(No Model.)

2 Sheets—Sheet 1.

S. G. BROSIUS.

ROTATING CYLINDER ENGINE.

No. 492,861. Patented Mar. 7, 1893.

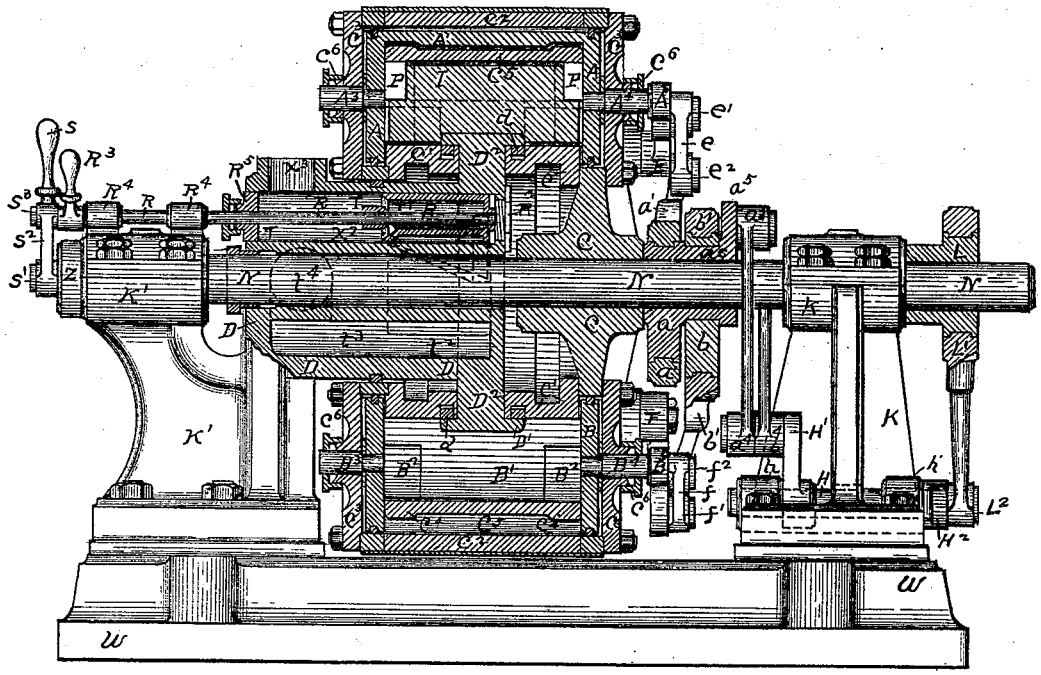

Fig. 1.

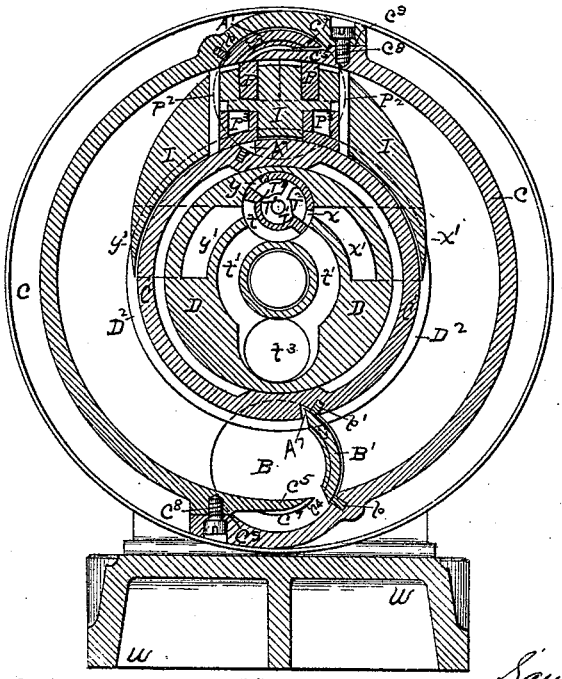

Fig. 2.

Witnesses
Daniel Fraser
P. L. Webb.

Inventor,
Samuel G. Brosius
By J. H. Rush
Attorney

(No Model.) 2 Sheets—Sheet 2.

S. G. BROSIUS.

ROTATING CYLINDER ENGINE.

No. 492,861. Patented Mar. 7, 1893.

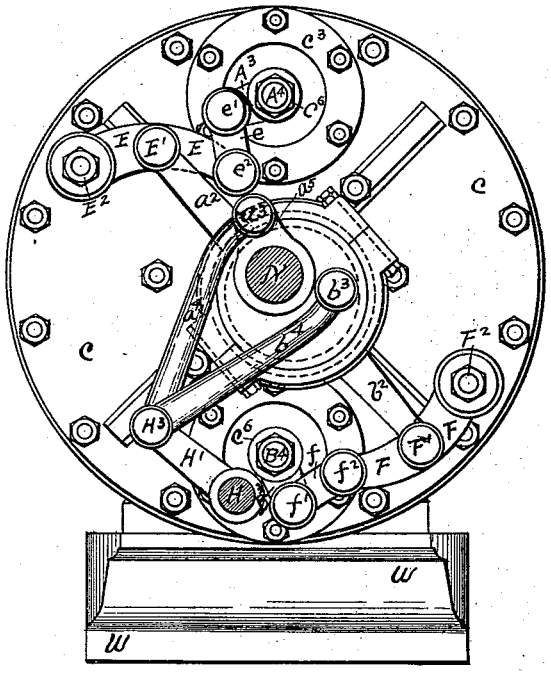

Fig. 3.

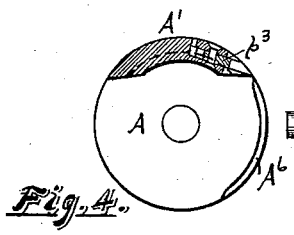

Fig. 4.

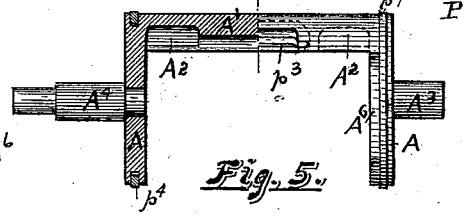

Fig. 5.

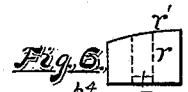

Fig. 6.

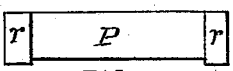

Fig. 7.

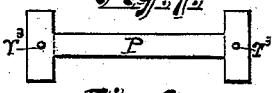

Fig. 8.

Fig. 9.

Fig. 10.

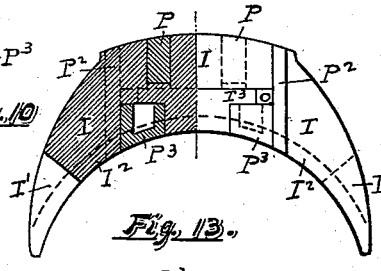

Fig. 13.

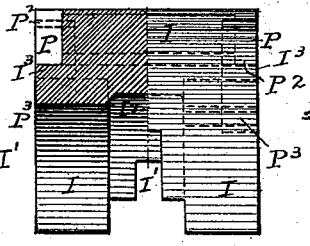

Fig. 14.

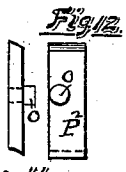

Fig. 12.

Fig. 11.

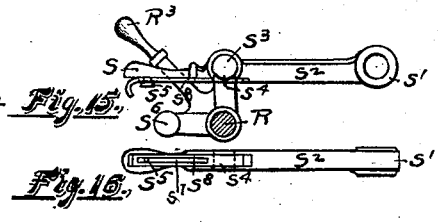

Fig. 15.

Fig. 16.

Witnesses
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UNITED STATES PATENT OFFICE.

SAMUEL GLENVILLE BROSIUS, OF SAVANNAH, GEORGIA.

ROTATING-CYLINDER ENGINE.

SPECIFICATION forming part of Letters Patent No. 492,861, dated March 7, 1893.

Application filed December 1, 1892. Serial No. 453,768. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL GLENVILLE BROSIUS, a citizen of the United States, residing at Savannah, in the county of Chatham and State of Georgia, have invented certain new and useful Improvements in Rotating-Cylinder Engines; 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 improvements in rotating cylinder engines of the class shown in my applications filed in United States Patent Office July 30, 1891, and April 17, 1892, Serial Nos. 401,208 and 418,721, respectively.

The object of my invention is to make a powerful and compact machine which can be reversed and to remove the working parts from the heat and action of steam pressure and impart a smooth and positive movement to the pistons.

In the drawings, Figure 1 is central longitudinal cross section of the engine, showing the interior of the cylinder, steam chest and working parts. Fig. 2 is a central cross section of the engine through the cylinder and steam chest. Fig. 3 is an end view of the engine showing the cylinder and the compound eccentrics, the rear pillow block being removed. Figs. 4 and 5 are respectively central cross section and longitudinal cross section and elevation of the piston. Figs. 6, 7, and 8 are respectively end, side and plan views of the outer packing strips. Figs. 9 and 10 are respectively end and side views of the inner packing strips. Figs. 11 and 12 are respectively end and side views of the end packing strips. Figs. 13 and 14 are each respectively cross section and elevation of the end and front views of the abutment. Figs. 15 and 16 are the elevation and plan views of the valve connecting rod hook.

Like letters of reference refer to like parts throughout the several views.

The driving shaft N is mounted in pillow blocks K, K′, which are secured to base plate W and is firmly attached in the hub of rotating cylinder C by which it is driven. The cylinder is provided with the pistons A and B which are mounted by their respective shafts A^3 A^4, B^3 B^4, in suitable journal boxes contained in cylinder heads C^3 which are secured to cylinder C as shown in Figs. 1 and 3; said cylinder C is made in parts and is joined at C^9 and securely bolted together by the screws C^8. The joint in the cylinder is so located that the piston chambers C^4 may be readily finished inside and for convenience of assembling and repairing.

The abutment disk D has a central disk D^2 which is provided with flanges D′ against which the packing rings *d* of the inner cylinder rings C′ pack. The abutment I is secured to said central disk D^2 which is provided with passages *x′ y′*. Said disk D is attached to the pillow block K′ and contains steam chest T which is provided with the cut-off valve T′ which controls the inlet and exhaust passages *x′ y′* respectively, through the ports *x* and *y* in said valve T′. The steam enters through pipe *x′* into steam chest T and passes through the valve T′ into the steam chamber T^2 of valve T′ and out through its inlet port *x* into the cylinder through passage *x′*, the exhaust steam passing through passage *y′*, exhaust port *t*, and exhaust passage *t′*, into exhaust chamber t^3, and thence escaping through exhaust pipe t^4, as shown in Figs. 1 and 2.

The valve T′ is controlled by valve rod R which is mounted in the journal boxes R^4, and at its end is provided with double crank S^3, S^6 and handle bar R^3 as shown in Fig. 15; the said double crank is controlled by the valve rod connecting hook S, S′, S^2 which is driven by the crank disk or eccentric Z, and has the journal S^4, and as shown in Fig. 16, said hook is held in place by the slide S^8 which moves in a suitable groove and is provided with a slot S^7 which slides over pin S^5 which holds said slide in position; said slide is also provided with a projection or handle to facilitate its operation. To disconnect said hook from crank S^3 the slide S^8 is pulled out and the hook raised from the wrist pin. To reverse the engine, the crank S^6 of the double crank is thrown over by its handle bar R^3 and is engaged by said connecting rod hook S^4, the steam and exhaust passages *x′* and *y′* being thereby reversed; that is, valve T′ is thrown around until its port *y* opens across passage *y′* which then becomes steam passage, and exhaust port *t* of valve T′ connects passage

x' with passage t' which then becomes exhaust passage.

The abutment I as before described is attached to central disk D^2 which fits in groove I', and it has steam passage ways and is also provided with the outer packing strips P, the end packing strips P^2 and the inner packing strips P^3; the said abutment is formed to the curves which allow the piston free passage and at the same time reduce the steam clearance to a minimum. The outer packing strips P, on their packing surface r', conform to the curve of the cylinder and have the lugs r which span, in passing, the opening of C^7 in said cylinder. Said packing also has the holes r^3 through which steam may be admitted to the under side to press them out. The inner packing strips P^3 are curved at J to conform to the curve of the inner cylinder ring C', and span, in passing, the opening of A^7.

The end packing strips P^2 conform to the end surfaces of the cylinder and are provided with lug C which rests between packing strips P and P^3 so that packing strips P^2 will not go past the bearing surfaces of said packings, but will not prevent them from separating and having full contact with the inner periphery of the cylinder.

The various packing strips above described are held in contact with the steam surfaces of the cylinder by steam pressure, springs or both.

As shown in Fig. 5, the piston is constructed with end disks A, cut away at A^6 to prevent uneven wear of the packing strips P'. Said disks A have in their peripheries packing rings p^4 which pack them in suitable piston seats and are connected by the wing A' which has the recesses A^2 and is provided with the packing p^3 in its face which fits over the central disk D^2 and its flanges D', packing the same steam tight. Said wing A' in passing abutment I drops back into the piston chamber C^7 of the outer cylinder ring C^2 of said rotating cylinder, said piston chamber C^7, and is provided with piston packing strips p, and is covered by tongue C^5 which is strengthened by rib C^4 over which the recesses A^2 of the piston pass; said ribs C^4 also narrow the opening of C^7 thereby allowing the lugs r of packing strips P to be shortened as will be readily seen. The inner cylinder ring C' is provided with the piston chambers A^7 which receive the edges of said pistons which are packed by the packing strips P'.

In Figs. 1 and 3, referring now to piston A, the shaft A^4 is provided with crank A^5 which is connected to lever E by link e through its journals e' e^2. The lever E is provided with journal pin E' to which is attached the eccentric rod a^2 which is secured to eccentric yoke a' and is operated by eccentric a which is journaled and oscillates on shaft N and is controlled by connecting rod a^4 through its crank a^5 by journal a^3, in which it moves. The connecting rod a^4 is connected by journal pin a^3 to crank H' which is securely attached to rocker shaft H which is journaled in boxes h h' secured to base pillow block K and is provided with crank H^2 which is controlled by eccentric yoke and rod L' L^2 which is operated by eccentric L secured to shaft N and rotates with it. The said eccentric L may be placed outside of pillow block K. The eccentric a controlling through its co-operating parts the piston, gives an intermittent motion to it; during half the revolution when the piston is under pressure and driving the rotating cylinder, it is substantially at rest, and through the balance of the revolution it is oscillating or moving back into and out of the piston chamber C^7 in passing abutment T of the rotating cylinder. This said intermittent motion is accomplished by the oscillation of the eccentric a about the shaft N, when the movement is in direction of rotation of said shaft N, there is substantially a rest, but when the movement is against it, the eccentric a acts and thereby causes a throw, the oscillations of said eccentric a are controlled by the eccentric L through the connections before described and said motion is fully described, shown and claimed in my application Serial No. 456,734; said lever E in conjunction with crank A^5 and their connecting link e form a toggle joint, so that when the piston is in position to receive pressure and is held against central disk D^2, the toggle joint is in a straight line and no friction resulting from holding same in place when the piston is stationary with regard to the rotating cylinder will come on working parts. The eccentric b is journaled and oscillates on sleeve a^6 of eccentric a; with this exception, the construction of eccentric b and the operation of piston B is identical with that of piston A and eccentric a in its construction and its operations by means of yoke b' b^2, journal pin F', lever F connecting rod f and its journals f' f^2 and its crank B^5 and shaft B^4. The eccentric b is controlled through crank H by connecting rod b^4 in the same manner as eccentric a. The eccentrics a and b are the working eccentrics and are driven by the driving eccentrics L through their connections as described. The connecting rods a^4 b^4 are curved in a suitable manner to avoid contact with shaft N. The steam acting on and between abutment L and the pistons A and B rotate the cylinder C when they are at rest with regard to it; one piston is under pressure while the other piston is oscillating into the piston chamber C^7 of cylinder C so as to pass the abutment I and after passing takes its position to receive steam pressure. The steam in its inlet is controlled by valve T' and may be cut off at any required point in the stroke; the exhaust being always free to escape. To reverse the engine, the exhaust passage is made to become the inlet passage and the inlet passage to become the exhaust as heretofore described.

I have shown an eccentric as the means for driving the working eccentrics, but it will be

understood that it need not be such a construction but may be a crank, wrist pin or any equivalent device.

I do not confine myself to this identical construction, as any mechanical equivalent may be used without departing from the spirit of my invention.

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

1. In an engine, an abutment, oscillating pistons and a rotating cylinder having tongues forming piston chambers in the inner periphery of the cylinder into which said pistons move in passing said abutment, substantially as described and set forth.

2. In an engine, an abutment, oscillating pistons provided with recesses and a rotating cylinder having tongues forming piston chambers in the inner periphery of the cylinder into which said pistons move in passing said abutment; said tongues having ribs adapted to move freely through the said recesses of the pistons without contact, substantially as described and set forth.

3. In an engine, an abutment provided with packing strips having lugs, oscillating pistons provided with recesses and a rotating cylinder having tongues forming piston chambers in the inner periphery of the cylinder into which said pistons move in passing said abutment; said tongues having ribs over which the recesses of said pistons move freely without contact, said ribs narrowing the opening of said piston chambers, thereby shortening the lugs of said packing strips, substantially as described and set forth.

4. In an engine, an abutment, provided with packing strips, pistons and a rotating cylinder having tongues forming piston chambers in the inner periphery of the cylinder into which said pistons move in passing said abutments, said packing strips being provided with lugs which span the openings of said piston chambers in passing the same, substantially as described and set forth.

5. In an engine, an abutment, provided with packing strips, pistons and a rotating cylinder having tongues forming piston chambers in the inner periphery of the cylinder into which said pistons move in passing said abutments, said packing strips being provided with lugs which span the openings of said piston chambers in passing the same, and provided with holes through which the steam passes to keep said strips in contact with the inner periphery of said cylinder, substantially as described and set forth.

6. In an engine, a rotating cylinder, pistons, and an abutment provided with inner, end and outer packing strips, said end packing strips having lugs securely attached to them and bearing against the inside edges of said inner and outer packing strips, thereby preventing the ends of said packing strips from protruding by the packing surfaces, but allowing the inner and outer packing strips to separate, substantially as described and set forth.

7. In an engine, an abutment, oscillating pistons, a rotating cylinder having piston chambers into which said pistons move, said abutment having packing strips which span the opening of the said piston chambers in passing the same, in combination with a driving shaft, a driving eccentric operated by said shaft and working eccentrics controlling said oscillating pistons, and connections between the said driving and working eccentrics, substantially as described.

8. In an engine, a rotating cylinder having pistons, chambers into which said pistons move, an abutment provided with packing strips having lugs which span the openings of the said piston chambers in passing the same and having holes through which the steam passes to keep said strips in contact with the inner periphery of said cylinder, substantially as and for the purpose described.

9. In an engine in combination, an abutment, pistons, a rotating cylinder having tongues forming piston chambers in the outer cylinder ring into which said pistons move, said cylinder having its said outer cylinder ring divided at the internal limit of the piston chambers and securely bolted together, substantially as described and set forth.

10. In an engine, having a rotating cylinder, an abutment, pistons, an abutment disk provided with a steam chest having an oscillating valve, provided with separate steam and exhaust chambers running parallel to the axis of the valve and steam and exhaust ports; from same leading into corresponding passages in the said abutment disk and adapted to be reversed, substantially as described and set forth.

11. In an engine, having a rotating cylinder, an abutment, pistons, an abutment disk provided with a steam chest and having an oscillating valve controlled by a double crank which is operated by a connecting rod hook, for the purpose set forth, substantially as described and set forth.

12. In an engine, having a rotating cylinder, an abutment, pistons, a cut-off valve, provided with a crank having a wrist pin operated by a connecting rod hook which has a slide provided with a projecting handle, and holding said hook normally in position on said wrist pin, substantially as described and set forth.

13. In an engine, a rotating cylinder, an abutment, a cut-off valve in combination with pistons controlled by crank levers operated by working and driving eccentrics, substantially as described and set forth.

14. In an engine, a rotating cylinder having an abutment, pistons provided with cranks in combination with a toggle-joint, operated

by driving and working eccentrics, substantially as described and set forth.

15. In an engine, in combination with a rotating cylinder, a pillow block, an abutment, pistons controlled by working and driving eccentrics, located on opposite sides of the pillow block and connected by a rocker shaft, substantially as described and set forth.

16. In an engine, in combination with a rotating cylinder, a pillow block, an abutment, piston controlled by a toggle joint operated by working and driving eccentrics, located on opposite sides of the pillow block and connected by a rocker shaft, substantially as described and set forth.

17. In an engine, an abutment, oscillating pistons and a rotating cylinder formed by inner and outer cylinder rings and heads and having tongues forming piston chambers in the outer cylinder ring into which said pistons move in passing said abutment and piston chambers in the inner cylinder ring in which the edges of said pistons are adapted to rest when said pistons are under pressure and driving said cylinder.

18. In an engine an abutment, oscillating pistons and a rotating cylinder formed by inner and outer rings and having tongues forming piston chambers in the inner periphery of the outer ring of the said cylinder, into which chambers the said pistons move in passing said abutment, substantially as described.

19. In an engine in combination, an abutment, a rotating cylinder, a driving shaft, a driving eccentric operated by said shaft, working eccentrics one of which oscillates on the said driving shaft and has mounted upon its sleeve the other working eccentric, which oscillate thereon pistons controlled by said working eccentrics and connections between the driving eccentric and the working eccentrics whereby the said driving eccentric controls the operations of the working eccentrics and regulates the operations of the pistons, substantially as described.

20. In an engine an abutment, oscillating pistons, a rotating cylinder having inner and outer cylinder rings and connected heads, and having tongues forming piston chambers in the inner periphery of the said cylinder, said pistons being mounted in said heads and moving in said piston chambers in passing said abutment, substantially as set forth.

21. In an engine an abutment, an abutment disk, oscillating pistons, packings and a rotating cylinder formed by inner and outer cylinder rings and provided with piston chambers in the outer ring formed by tongues and into which chambers the said pistons move, said packings fitting around the face of the said abutment disk during the oscillations of the pistons, substantially as described.

22. In an engine, a rotating cylinder provided with piston chambers, pistons which move therein, an abutment mounted on an abutment disk, cranks, levers, toggle joint, and working and driving eccentrics, said pistons being operated by said eccentrics through said cranks, levers and toggle joint, substantially as set forth.

23. In an engine, a central abutment disk, an abutment mounted thereon, oscillating pistons and a rotating cylinder having tongues forming piston chambers in said cylinder into which said pistons move in passing said abutment, substantially as described and set forth.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL GLENVILLE BROSIUS.

Witnesses:
DANIEL FRASER,
P. L. WEBB.