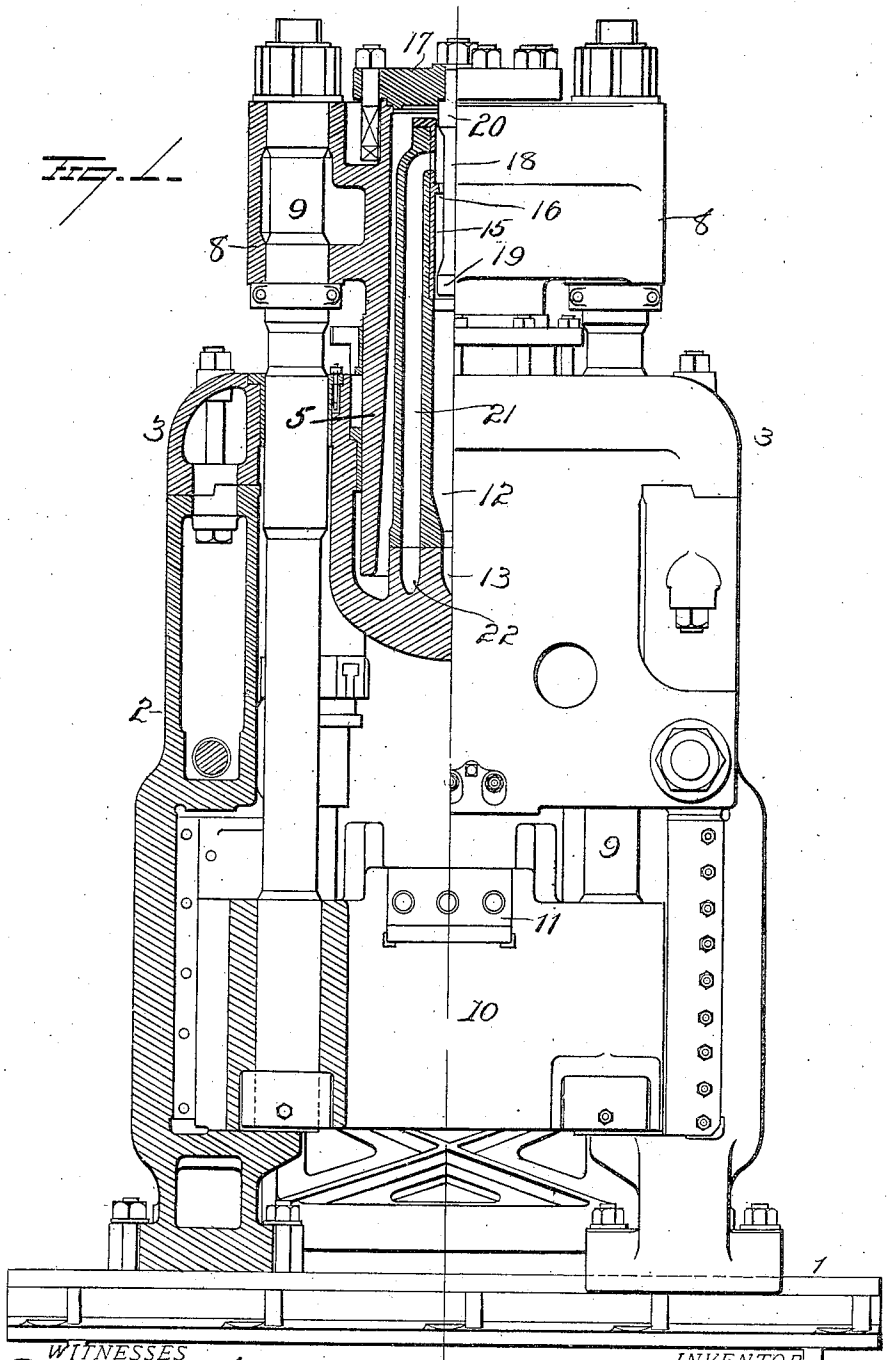
C. L. TAYLOR.

THROTTLING DEVICE FOR HYDRAULIC MACHINERY.

APPLICATION FILED JUNE 15, 1905.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

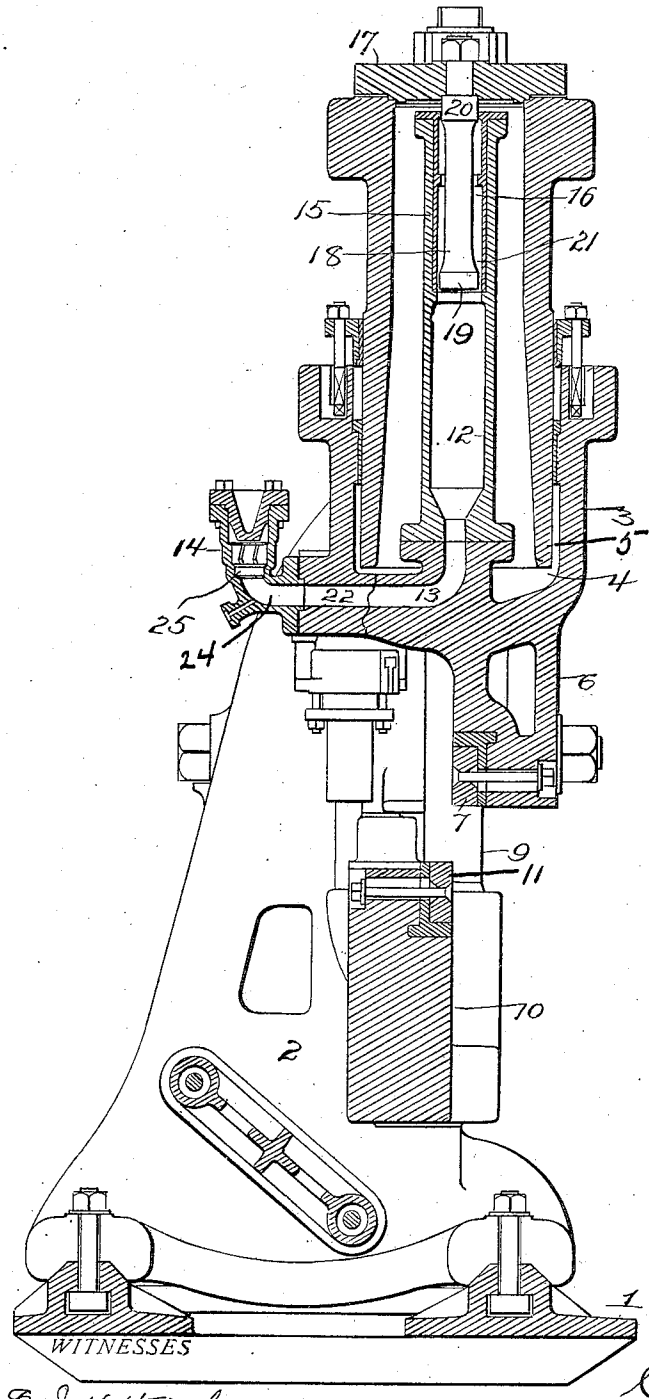

FIG. 2.

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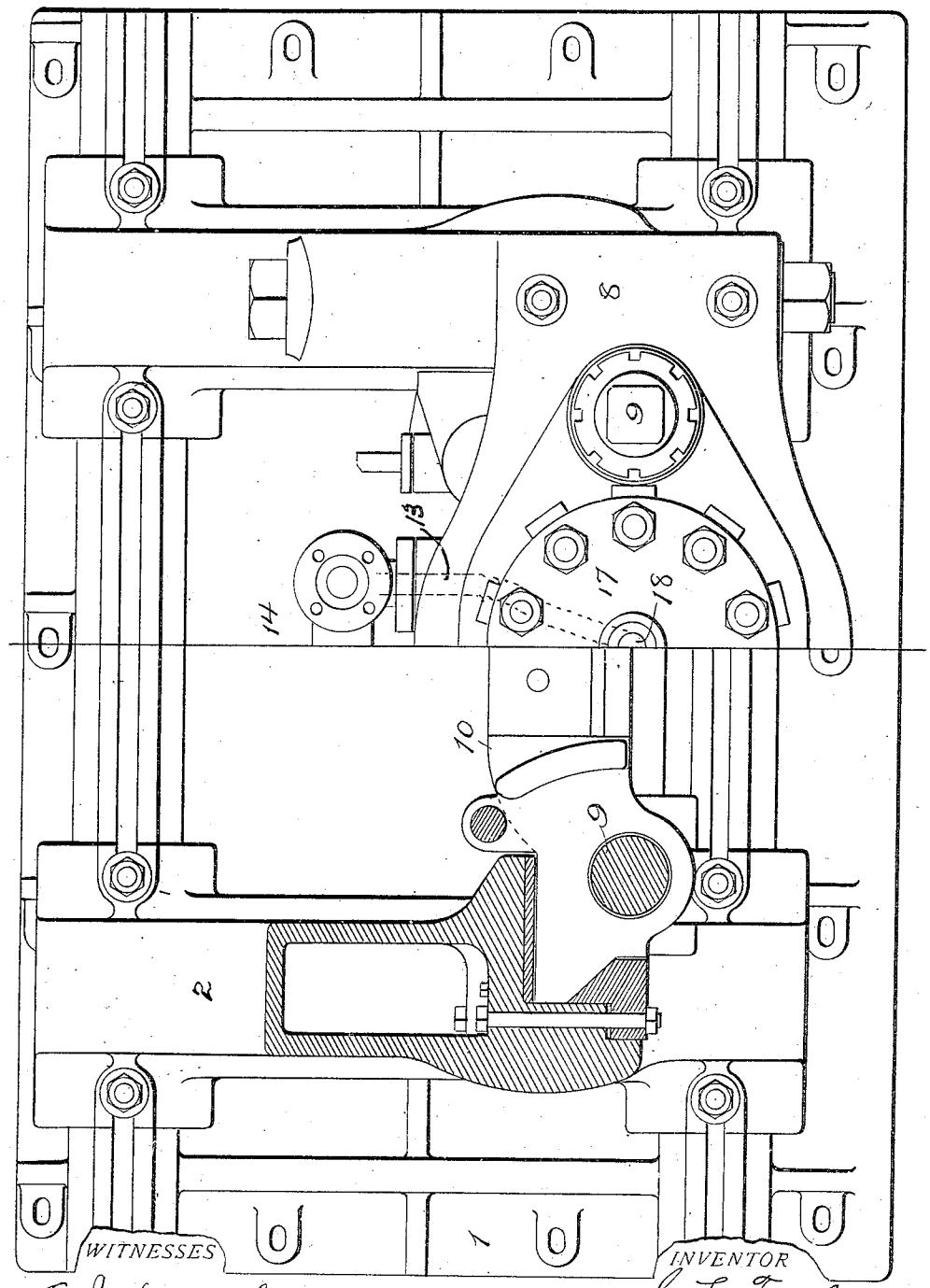
4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

FIG. 4.

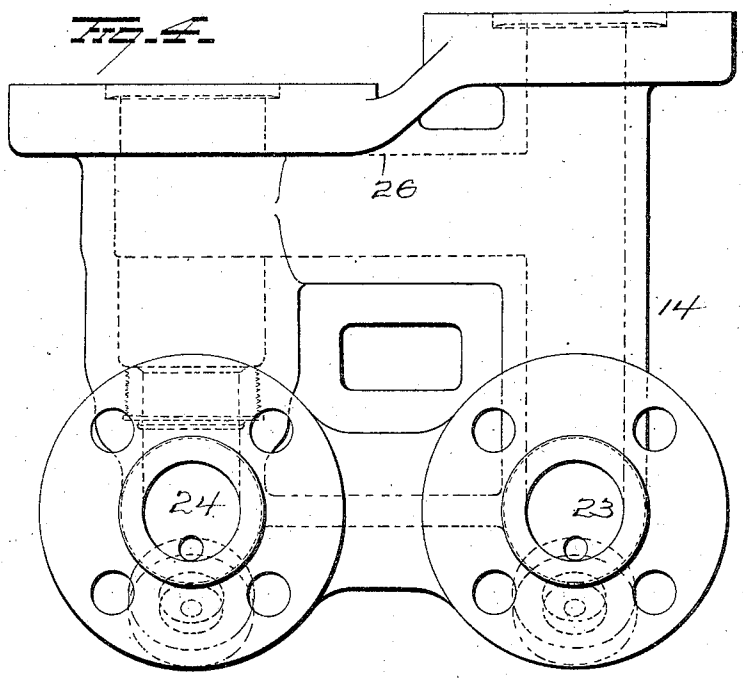
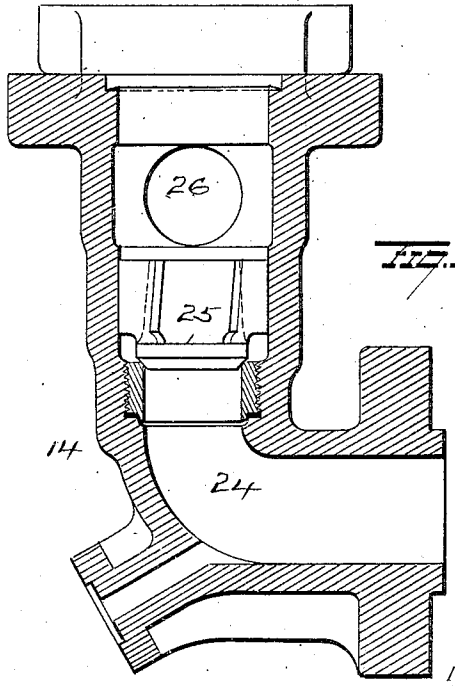


FIG. 5.



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UNITED STATES PATENT OFFICE.

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THROTTLING DEVICE FOR HYDRAULIC MACHINERY.

No. 881,165. Specification of Letters Patent. Patented March 10, 1908.

Application filed June 15, 1905. Serial No. 265,351.

To all whom it may concern:

Be it known that I, CLARENCE L. TAYLOR, of Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Throttling Devices for Hydraulic Machinery; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to an improvement in throttling device for hydraulic machinery, the object of the invention being to provide means for automatically cutting off the power or pressure when the machine reaches the end of its stroke, or when the resistance is removed, thus preventing the movable part of the machine from jumping.

With this end in view my invention consists in the parts and combination of parts as will be more fully explained and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in rear elevation partly in section of a hydraulic shear embodying my invention. Fig. 2 is a view in vertical transverse section the inner end of the exhaust port 22 being broken away so as to show a portion of the pressure port 13 and the valve in the exhaust passage. Fig. 3 is a view in plan partly in horizontal section. Fig. 4 is a rear view of the casting carrying the check valve and Fig. 5 is a section through same showing the check valve.

While my improvement is applicable to hydraulic shearing punching and similar machines I have shown it in connection with a hydraulic shear, but I desire to have it distinctly understood that I do not limit the application of the improvement to any particular class of machines.

1 represents a base plate supported on a suitable foundation, and to which are bolted the side frames 2. Secured to the tops of the side frame is the top frame 3, which latter is provided centrally with a depending cylinder 4 open at its top for the reception of the vertically movable hollow piston 5. The top frame 3 projects at its rear as shown at 6, considerably below the bottom of the cylinder, and this projecting portion is provided at its front edge with a cutting blade 7 which latter constitutes the fixed cutter of the shear. The hollow piston 5 is mounted in the open upper end of the cylinder 4 and is provided at diametrically opposite sides with projection 8, in which are secured the upper ends of the rods 9. These rods are mounted and guided in the top and side frames 3 and 2, and are secured at their lower ends to the movable shear block 10 carrying at its upper rear edge the shear blade 11. The shear blades 7 and 11 are in alinement as shown in Fig. 2, and operate in the ordinary and well known manner. In the operation of the device, fluid under pressure will be admitted to the cylinder within the hollow piston, and operate to elevate the latter and the lower shear block 10 connected thereto.

In all punching and shearing machines there is a tendency of the movable shear or punch to jump just as soon as the resistance is removed, and the object of my present invention is to provide means for automatically cutting off the supply of fluid the instant the resistance has been removed, or at the instant the cutting edge of the lower shear blade reaches and passes the plane of the upper shear blade. This throttling device comprises a cylinder 12 secured at its lower end to the base of the cylinder 4, and is in open communication with the inlet port 13 in top frame 3.

Located within the cylinder 12 and extending from its top down to a point near the center thereof, is the bushing 15 provided with an inwardly projecting peripheral shoulder or seat 16.

Secured to the piston head 17 is the plunger 18 the lower end 19 of which normally rests below the peripheral shoulder or seat 16. The lower end 19 of the plunger is of less diameter than the bushing 15 so as to permit of the free passage of water around said end, while the upper end 20 of said plunger is designed to snugly fit within the upper end of bushing and form a closure for the same when the piston is in its normal position, the body of the plunger between its ends being considerably reduced in diameter so as to permit the free passage of water up around the plunger. When the parts are in these positions above referred to, the head 19 of the plunger 15 rests a distance below the peripheral shoulder or seat 16, somewhat greater than the distance between the cutting edges of the two shear blades.

When the water under pressure is first introduced into cylinder 12, the pressure thereof against the head 19 of plunger 18, operates

to give the initial start to the piston 5, and the shear block 10. This upward movement of the piston carries the head 20 of plunger 18 out of bushing 15 thus permitting the actuating fluid to enter cylinder 4 and hollow piston 5, and exert its full power thereagainst, thus causing the shear block 10 with its shear blade 11 to rise, and sever the plate, billet or other article between the blades. After the cutting edge of shear blade 11 passes the cutting edge of blade 7, and about the time of the removal of the resistance to the free upward movement of the shear block 10, the conical section 21 of the plunger 18 reaches the plane of the peripheral shoulder or seat 16 and gradually reduces the supply of fluid to the piston 5 and this supply is completely cut off by the head 19 entering or engaging the shoulder or seat 16. From this it will be seen that upon the severance of the plate or billet, or when the resistance is removed, the supply of power to the piston is gradually cut off thus preventing the block 10 from jumping, as it would do if the supply were continued after the severance.

Formed in the side of cylinder 12 as shown in Fig. 1 is the exhaust passage 21. This passage communicates with cylinder 12 near the upper end of the latter, and at its lower end with an exhaust port 22 formed in the top frame 3, or base of cylinder 4, consequently cylinder 12 remains normally full of water.

Secured to the front face of the top frame 3 is the casting 14 provided with a passage way 23 communicating with the pressure port 13, and with a passageway 24 communicating with the exhaust port 22. Passageway 24 in casting 14, communicates with passageway 23, through port or passage 26, a downwardly closing valve 25, being located in passage-way 24 below port 26, so that when the ports 23 and 26 are filled with water under pressure the valve 25 will be held on its seat. A three or four way valve is connected up to port 23 of casting 14 for regulating the supply and exhaust.

It will be apparent that when the hydraulic valve is turned to admit water under pressure, the water thus admitted will pass into passage 23 in casting 14, and from thence to port 13 into cylinder 12 and elevate the hollow piston 5 and plunger 19, the pressure of water on the top of check valve 25 and in passage way 26, holding the valve in its closed position. The water thus entering cylinder 12 will pass out at the top of the latter and elevate the piston and shear block. The water under pressure will also pass into and fill exhaust passage 21 in cylinder 12, passage 22 in top frame 3, and port 24 in casting 14, valve 25, however, being prevented from rising at this time by pressure above. By now turning the valve so as to shut off the pressure and open the exhaust, the weight of piston 5, shear block 10 and connecting parts will cause these parts to descend and force the water out through the exhaust port 22, into port 24 in casting 14. The water entering port 24 under valve 25, lifts the latter and passes into port 26 and thence through port 23 to a three or four way valve and from the latter to the waste pipe. As the inner cylinder 12 is also filled with water, it follows that as soon as the exhaust shall have been opened, the water under plunger 18 will flow out through port 13, to port or passage way 23 and from thence out through the valve thus giving a free and rapid exhaust both from under the hollow piston 5 and also from under plunger 18.

It is evident that many slight changes might be resorted to in the relative arrangement of parts herein shown and described without departing from the spirit and scope of my invention hence I would have it understood that I do not wish to confine myself to the exact construction herein shown and described, but,

Having fully described my invention what I claim as new and desire to secure by Letters-Patent, is:—

1. The combination with a fixed main cylinder, a smaller cylinder secured to the closed end of the fixed main cylinder and a liquid supply for the main cylinder leading to the smaller cylinder, of a hollow piston for the main cylinder, and a plunger carried by said piston and moving within the smaller cylinder, the said plunger and cylinder being shaped to permit the liquid to freely pass, and enter the main fixed cylinder except when the piston has approximately reached the ends of its stroke.

2. The combination with a main fixed cylinder, a smaller cylinder secured to the closed end of the fixed main cylinder, and provided with an annular peripheral shoulder or seat, and a liquid supply for the main cylinder leading to the smaller cylinder, of a hollow piston for the main cylinder, and a plunger carried by said piston and provided with a head of less diameter than the smaller cylinder, the said head adapted to coöperate with the shoulder or seat in the smaller cylinder for shutting off the supply of fluid to the larger cylinder.

3. The combination with a main fixed cylinder, a smaller cylinder secured to the closed end of the fixed main cylinder and provided with an annular peripheral shoulder or seat, and a supply port for the main fixed cylinder discharging into the inner cylinder, of a hollow piston for the main cylinder, and a plunger carried by the piston and provided with an enlarged end or head adapted to coöperate with the shoulder or seat within the smaller cylinder for cutting off the supply of fluid to the main cylinder.

4. The combination with a fixed main

cylinder, a smaller cylinder within the main cylinder and provided with an internal peripheral shoulder or seat, and an inlet port for the main cylinder discharging into the inner cylinder, of a hollow piston for the main cylinder, and a plunger fixed to said piston and moving within the smaller cylinder, the said plunger having enlarged heads at its ends, one head adapted to normally close the free end of the smaller cylinder, and the other head adapted to coöperate with the peripheral seat or shoulder in the smaller cylinder for cutting off the supply of fluid to the main fixed cylinder as the piston nears the end of its up stroke.

5. The combination with a fixed main cylinder, a smaller cylinder secured to the closed end of the main cylinder and in open communication at its free end with the latter, a fluid supply port discharging into said smaller cylinder, an exhaust port, a port connecting the supply and exhaust ports and a valve in the exhaust port, of a hollow piston for the main cylinder, and a plunger carried by said piston and moving within the smaller cylinder.

6. The combination with a fixed main cylinder having an exhaust port, and an inlet or pressure port, a check valve in the exhaust port and a port connecting the exhaust and inlet ports above the check valve, of a hollow piston for the main cylinder, a smaller cylinder secured to the main cylinder and in communication with the inlet port and a plunger carried by the piston and moving within the smaller cylinder.

7. The combination with a main cylinder, a smaller cylinder therein, the latter communicating at its free end with the main cylinder, an inlet or pressure port leading to the fixed end of the smaller cylinder, and an exhaust port the inner end of which communicates with the cylinders approximately in the plane of the free end of the smaller cylinder, of a hollow piston for the main cylinder and a plunger carried by the piston and moving within the smaller cylinder.

8. The combination with a main cylinder, a smaller cylinder therein, the latter communicating at its free end with the main cylinder, an inlet or pressure port leading to the fixed end of the smaller cylinder and an exhaust port leading from the smaller cylinder near the free end of the latter, of a hollow piston for the main cylinder, and a plunger carried by the piston and moving within the smaller cylinder.

In testimony whereof, I have signed this specification in the presence of two subscribing witnesses.

CLARENCE L. TAYLOR.

Witnesses:
N. C. FETTERS,
A. L. ROBERTS.