(No Model.)

2 Sheets—Sheet 1.

S. G. BROSIUS.

ROTATING CYLINDER ENGINE.

No. 492,860. Patented Mar. 7, 1893.

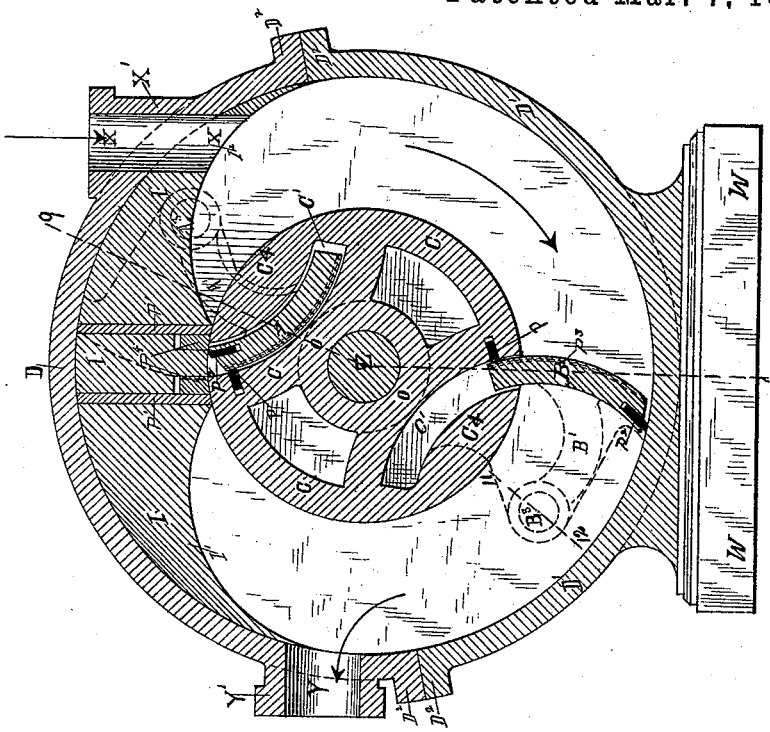

Fig. 1.

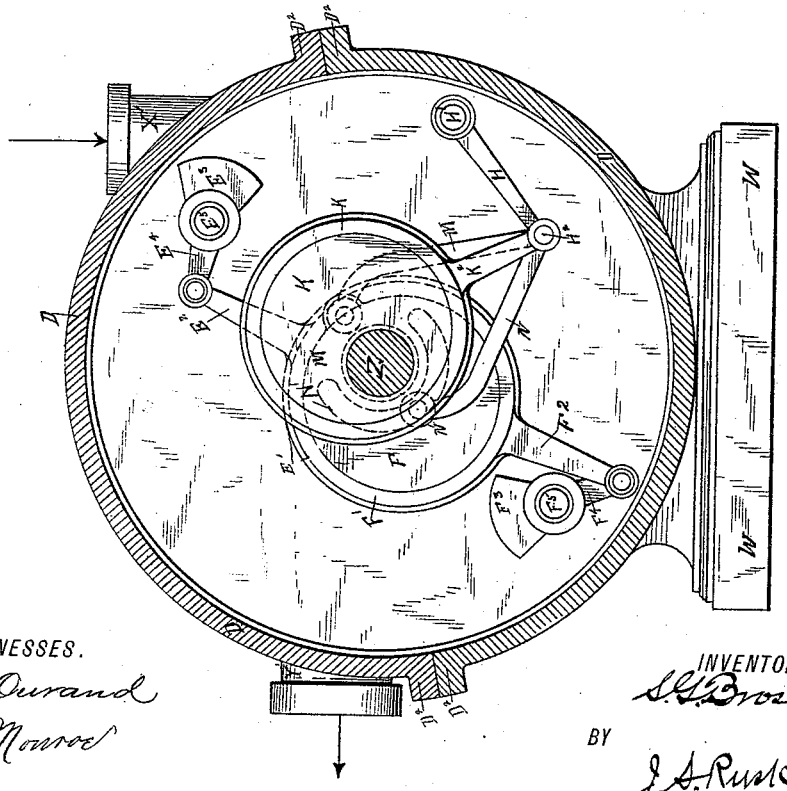

Fig. 2.

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(No Model.) 2 Sheets—Sheet 2.

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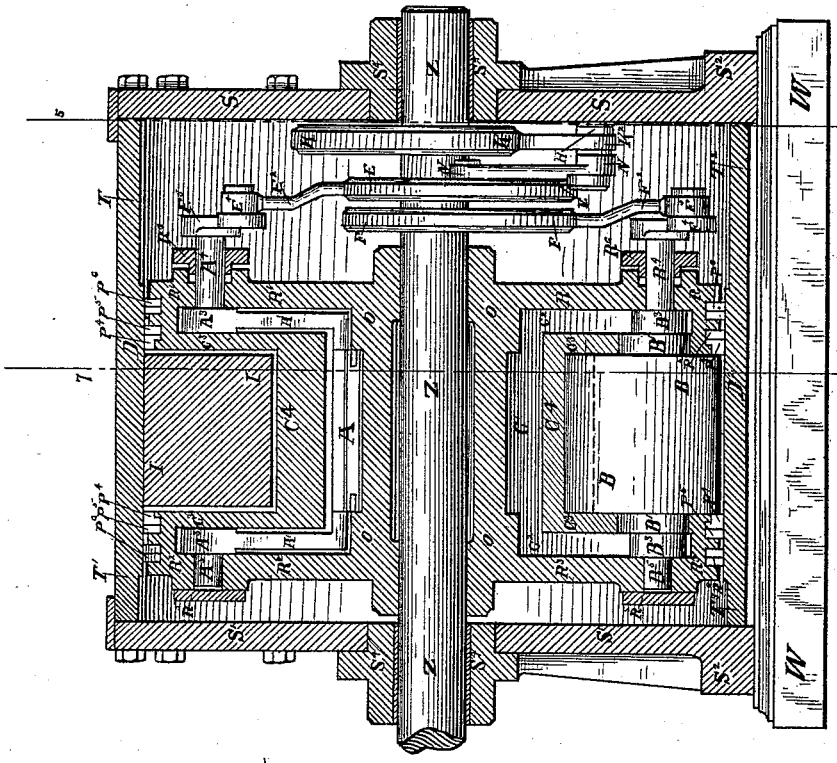

Fig. 3.

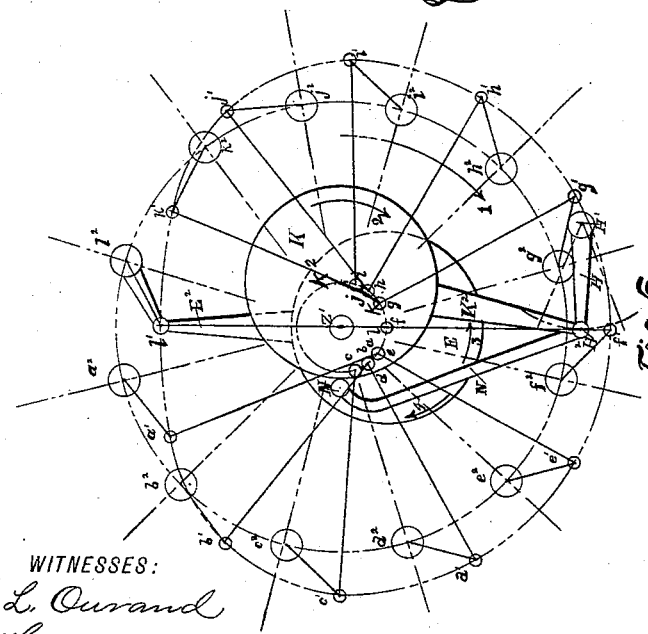

Fig. 6.

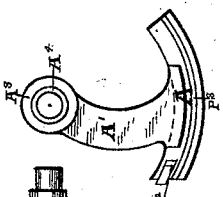

Fig. 4.

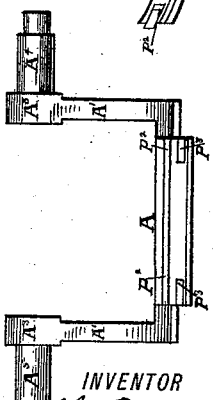

Fig. 5.

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UNITED STATES PATENT OFFICE.

SAMUEL GLENVILLE BROSIUS, OF SAVANNAH, GEORGIA.

ROTATING-CYLINDER ENGINE.

SPECIFICATION forming part of Letters Patent No. 492,860, dated March 7, 1893.

Application filed January 20, 1892. Serial No. 418,721. (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 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, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The object of my invention is to produce a compact rotating cylinder engine, which may be easily and practically constructed, and will be economical in the use of steam; also to overcome all possibility of jar or uneven motion in the operation of the pistons. This is accomplished by the construction hereinafter set forth and described.

Figure 1, is a view in cross section of the engine on the line 7—8 of Fig. 3, showing the pistons and abutment. Fig. 2, is a view in cross section of the engine on the line 5—6 of Fig. 3, showing compound eccentrics and piston cranks in position. Fig. 3, is a longitudinal section of the engine on the lines 9—10, and 11—12 of Fig. 1. Figs. 4 and 5, are respectively end and front elevations of the piston. Fig. 6, is a diagram showing the motion imparted to the pistons through their cranks by the compound eccentrics.

In the drawings, Figs. 1 to 3 inclusive, the driving shaft Z—Z is mounted in the journal boxes S^3—S^4, which are securely attached to the heads S—S′ to which the annular casing T—T′—T^2 and T^3 is bolted. Said annular casing also forms the stationary outer cylinder ring D—D′ in which the cylinder rotates. This annular casing with its heads is secured by the flanges S^2 to the brace plate W—W. For convenience in construction and to facilitate repairs, the said outer cylinder ring is made in parts and bolted securely by the flanges D^2—D^2.

Attached to the shaft Z—Z by the hub O is the rotating cylinder R R′—R^2—R^3, which rotates and drives said shaft. Within said cylinder are mounted the pistons A and B, which oscillate in their respective journals A^4—A^5 and B^4—B^5, being mounted in suitable journal boxes which have the caps R^5 and the stuffing boxes R^6.

C is the inner cylinder ring around the hub O and placed between the heads R R′ and R^2 R^3 of the said rotating cylinder, and connects them, and is broken by the openings of the piston chambers C′ which it contains and in which the pistons A and B move; the tongues C^4 which project over these piston chambers C′ are formed by a part of the inner cylinder ring C and are continuations in the heads of the piston chambers C′ and form the piston recesses and allow the arm A′ A^3 and B′ B^3 of the respective pistons to slide through them. The webs C^3 form the partitions between said piston chambers C^2 and the annular steam cavity of said rotating cylinder. Said annular steam cavity is formed by the heads R R′ and R^2 R^3 in conjunction with the inner cylinder ring C and the outer stationary cylinder ring D D′ and is the steam cylinder. The abutment I is attached to the outer cylinder D′ and packed steam tight within said annular steam cavity by the packings P P′ P^2; said abutment is formed with the curves I′ and I^2, which allow the pistons free passage, and at the same time reduce the steam clearance to a minimum.

Referring also to Figs. 4 and 5 and especially to piston A, it will be seen that the piston is formed of the piston proper A, which connects the arms A′; the hubs A^3 are that part of said arms by which the pistons are secured on the journal shafts A^4 and A^5; said journal shaft A^4 is provided with a crank E^3 E^4 E^5, E^5 is the hub by which said crank is attached to said journal, E^3 and E^4 being the counter-balance and arm respectively of said crank. The piston A, is controlled in its operations by the compound eccentrics K and E through the yokes and arms K′ and E′ and K^2 and E^2 respectively; arm E^2 being provided with the journal head E^6, which operates the crank of said piston. Eccentric E is oscillated by the driving eccentric K through the arm N; said arm is journaled at H^2 on the rocker arm H, and at M′ to the eccentric E. Said rocker shaft is pivoted stationary at H′. The full action of the compound eccentric will hereinafter be explained. Piston B with its co-operating parts B′, B′, B^3, B^4, B^5,

F, F′, F², F³, F⁴ and F⁵, F⁶ is indentical in construction and operation to piston A, and its co-operating parts as described. The eccentrics E and F are the working eccentrics and are driven by the driving eccentric K by the connections described. The cylinder C is provided with packings P which pack against the pistons A and B; said pistons are also provided with the packings P² and P³, which pack steam tight within the annular steam cavity of the cylinder. Packing rings P⁴, P⁵ and P⁶ are placed in the outer periphery of the heads of the said rotating cylinder, packing it steam tight against the outer stationary cylinder D D′. Packing rings P⁴ are provided with suitable annular flanges which turn inward to the steam cavity and fill up that space which would otherwise be open and packs against the edges of the oscillating pistons.

As shown in Figs. 2 and 3, eccentric E which operates piston A, is directly back of eccentric F which operates piston B. Eccentrics E and F are respectively operated by the arms N and M, which are controlled by eccentric K. Referring to Fig. 6, which is the diagram showing the action of the compound eccentrics. Eccentric E oscillates about the center of Z′ of shaft Z and is driven by eccentric K, through the agency of the eccentric rod K² and arm N; arm N is connected to eccentric E and rocker arm H respectively by journal N′ and H²; said rocker arm is pivoted stationary at H′.

As shown in Fig. 6, the driving eccentric K and rod E² with the piston crank E⁴ rotates as shown by arrows 1 and 2; this consequently gives working eccentric E a motion in the direction shown by arrow 4. During substantially half a revolution eccentric E oscillates through the points *i*, *h*, *g*, *f*, *e*, *d*, *c*, in the direction indicated by said arrow 4. During the balance of the revolution it oscillates through the points *c*, *b*, *a*, *l*, *k*, *j*, *i*, in direction of arrow 3. The position of the center of the piston shaft is indicated at l^2, k^2, j^2 around to a^2 inclusive, moving in direction of arrow, while the end of said crank is shown at *l*′, *k*′, *j*′, around to *a*′ inclusive. It is evident that the piston crank with regard to the cylinder is substantially stationary during that part of the revolution comprised between the points *i*′, *h*′, *g*′, *f*′, *e*′, *d*′, *c*′, while between *c*′, *b*′, *a*′, *l*′, *k*′, *j*′, *i*′, the throw or stroke is made; that is to say, when eccentric E oscillates in the direction indicated by arrow 4, which is the direction of the rotation of the engine, as shown by arrow 1, the connecting rod E² which controls the piston, is substantially stationary, with regard to the rotating cylinder. When eccentric E moves as shown by arrow 3, the throw or stroke occurs which operates the pistons, so that they pass the abutment I. Eccentric E oscillates freely on shaft Z around its center Z′, while eccentric K rotates with the said shaft and oscillates eccentric E, by the connecting arms K² and N as explained. Rocker shaft H is pivoted stationary at H′ and keeps eccentric E in proper position. Eccentric F is operated in a similar manner by eccentric K, and operates piston B through its crank, as shown in Figs. 2, 3 and 6. The slot N′ in said eccentric E is located so that the wrist pin of the eccentric F to which the connecting rod N is attached may pass through it without interference when both said eccentrics are oscillating.

X′ and Y′ are steam and exhaust pipes and may be interchanged and engine reversed. The steam enters at port X and acting on piston B drives it in direction as indicated by arrow. Just before said piston B reaches port Y in the revolution of the cylinder, piston A controlled by the compound eccentric, takes its position to receive the steam and propel the engine for half a revolution. Piston B also controlled by compound eccentrics slides into cavity C′, oscillating on its journals B⁴ and B⁵, and takes the position formerly occupied by piston A in passing the abutment I. This operation is repeated by the pistons alternately. Said pistons driving the rotating cylinder, which in turn rotates the driving shaft.

The mechanical movement herein shown and described is not claimed *per se* in this application but forms the subject matter of a separate application filed by me December 29, 1892, Serial No. 456,734.

I have shown an eccentric as a means for driving the working eccentric, but it will be understood that such a construction is not essential as it may be a crank, wrist pin and 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 do claim, and desire to cover by Letters Patent, is—

1. In an engine, an abutment, oscillating pistons, a rotating cylinder having an inner cylinder ring and heads provided with piston chambers, said heads connected by the inner ring and having piston chambers which, taken in conjunction form the recesses in which the pistons operate, substantially as set forth and described.

2. In an engine, an abutment, oscillating pistons, a rotating cylinder having a rotating cylinder ring, and connected heads and piston chambers in said heads and connecting cylinder, which, taken together form recesses in which said pistons operate, substantially as set forth and described.

3. In an engine, an abutment, oscillating pistons, a rotating cylinder having a rotating cylinder ring and heads and piston chambers in the heads and connecting cylinder ring in which said pistons operate, said pistons being provided with arms having hubs provided with journal shafts mounted in said heads, substantially as set forth and described.

4. In an engine, an abutment, oscillating

pistons, a rotating cylinder having a rotating cylinder ring and heads and piston chambers in the heads and connecting ring in which said pistons operate, said pistons having arms provided with shafts by which they are held in place and operated, substantially as set forth and described.

5. In an engine, an abutment, oscillating pistons, rotating cylinder with a rotating cylinder ring and connected heads and piston chambers forming recesses in which said pistons operate, said piston chambers being formed by webs in the said heads and overlapping tongues in said connecting cylinder ring, substantially as set forth and described.

6. In an engine, an abutment, oscillating pistons, rotating cylinder with a rotating cylinder ring and connected-heads and forming recesses in which said pistons operate, said recesses being formed by webs in the said heads and overlapping tongues in said connecting cylinder ring, said rotating cylinder being constructed of two parts securely held together, substantially as set forth and described.

7. In an engine, an abutment, oscillating pistons, a rotating cylinder having an outer stationary cylinder ring, and an inner rotating cylinder ring, heads having piston chambers and connected by the inner cylinder ring which is also provided with piston chambers which taken in conjunction form the recesses in which the pistons operate, said abutment being attached to said outer stationary ring, substantially as set forth and described.

8. In an engine, an abutment, a rotating cylinder provided with an inner cylinder and heads carrying oscillating pistons, and provided on said heads with a packing ring having an annular flange toward the steam space, thereby packing said heads against the outer casing and against the edges of the oscillating pistons, substantially as set forth.

9. In an engine, a rotating cylinder, an abutment, oscillating pistons mounted in shafts in journals mounted in the heads of said cylinder, said shafts being provided with a crank controlled by working and driving compound eccentrics, substantially as set forth and described.

10. In an engine, an abutment, a rotating cylinder, oscillating pistons operated by a compound eccentric consisting of a driving eccentric operated by the driving shaft, working eccentrics, a rocker arm operated by said driving eccentric controlling a connecting rod operating said working eccentrics, thereby producing an intermittent motion, substantially as set forth and described.

11. In an engine, an abutment, rotating cylinder and pistons controlled by working and driving eccentrics in passing the abutment, and in taking position to receive the steam pressure, substantially as set forth, and described.

12. In an engine, an abutment, pistons and a rotating cylinder provided with piston chambers in which the pistons move in passing the said abutment, in combination with a compound eccentric consisting of working and driving eccentrics, said eccentrics controlling the said pistons in passing the said abutment and in taking position to receive said steam pressure.

13. In an engine, a driving shaft, an abutment, a rotating cylinder, an oscillating piston operated by a compound eccentric consisting of a driving eccentric operated by the driving shaft, and working eccentrics, connections between the said driving and working eccentrics, one of said working eccentrics having a slot through which the connection between the driving eccentric and the other working eccentric is arranged and operates, substantially as described.

14. In an engine, a shaft, an abutment, a rotating cylinder, oscillating pistons operated by a compound eccentric consisting of a driving eccentric having means for driving it, and working eccentrics mounted on said shaft and oscillating thereon, connections between said working and driving eccentrics whereby the said working eccentrics are controlled by the said driving eccentric, and a variable motion is produced, substantially as described.

15. In an engine, a shaft, an abutment and rotating cylinder, oscillating piston operated by a compound eccentric, consisting of a driving eccentric having means for operating it, and working eccentrics mounted on said shaft and oscillating thereon, connections between said driving and working eccentric, one of said working eccentrics having a slot through which the connection between the driving eccentric and the other working eccentric is arranged and operates, substantially as described.

16. In an engine, in combination, an abutment, a rotating cylinder, a driving shaft, a driving eccentric operated by said shaft, working eccentrics, connecting rods and a rocker shaft provided with arms, pistons controlled by said working eccentrics, the said driving eccentric controlling through the said rocker shaft, arms and connecting rods, the operations of said working eccentrics and thereby regulating the operations of the pistons, substantially as described.

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

SAMUEL GLENVILLE BROSIUS.

Witnesses:
JOHN J. NEAL,
J. ST. CLAIR NEAL.