No. 748,533. PATENTED DEC. 29, 1903.

W. J. ROWE & A. L. WHITBECK.

ROTARY ENGINE.

APPLICATION FILED MAY 19, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

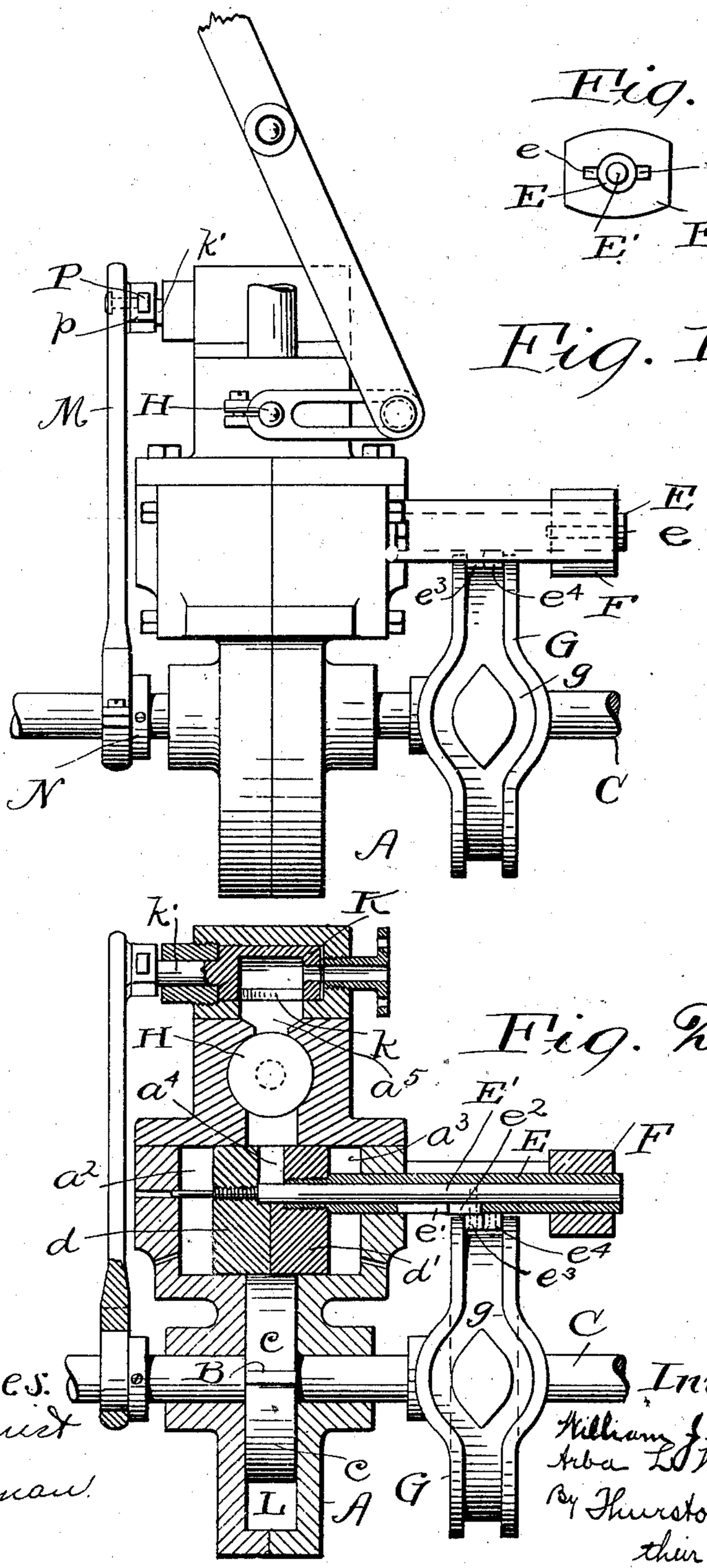

Fig. 1.

Fig. 5.

Fig. 2.

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N. L. Brennan.

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NO MODEL. 2 SHEETS—SHEET 2.

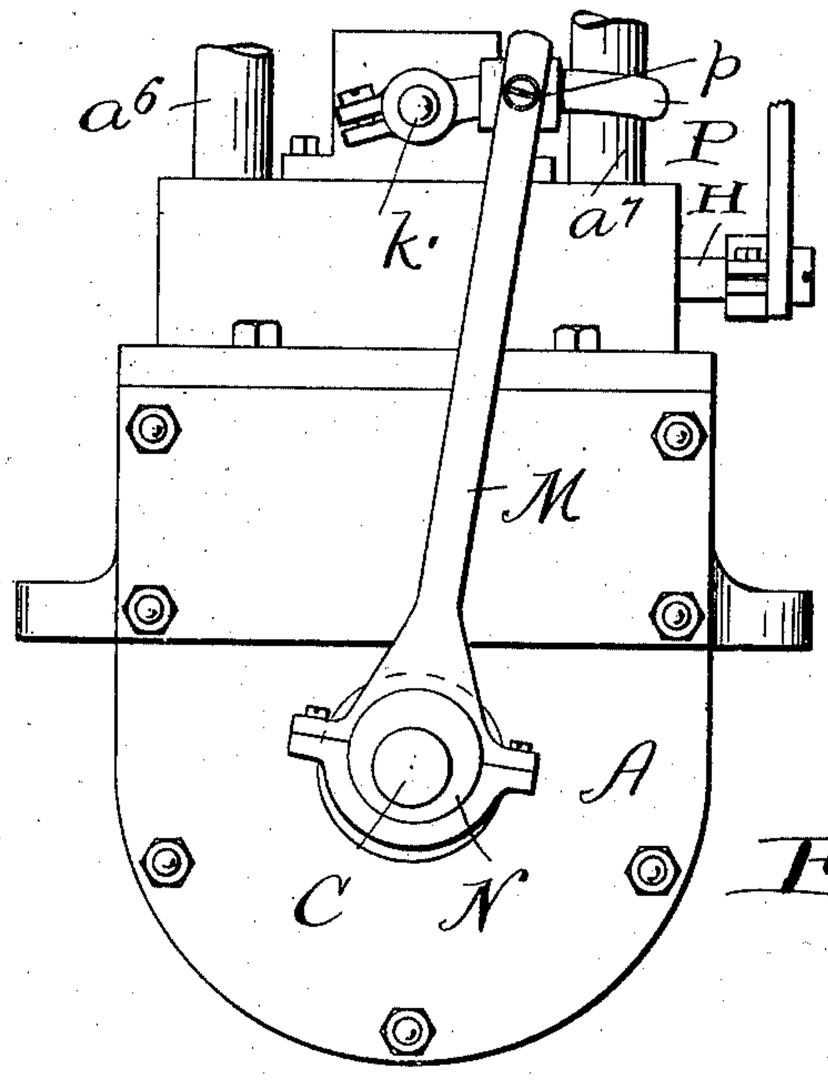

Fig. 3.

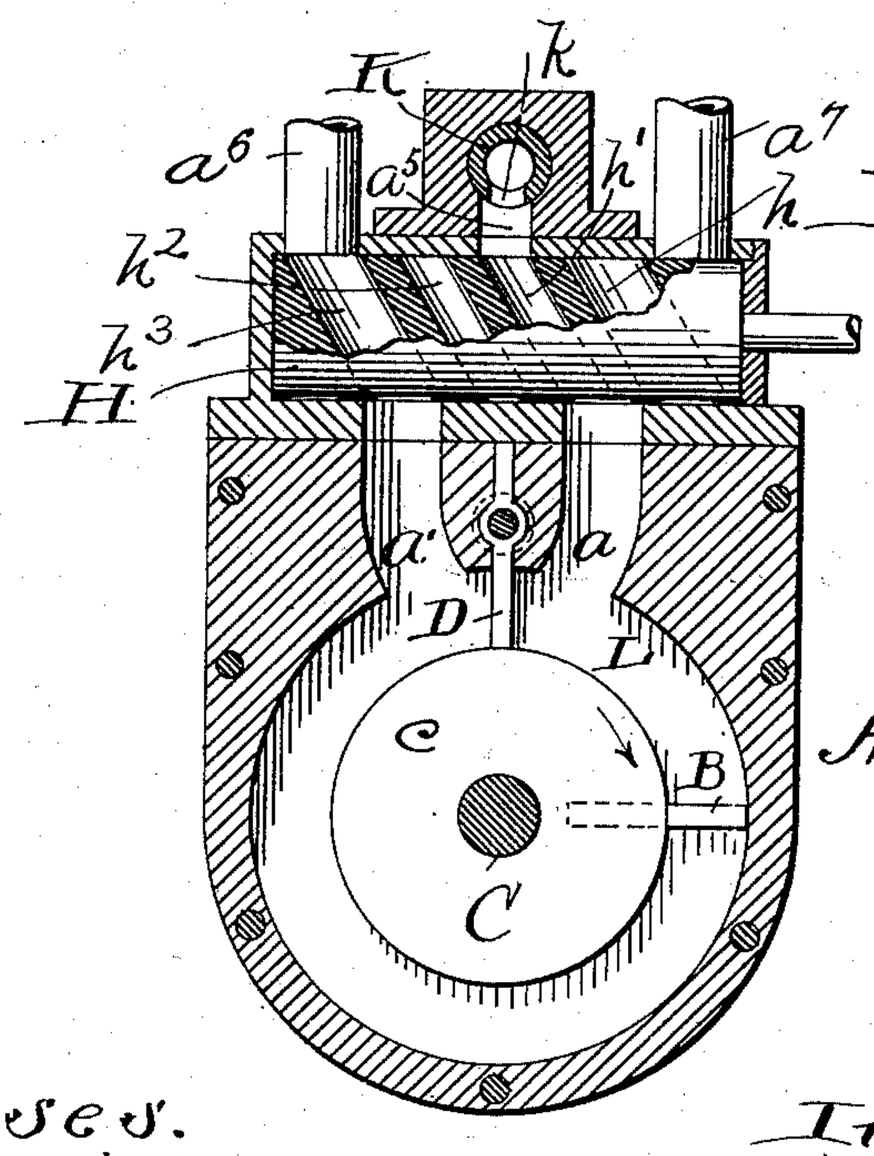

Fig. 4.

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UNITED STATES PATENT OFFICE.

WILLIAM J. ROWE AND ARBA L. WITBECK, OF CLEVELAND, OHIO.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 748,533, dated December 29, 1903.

Application filed May 19, 1903. Serial No. 157,873. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM J. ROWE and ARBA L. WITBECK, citizens of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Rotary Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of the invention is to provide a simple, economical, and efficient rotary engine.

The invention is to be found in the movable abutment and the operating mechanism therefor, in the valve mechanism for controlling the admission and cutting off of steam, and in the mechanism for controlling the admission of steam to one side or the other of the abutment, all as shown in the drawings and hereinafter described and claimed.

In the drawings, Figure 1 is a front elevation of an engine embodying my invention. Fig. 2 is a central vertical section thereof. Fig. 3 is a side view thereof. Fig. 4 is a vertical sectional view in a plane at right angles to the section-plane of Fig. 2, and Fig. 5 is an end view of the guide-block F.

The following is a description of the invention in the best form now known to us.

Within the casing A is the cylindrical chamber. The main shaft C extends axially across this chamber and is journaled in the sides of the casing. The cylindrical piston member *c* is secured upon this shaft and fits nicely between the sides of the chamber; but it is of less diameter, wherefore an annular piston-chamber L is formed within said casing around said member *c*. This member *c* is really a part of the shaft and may be formed as an integral part thereof. The piston-wing B is fitted in this annular chamber, and it projects radially out from the member *c*, to which it is secured. There are two parts $a\ a'$ leading to this piston-chamber, and they serve as the inlet and exhaust ports, depending upon the direction in which the engine is running. Between these two ports the abutment D extends like a partition across the piston-chamber. This abutment is of course movable and is withdrawn at proper intervals to allow the piston-wing to pass. This abutment is composed of two gates $d\ d'$, which meet midway between the sides of the chamber and which slide apart, each moving at least far enough to carry it wholly out of the chamber and into the sides of the casing. These gates are fitted to the grooves $a^2\ a^3$ in the casing, and they extend outward into a chamber a^4, where they are respectively secured to the rod E′ and the tubular rod E, through which the rod E′ passes. The rod E has on its projecting end means, as the wings *e*, to prevent it from turning. The winged part of this rod is slidably fitted to a correspondingly-shaped hole in a fixed guide-block F. In this rod E is a longitudinal slot *e′*, and a lug e^2, fast to the rod E′, passes into it, which lug is provided with a pin e^3, which projects out of the slot. Another pin e^4 is secured to the rod E. These two pins project into two cam-grooves $g\ g$ in the periphery of a disk G, secured to the main shaft. For a greater part of their length these two grooves are shown merged into one; but this is an immaterial detail. At the proper point these grooves diverge sufficiently to impart to said rods and the gates attached to them the necessary movement in the direction apart and then converge to close them. The diverging and converging parts of these cam-grooves are so placed that the gates are opened just before the piston-wing reaches them and are closed immediately it has passed.

In the casing just above the ports $a\ a'$ is a cylindrical member H, capable of being turned one hundred and eighty degrees more or less, and through this member four inclined ports $h\ h'\ h^2\ h^3$ are formed. Above this member are the inlet-port a^5 and at the sides thereof two outlet-ports $a^6\ a^7$. The inclination of the ports in the member H is such that when it is in one position, as shown, the steam travels from port a^5 through port h' to port *a* and thence into the piston-chamber, wherefore the piston travels in the direction indicated by the arrow on Fig. 4. Under the circumstances stated the steam exhausts through the ports $a'\ h^3\ a^6$. To run the engine in the reverse direction, the cylinder H is turned one hundred and eighty degrees, whereupon the port h^2 establishes communication between the inlet-port a^5 and the port a', and the port *h* establishes connection between the port *a* and the exhaust-port a^7.

Admission of steam to the port a^5 is con-

trolled by a valve K, which is operated from the shaft and may be adjusted to cut off steam at any period in the travel of the piston-wing. In the construction shown this valve is a hollow cylinder, which is mounted in the casing in a recess which communicates with the port a^5. Steam is admitted to the open end of said cylinder through a pipe. This cylinder has a port k, which is for a part of the time covered and closed by the wall of the recess in which the cylinder is mounted, which forms a seat. On the projecting stem k' of the cylinder K an arm P is attached. On this arm is a sliding box p, to which is attached the end of the eccentric-rod M, which rod is operated by an eccentric N on the main shaft. By changing the position of the box on the arm the operation of the valve may be so changed as to have it remain open for any desired part of the stroke of the piston, and by changing the position of the arm p on the stem k' the lead of the valve may be changed as desired. It will be seen, therefore, that the operation of the valve may be changed to any extent desired. The throttle is not shown; but it is clear that the cylinder H may be used for this purpose, for by turning it the ends of the ports may be closed wholly or to any extent desired.

No packing is shown in various places where it will probably be needed; but any one skilled in the art will know how and where to apply packing. The nicety of fit in many places will have much to do in determining where packing is required and what kind of packing to employ.

Having described our invention, we claim—

1. In a rotary engine, the combination of a casing containing an annular piston-chamber having suitable ports, and laterally-extending grooves, of a rotatable shaft extending axially across said chamber, abutment-gates slidable in said grooves and adapted when closed to form a partition across said chamber, a tubular rod secured to one of said gates and extending out of said casing, a rod secured to the other gate and extending through said tubular rod and the gate to which the latter is attached, and means in connection with said rod and said tubular rod for moving said gates, substantially as specified.

2. In a rotary engine, the combination of a casing containing an annular piston-chamber having suitable ports and laterally-extending grooves, of a rotatable shaft extending axially across said chamber, abutment-gates slidable in said groove and adapted when closed to form a partition across said chamber, a tubular rod secured to the other gate and extending through said tubular rod and the gate to which the latter is attached, a pin attached to the inner rod and extending through a suitable slot in the tubular rod, a pin secured to said tubular rod and means engaging said pins for moving said gates, substantially as described.

3. In a rotary engine, the combination of a casing containing an annular piston-chamber having two ports and, between them, laterally-extended grooves, and a rotatable shaft extending axially across said chamber, with two abutment-gates slidable in said grooves in opposite directions toward and from each other and adapted to meet in said chamber to form a partition across the same, a tubular rod secured to one of said gates and extending out of said casing, a rod secured to the other gate and extending through said tubular rod and the gate to which the latter is attached, a pin attached to the inner rod extending through the slot in the tubular rod, a pin secured to said tubular rod and cams engaging with said pins, and operative connection between said shaft and cams, substantially as specified.

4. In a rotary engine, the combination of a casing containing a cylindrical chamber, said casing having two ports leading to said chamber, a rotatable shaft crossing said chamber axially, a piston-wing secured to said shaft and fitted to said chamber, a cylindrical recess, and a cylindrical member mounted in said recess and having diagonally-disposed ports which terminate in the periphery of said cylinder, the casing of said cylindrical recess having an inlet-port and on the opposite sides thereof two outlet-ports together with two ports diametrically opposed to said other ports and communicating with the ports of said cylindrical chamber, substantially as described.

5. In a rotary engine, the combination of a casing containing a cylindrical piston-chamber and having above that a cylindrical valve-chamber, and two ports establishing communication between said two chambers, there being also three ports in the cylindrical portion of the casing of said valve-chamber, with a movable cylindrical valve in said valve-chamber having diagonal ports terminating in the periphery thereof, a rotatable shaft extending axially across the piston-chamber, a piston-wing secured thereto, and an abutment-partition located between the two ports of said piston-chamber and adapted to be moved periodically across and out of said chamber, substantially as specified.

6. In a rotary engine, the combination of a casing containing a cylindrical chamber and having two ports leading to said chamber, a shaft extending axially across said chamber, a movable partition located between said ports and adapted to be periodically moved into and out of the annular chamber around said shaft, and mechanism operated by the shaft for so moving them, with the valve H having four diagonal ports, the casing of said valve having two exhaust-ports, and between them an inlet-port, a movable valve controlling the flow of steam to said inlet-port, and operative connections between the shaft and last-mentioned valve, substantially as specified.

7. In a rotary engine, the combination of a

casing containing a cylindrical chamber and having two ports leading to said chamber, a shaft extending axially across said chamber, a movable partition located between said ports and adapted to be periodically moved into and out of the annular chamber around said shaft, and mechanism operated by the shaft for so moving them, with the valve H having four diagonal ports, the casing of said valve having two exhaust-ports, and between them an inlet-port, a movable valve controlling the flow of steam to said inlet-port, and operative connections between the shaft and last-mentioned valve, said connections being adjustable, substantially as specified.

In testimony whereof we hereunto affix our signatures in the presence of two witnesses.

WILLIAM J. ROWE.
ARBA L. WITBECK.

Witnesses:
E. B. GILCHRIST,
E. L. THURSTON.