

(No Model.)

2 Sheets—Sheet 1.

J. P. METZGER.  
SLIDE VALVE.

No. 488,525.

Patented Dec. 20, 1892.

FIG. 1.

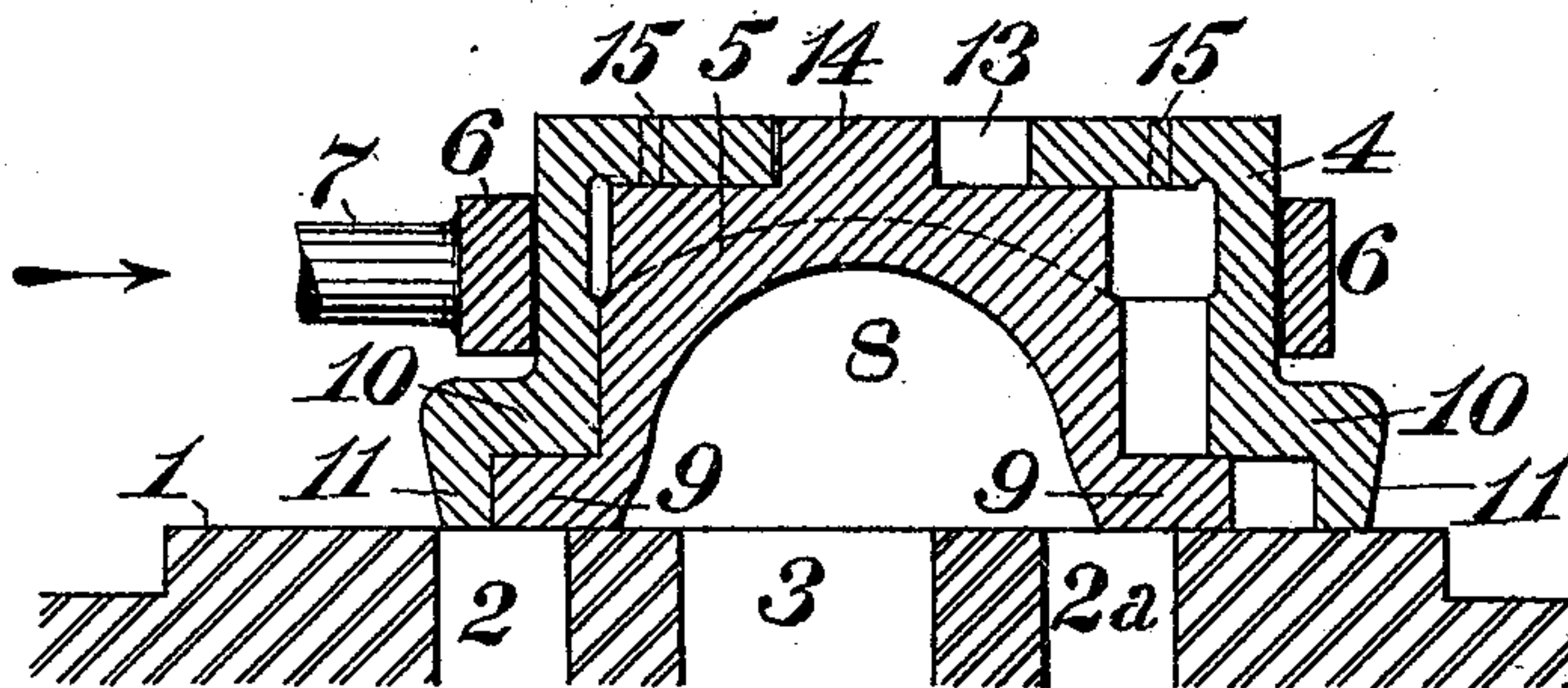
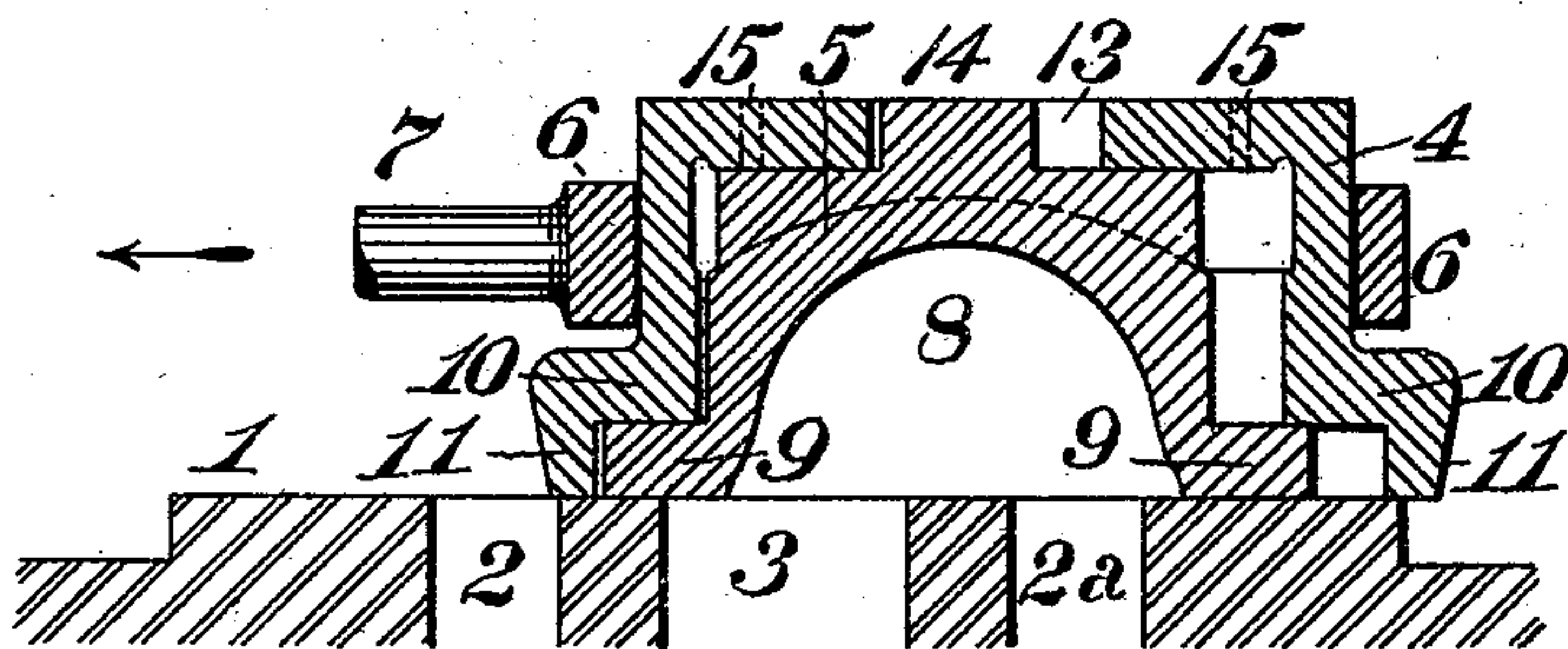


FIG. 2.



WITNESSES:

*T. J. Hogan.*  
*F. E. Gaither.*

INVENTOR

*Jules P. Metzger*  
BY  
*J. Mendenhall*  
ATTORNEY.

(No Model.)

2 Sheets—Sheet 2.

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SLIDE VALVE.

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FIG. 3.

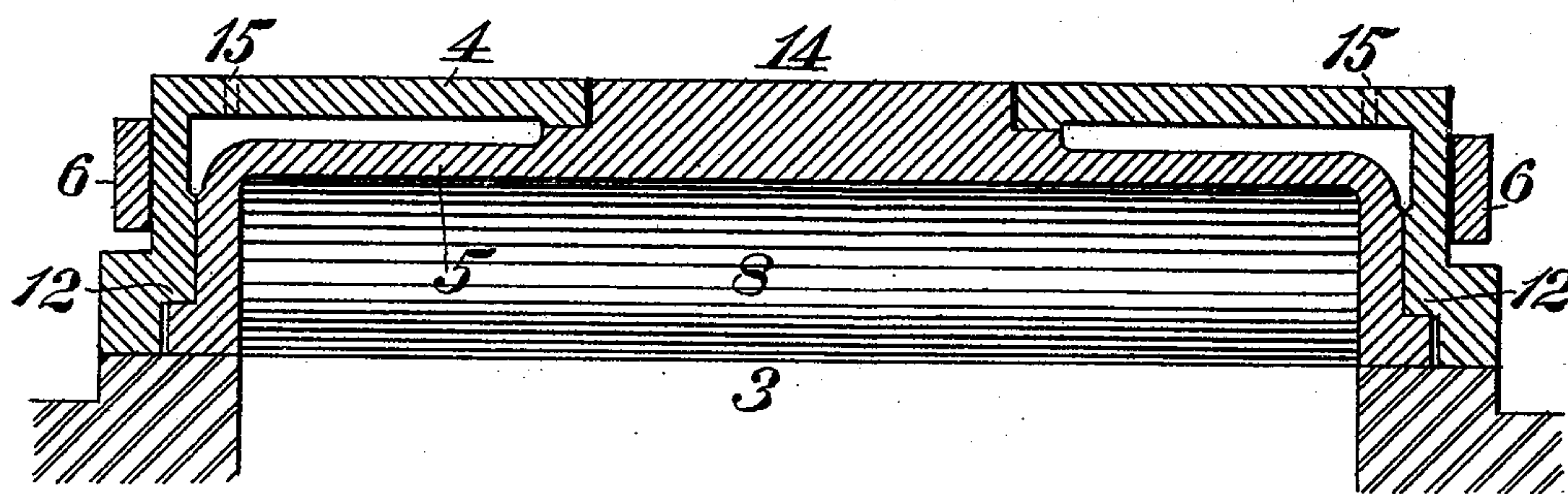
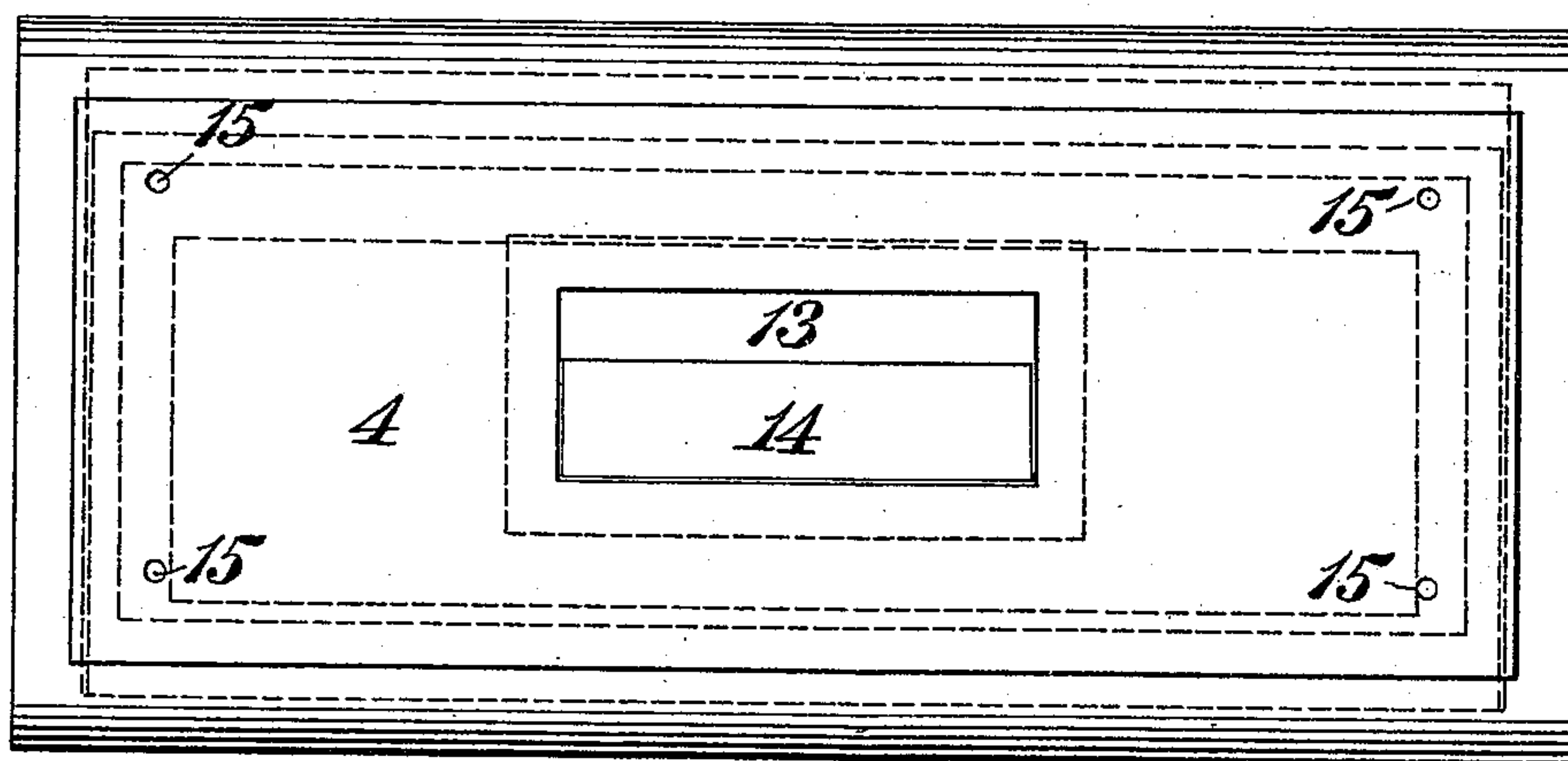


FIG. 4.



WITNESSES:

T. J. Hogan.  
P. E. Gauthier

INVENTOR

Jules P. Metzger,  
BY  
J. Snowden Bell  
ATTORNEY.



# UNITED STATES PATENT OFFICE.

JULES P. METZGER, OF PATERSON, NEW JERSEY, ASSIGNOR TO THE LESLIE BROTHERS MANUFACTURING COMPANY, OF SAME PLACE.

## SLIDE-VALVE.

SPECIFICATION forming part of Letters Patent No. 488,525, dated December 20, 1892.

Application filed September 9, 1892. Serial No. 445,476. (No model.)

*To all whom it may concern:*

Be it known that I, JULES P. METZGER, of Paterson, in the county of Passaic and State of New Jersey, have invented a certain new and useful Improvement in Slide-Valves, of which improvement the following is a specification.

My invention relates to slide distribution valves for steam and other fluid pressure engines, of the class or type in which the valve is composed of an outer and an inner section, the former controlling the induction and the latter the exhaust of motive fluid, traverse of the outer section, independently of the inner, being provided for, so that there shall be a period of rest or stoppage of the inner section, at and succeeding the beginning of the stroke of the outer section in each direction, during which period the exhaust cavity of the inner section is fully open to the cylinder exhaust port, thereby correspondingly promoting freedom of exhaust and reduction of back pressure.

The object of my invention is to provide a valve of the above type, in which the inner section shall be, in all positions, held positively to its seat, and shall be prevented from being moved by frictional contact with the outer section, during its designed periods of rest.

To this end, my invention consists in a novel construction and combination of an inner and an outer slide valve section, as hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a transverse central section through a slide valve embodying my invention, the valve being shown as moving toward the right and beginning the admission of steam to the left hand cylinder induction port; Fig. 2, a similar section, showing the valve as beginning its stroke to the left; Fig. 3, a longitudinal central section, and; Fig. 4, a plan or top view.

My improved slide valve is adapted to be reciprocated, by connection to any suitable actuating gear, upon a cylinder valve face 1, in which are formed the usual induction and eduction ports 2, 2<sup>a</sup>, and exhaust port 3. The valve is composed of an outer section 4, and

an inner section 5, each of which is a hollow or chambered casting or forging, open on its bottom or lower side and faced off truly to make a steam tight joint with the valve face 1, and the outer section 4 is connected by a yoke 6, or in any other suitable manner, to a valve stem 7, which is coupled to a link motion or other appropriate actuating mechanism. The inner valve section 5 is provided with an exhaust recess or cavity 8 of the usual form, at each end of which a bar or bridge 9 extends from one side of the section to the other, said bars forming, with the sides of the section, its bearing surfaces on the valve face. The outer section 4 is made of greater length than the inner section, so as to admit of a range of motion independent of the latter, at the beginning of the stroke of the valve in each direction, during which motion the inner section 5 remains stationary, with its exhaust recess 8 fully open to the exhaust port 3. Bearing faces 10, formed on the ends of the outer section 4, fit truly on the tops of the bridges 9, and said bearing faces are provided, at their outer ends, with bridges 11, fitting by their lower faces on the valve face 1, and forming, with the sides of the section 4, its bearing surfaces on the valve face. Shoulders 12 are also preferably formed on the side walls of the outer section, said shoulders overlapping and bearing against projections on the side walls of the inner section, as shown in Fig. 3. An opening 13 is formed in the top of the outer section 4, through which opening the top of the inner section 5, above its exhaust cavity, is exposed to the pressure of the motive fluid in the valve chest, and the inner face of the top of the outer section is fitted to bear truly on the top of the inner section. A projection 14, extending upwardly into the opening 13, may, if desired, be formed on the inner section, to serve as an abutment for a spring to cushion the sections. When such a spring is employed, it can be much more readily inserted in the opening 13, and will be more conveniently accessible, than if located in the inside of the section 4 and between it and the section 5. Small ports or openings 15, formed in the top of the outer section 4, adjacent to its ends, serve to admit motive fluid to the spaces



between the inner and outer sections, to serve as a cushion, in the contact of the outer section with the inner, after each reversal of movement of the former, such motive fluid being prevented from passing into the exhaust cavity by the closed top wall of the inner section, and the close fitting of its bearing faces on the valve face 1. The valve is shown in Fig. 1 as moving to the right, the inner surface of the left hand wall of the outer section 4 abutting against the adjacent face of the inner section 5, which is thereby moved to the right coincidently with the outer section. Motive fluid begins and continues to enter the left hand cylinder port 2, and the exhaust is effected through the right hand port 2<sup>a</sup>, the exhaust recess 8 of the inner valve section, and the exhaust port 3. In Fig 2, the valve is shown as having reached the terminal of its stroke to the right, in which position the right hand cylinder port 2<sup>a</sup> is fully open to the exhaust. The inner section 5 remains in the position shown, after the outer section 4 has commenced its stroke to the left until the outer section has moved through that portion of its traverse which is equal to the distance between the inner face of the right hand end of the outer section and the adjacent face of the inner section, during which period the port 2<sup>a</sup> remains fully open to the exhaust, and upon the contact of the outer section with the right hand end of the inner section, the latter is carried by and with the outer section throughout the residue of its stroke to the left, the port 2<sup>a</sup> not being closed to the exhaust until after motive fluid has been cut off from the port 2.

In valves of the class to which my invention relates, difficulty has been experienced in preventing the inner section from being lifted from its seat on the valve face, and from being moved thereon by frictional contact with the outer section during the initial portion of the travel of the latter above specified in which it is not in end contact therewith. This objection is effectually obviated by my improvement, in which, as above described, the outer section is provided with a partially open top, and bears, except throughout the area of said opening, upon the inner section. The inner section is thereby exposed, through the opening of the outer section to the direct pressure of the motive fluid in the valve chest, which pressure acting against the comparatively low pressure in the exhaust recess, on the opposite side of the inner section, holds said section independently and positively to its seat during its desired periods of rest, that is to say, except when the outer section abuts endwise against it and effects its coincident traverse.

I am aware that a two section valve in which the inner section is provided with an upper abutment against the outer, and is exposed throughout a portion of the area of its back

to motive fluid pressure, was known in the art prior to my invention, such a construction being set forth in Letters Patent No. 428,847, to E. Leslie, dated May 27, 1890, and therefore not being broadly claimed as of my invention.

My improvement differs, however, from that of said patent in the following substantial features. In said patent, the inner section is open, throughout a substantial portion of its area, to the outer section, and its bearing upon the latter is formed by narrow flanges, and further, the continuity of surface of its exhaust recess is interrupted by its large central opening to the outer section. This construction is subject to the objection that a large area of the central portion of the inner section is not exposed to pressure acting to hold it to its seat, and that after the bearing flanges of the inner section have become slightly worn, motive fluid admitted to the space between the sections escapes therefrom into the exhaust recess, and also that the irregular form of the exhaust recess due to the central opening in the top of the inner section impairs easy exhaust. In my improvement, the motive fluid which enters the space between the sections, through the perforations 15, for cushioning purposes, is not subject to tendency to escape into the exhaust recess through wear or imperfect fitting of the sections, the pressure acts centrally upon the inner section to hold it to its seat, and the exhaust recess presents a continuously smooth and unbroken surface, and correspondingly promotes a free and clear exhaust.

I claim as my invention and desire to secure by Letters Patent:

1. In a slide valve composed of an outer and an inner valve section, fitted with the capacity of independent movement of the outer section at the beginning of the stroke, the combination of an outer section having an opening through which the inner section is exposed centrally to motive fluid pressure in operation, and an inner section having a completely closed top wall, and bearing at its top against the inner face of the outer section, substantially as set forth.

2. In a slide valve composed of an outer and an inner valve section, fitted with the capacity of independent movement of the outer section at the beginning of the stroke, the combination of an outer section having an opening through which the inner section is exposed centrally to motive fluid pressure in operation, and an inner section having a completely closed top wall, and a continuous upper bearing against the inner face of the outer section, on each side of the top opening therein, substantially as set forth.

3. In a slide valve composed of an outer and an inner valve section, fitted with the capacity of independent movement of the outer section at the beginning of the stroke, the



combination of an outer section having inner bearing faces at each of its ends fitting truly over bridges on the ends of the inner section, an inner section having a completely closed top wall and bearing at its top against the inner face of the outer section and fluid supply ports formed in the outer section and leading into the end spaces between the sections, substantially as set forth.

JULES P. METZGER.

Witnesses:

JOHN BERWICK,

JOHN WILSON.