No. 816,291. PATENTED MAR. 27, 1906.

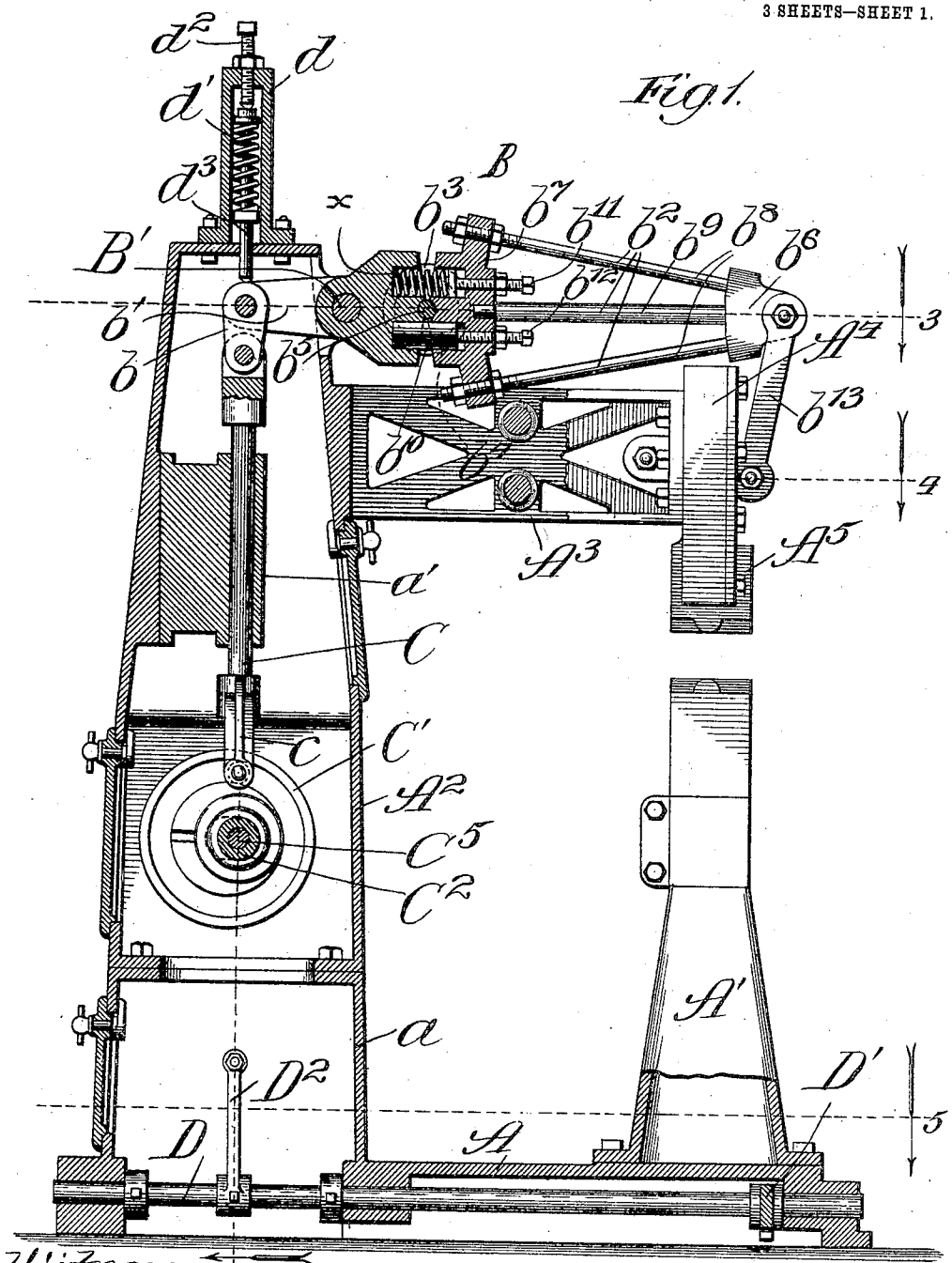
C. W. BLACKSTONE.

POWER HAMMER.

APPLICATION FILED AUG. 8, 1904.

3 SHEETS—SHEET 1.

Fig. 1.



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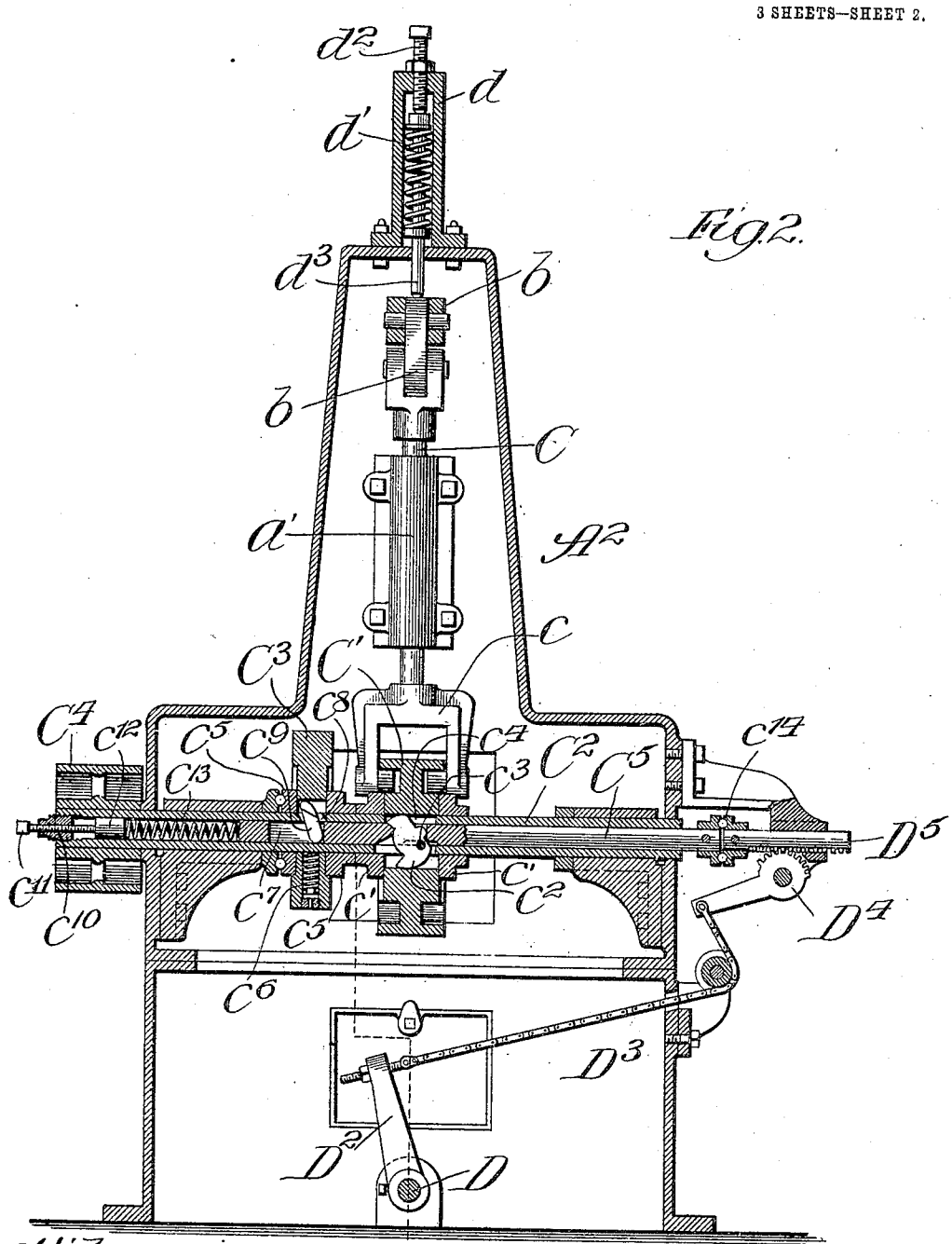
3 SHEETS—SHEET 2.

Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 3.

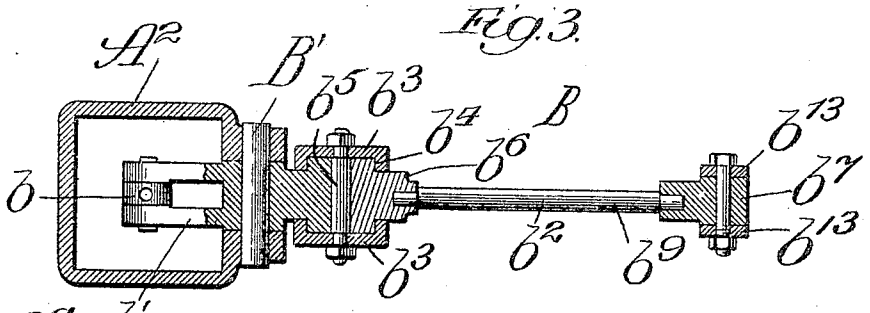


Fig. 3a.

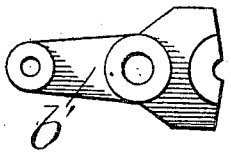


Fig. 4.

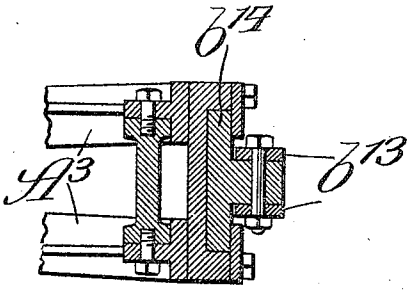
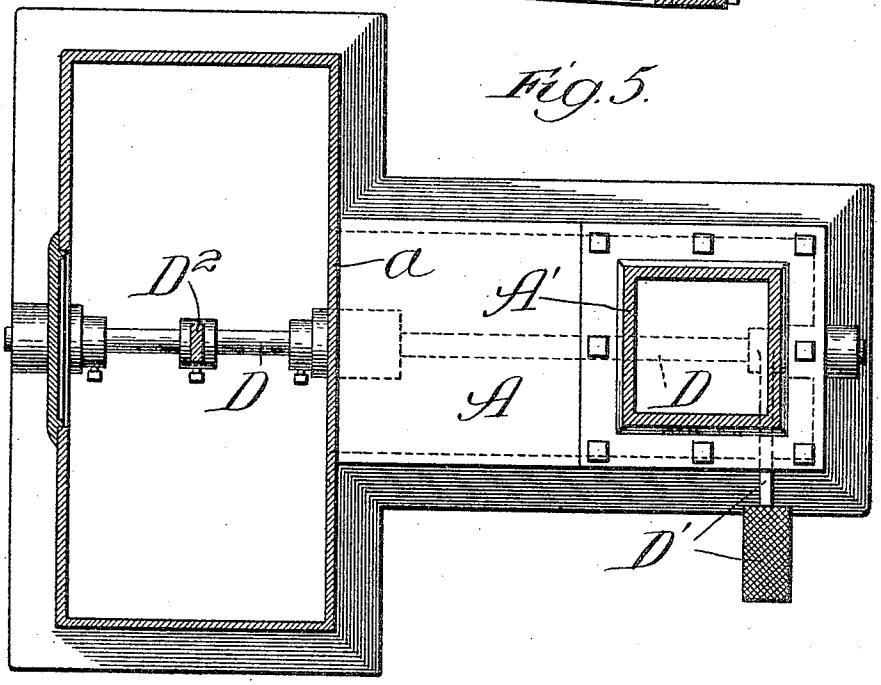


Fig. 5.



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UNITED STATES PATENT OFFICE.

CLARENCE W. BLACKSTONE, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO FRED H. KNAPP, OF CHICAGO, ILLINOIS.

POWER-HAMMER.

No. 816,291. Specification of Letters Patent. Patented March 27, 1906.

Application filed August 8, 1904. Serial No. 219,915.

To all whom it may concern:

Be it known that I, CLARENCE W. BLACKSTONE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Power-Hammers, of which the following is a specification.

My present invention is in the nature of an improvement upon the riveting-machine described and claimed in my Patent No. 751,778, granted February 9, 1904.

My primary object is to provide a machine involving certain of the features described in said patent and particularly adapted to perform a heavier class of work than was the machine disclosed in said patent.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 represents a broken vertical sectional view of my improved machine, the section being taken parallel to one side of the machine, as indicated at line 1 of Fig. 2; Fig. 2, a vertical section taken as indicated at line 2 of Fig. 1; Fig. 3, a horizontal section taken as indicated at line 3 of Fig. 1 and showing the details of construction of the hammer-actuating lever or helve; Fig. 3^a, a side elevational view of the rear section of said lever or helve; Fig. 4, a horizontal section showing the hammer-actuating cross-head and the guide; and Fig. 5, a horizontal section at the base of the machine, the section being taken as indicated at line 5 of Fig. 1.

The preferred construction is as follows:

A represents the base of the frame, from the front end of which rises a standard or anvil-support A′ and from the rear end of which rises a relatively large hollow standard A^2 of rectangular cross-section; A^3, a forwardly-projecting bracket or frame member connected with the standard A^2 near the upper end thereof and equipped at its front extremity with a vertical guide A^4, in which works the cross-head supporting the hammer A^5; B, a hammer-actuating lever or helve supported on a transverse pivot B′; C, a vertically-reciprocating rod linked to the end of the lever B and actuated by a normally concentric eccentric C′, adjustably mounted upon a transversely-extending hollow shaft C^2; C^3, a normally concentric disk-like counterweight-wheel adjustably connected with the shaft C^2; C^4, a pulley whereat power is applied to the shaft C^2; C^5, a longitudinally-shiftable shaft serving to actuate cams for shifting the wheels C′ C^3, and D a longitudinally-extending rock-shaft passing centrally through the base of the machine and equipped at its front end with a foot-pedal D′ and at its rear end with an arm D^2, connected by a chain D^3 with the actuating-arm of a gear-segment D^4, working in a rack D^5, with which the front end of the shaft C^5 is equipped.

The frame may be of any suitable construction, although the frame shown is peculiarly adapted to the present construction. Preferably the base is of the **T** shape shown in Fig. 5 and has formed integrally with its rear portion a raised part *a*, upon which is mounted the standard A^2. The standard A′ is connected with the front end of the stem of the **T** by bolts, as shown. The hollow member *a* is provided with a removable plate, and the hollow member A^2 is provided with front and rear plates, as shown, to permit access to the internal working parts. The rod C works in a vertical guide *a*′, supported from the inner surface of the rear wall of the standard A^2. The standard A^2 is slotted at its front upper portion to permit the rear end of the lever B to extend within the standard, where the lever is connected, by means of a link *b*, with the upper end of the rod C.

The lever B comprises, as shown in Figs. 1, 3, and 3^a, front and rear sections *b*′ b^2, respectively, and means for connecting said sections together. Said sections are connected by means of lateral circular caps b^3, having inturned flanges embracing bosses b^4, with which the sections are provided. The caps are connected by a bolt b^5, which enters grooves on the adjacent surfaces of said sections. The adjacent surfaces of the sections are chamfered or beveled to permit adjustment of the front section with relation to the rear section about the axis b^5. The section b^2 of the lever comprises, preferably, castings b^6 b^7 and connecting-rods b^8 b^9. The section *b*′ of the lever comprises a casting having an enlarged front end. Above and below the bolt b^5 are provided sockets in the members *b*′ b^7. The upper socket receives a spring *x*, and the lower socket a plug b^{10}. Through the member b^7 extend set-screws b^{11} b^{12}, the former of which serves to apply tension to the spring and the latter of which serves as a stop

engaging the forward end of the plug b^{10}. By means of the connections described it will be understood that any desired tension may be applied at the spring x and that any desired angle of the front section of the lever with relation to the rear section thereof may be obtained. The member b^7 of the front section of the lever is joined by a link b^{13} to the hammer-actuating cross-head b^{14}.

The rod or plunger C is provided at its lower end with a bifurcated head c, having inwardly-projecting studs at the free ends of its forks engaging lateral annular grooves in the eccentric C′. The eccentric is confined between collars c', with which it has grooved connection, and is shifted by means of a cam c^2, supported on a pivot c^3, extending through the hollow shaft C^2. The cam works in a slot c^4, extending transversely through the hollow shaft C^2 and the solid shaft C^5. The weight-wheel C^3 is confined between collars c^5, with which it has tongue-and-groove connection. The weight is maintained in a normally concentric position by means of a spring c^6, confined in a radial passage in the weight-wheel and having its inner end bearing against the shaft C^2 and its outer end bearing against a plug in said passage. The shafts C^2 C^5 are provided with registering slots c^7 c^8, into which is set a cam c^9, which serves to shift the weight-wheel in one direction against the action of the restraining-spring thereof. In the end of the shaft C^2, on which the pulley C^4 is secured, is inserted a plug c^{10}, through which passes a screw c^{11}, serving to adjust a block c^{12}, bearing against a spring c^{13}, which is confined between said block and the adjacent end of the solid shaft C^5. In Fig. 2 the parts are shown in the position which they occupy after the actuating-arm of the segmental pinion has been drawn downwardly to force the shaft C^5 toward the left against the action of the spring c^{13}, thereby shifting the eccentric C′ in one direction with relation to the shaft and the weight-wheel C^3 in the opposite direction with relation to the shaft. The shaft C^5 is divided, as shown at c^{14}, and ball-bearings are provided, it being understood that the rack-equipped section of said shaft does not rotate, whereas the other section of the shaft rotates with the hollow shaft C^2.

The hammer-actuating lever is provided with balancing or counterweighting means which preferably comprise a hollow frame member d, surmounting the standard A^2 and equipped with a spring d', adjustable in tension by means of a screw d^2, and a stem d^3, upon which said spring bears and which in turn bears upon the rear end of the section d' of the lever.

From the foregoing detailed description the operation of the machine will be readily understood. The relation of the section b^2 of the hammer-actuating lever to the section b' thereof may be adjusted by means of the set-screw b^{12} and the set-screw b^{11}, the latter serving to give the desired tension to the spring x. The purpose of the spring x is to permit a yielding blow to be struck; but it will be understood that the sections of the lever when once adjusted practically move as a unit. The shaft C^2 is kept in constant rotation through the medium of the pulley C^4, and when it is desired to actuate the hammer it is only necessary to press the foot-lever D′. This rocks the shaft D, thereby actuating the segmental pinion D^4 and shifting the shaft C^5 against the action of its spring, the shaft C^5 acting through the walls of the slots, in which the cams c^2 c^9 are confined, to actuate said cams and shift the eccentric C′ and the counterweight C^3, the shaft being maintained in proper balance by the counterweight. When the pressure upon the pedal is removed, the shaft C^5 is returned to its normal position through the action of the spring c^{13}, and inasmuch as the eccentric then rotates concentric with the shaft C^2 there is no movement of the connecting-rod C, and consequently no movement of the hammer. The spring d' should be so adjusted that the eccentric will not have an undue amount of work to do in raising the hammer.

It is evident that the construction provides for housing the mechanism and is characterized by symmetry, durability, and handiness. Obviously, however, many changes in details of construction within the spirit of my invention may be made. Hence no undue limitation should be understood from the foregoing detailed description.

What I regard as new, and desire to secure by Letters Patent, is—

1. The combination of a hollow rotary shaft, a longitudinally-shiftable shaft therein, a spring at one end of said hollow shaft and yieldingly holding the inner shaft in its normal position of rest, manually-actuated means engaging the free end of the inner shaft, a transversely-shiftable eccentric mounted on the hollow shaft, said last-named shaft having an opening at the eccentric, and an eccentric-shifting member at said opening engaging the eccentric and connections between the shiftable shaft and shifting member constructed to shift the eccentric in either direction, according to the movement of the shiftable shaft, for the purpose set forth.

2. The combination of a hollow rotary shaft, a shiftable eccentric thereon, an eccentric-shifting member pivoted in said shaft and having engagement with the eccentric adapted for shifting the eccentric in either direction, a counterweight shiftably mounted on said shaft, an actuating member for said weight within said shaft, and an inner shiftable shaft having openings therein into which extend the members for shifting the eccentric and counterweight, for the purpose set forth.

3. The combination with a hammer-actuating lever, of hollow rotary shaft, a transversely-shiftable eccentric mounted on an intermediate portion thereof and connected with said lever, the shaft having an opening at the eccentric, an eccentric-shifting cam pivoted in said shaft at said opening and bearing against the eccentric on opposite sides of the shaft whereby to positively move the eccentric in both directions, a shaft within said rotary shaft and which rotates therewith, said inner shaft being equipped with means for actuating said cam in both directions, means applied to and yieldingly confining said inner shaft in one direction, and means serving to shift said inner shaft in the other direction, for the purpose set forth.

4. The combination of a hollow rotary shaft provided intermediately with an opening, a shiftable eccentric mounted on said shaft at said opening, an eccentric-shifting cam within said shaft and controlling the movements of said eccentric in both directions, a longitudinally-shiftable inner shaft equipped with means for actuating said cam, said inner shaft rotating with the outer shaft, a non-rotating shaft-shifting member equipped with a rack and slidably mounted in a bearing, and a manually-actuated pinion engaging said rack, for the purpose set forth.

5. In a machine of the character set forth, the combination of a hollow standard, a hammer-actuating lever pivoted on said standard and having its rear end extending therein, an actuating-rod depending from the rear end of said lever within the standard, an eccentric connected with the lower end of said rod, a hammer connected with the front end of the lever, and an adjustable spring connected with said standard above the lever and having a bearing on the rear end of the lever, for the purpose set forth.

6. In a machine of the character described, the combination of a pivoted rear lever-section, actuating means connected with the rear end thereof, a front lever-section pivotally connected with the front end of said rear lever-section, a spring tending yieldingly to depress the front section when the front end of the rear section is depressed, a stop serving to limit the depression of said front section under the action of said spring, and a hammer connected with the front end of said lever, for the purpose set forth.

7. In a machine of the character described, the combination of a pivoted rear lever-section, actuating means therefor, a front lever-section pivotally connected with the front end of the rear section, an adjustable stop for limiting the depression of the front section with relation to the rear section, an adjustable spring serving yieldingly to hold said stop in contact with its seat, and a hammer connected with the front end of the front lever-section, for the purpose set forth.

8. In a machine of the character described, the combination of a pivoted rear lever-section, actuating means therefor, a front lever-section having its rear end pivotally connected with the front end of the rear lever-section, an adjustable spring confined between the adjacent ends of said lever-sections above the axis of the pivot joining said sections, an adjustable stop confined between the adjacent ends of said lever-sections beneath the axis of the pivotal connection thereof, and a hammer connected with the free end of the front lever-section, for the purpose set forth.

9. In a machine of the character described, the combination of a frame having a base with a longitudinally-extending rock-shaft journaled therein and equipped at its front end with a laterally-extending treadle, a transversely-extending hollow rotary shaft journaled in said frame above the rear portion of said rock-shaft, an eccentric shiftably connected with said shaft, a longitudinally-shiftable inner shaft through the medium of which said eccentric is shifted, connections between said rock-shaft and said inner shaft, a vertically-disposed plunger connected with said eccentric, a forwardly-projecting hammer-actuating lever having its rear end connected with said plunger, and a hammer connected with the front end of said hammer-actuating lever, for the purpose set forth.

CLARENCE W. BLACKSTONE.

In presence of—
WALTER N. WINBERG,
F. M. WIRTZ.