Sheet 1.
(2 Sheets)

J. B. & S. M. Davis.

Steam Engine.

109721

PATENTED Nov 29 1870

Fig. 1.

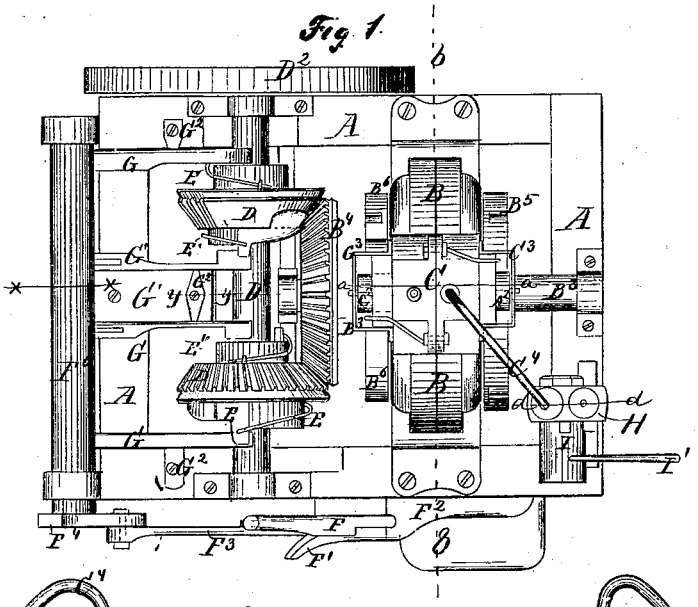

Fig. 2.

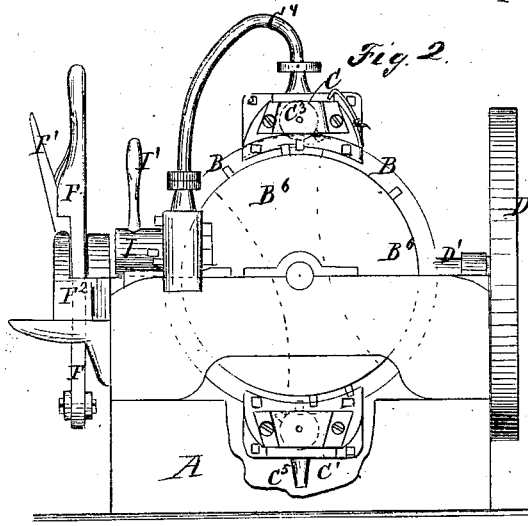

Fig. 3.

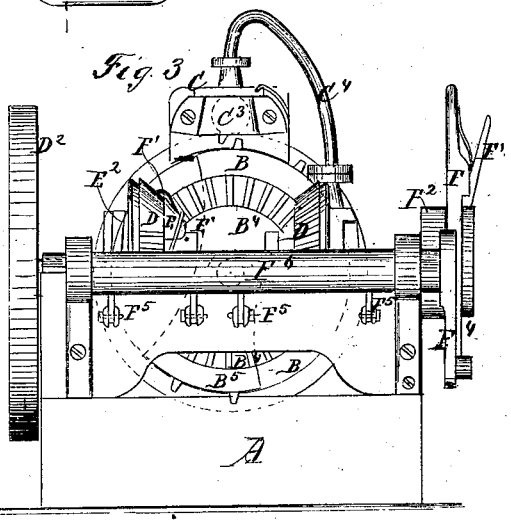

Fig. 4.

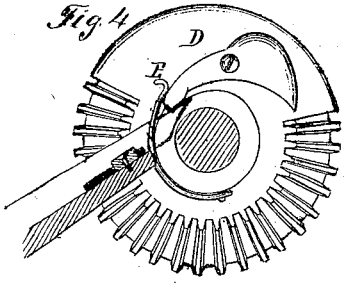

Fig. 6.

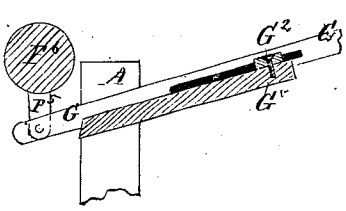

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Fig. 6

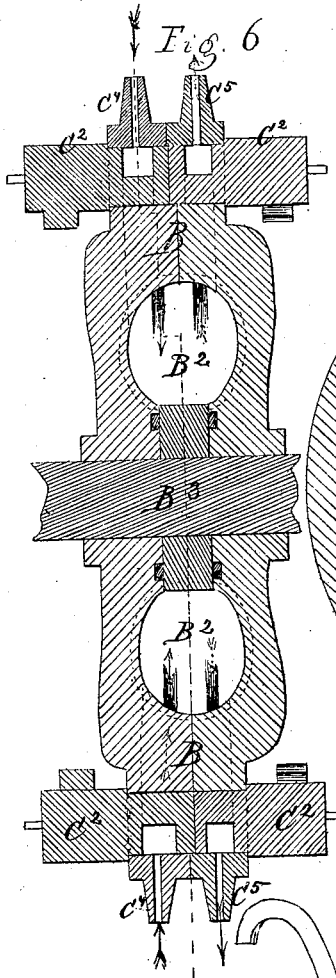


Fig. 7

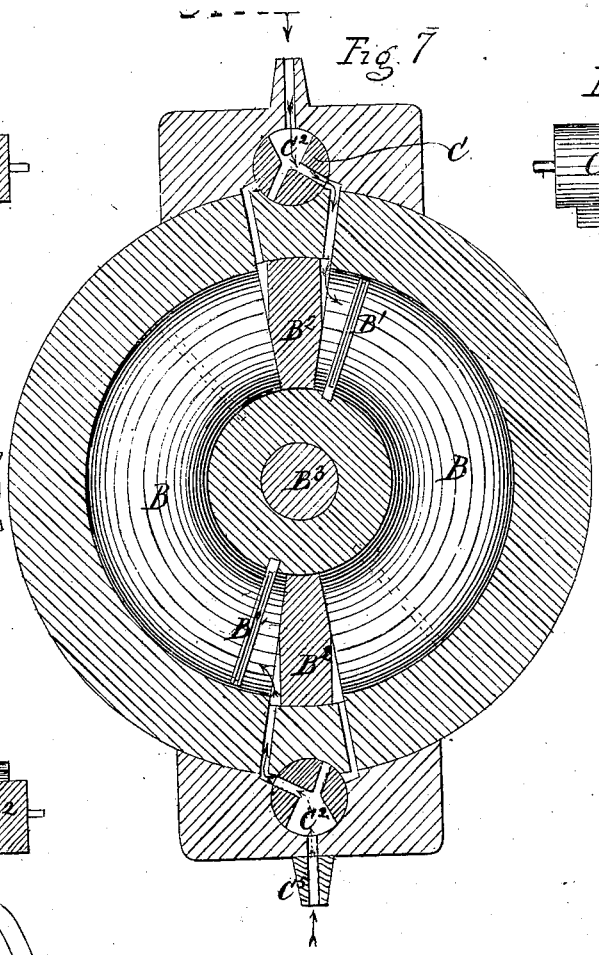


Fig. 8

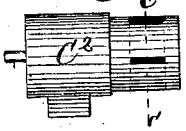


Fig. 9

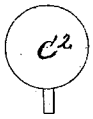


Fig. 10

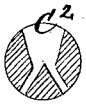


Fig. 11

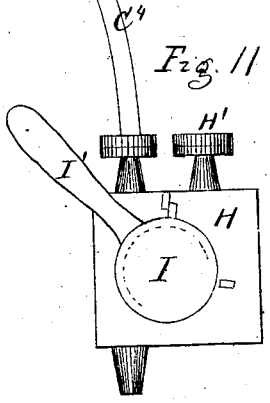
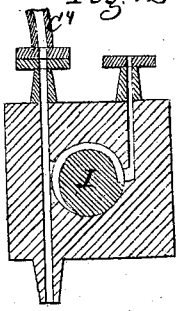


Fig. 12



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United States Patent Office.

JAMES B. DAVIS AND SETH M. DAVIS, OF HARRISONVILLE, MISSOURI.

Letters Patent No. 109,721, dated November 29, 1870.

IMPROVEMENT IN OSCILLATING PISTON-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, JAMES B. DAVIS and SETH M. DAVIS, of Harrisonville, in the county of Cass and State of Missouri, have invented a new and improved Oscillating-piston Engine; and I do hereby declare that the following is a full, clear, and exact description, reference being had to the accompanying drawing.

Drawing.

Figure 1 is a plan or top view of our improved double-acting engine, showing the general arrangement of its parts.

Figure 2 is an end view, showing the arrangement of the reverse lever, the throttle-valve, the induction-pipe, the induction and eduction-valves, the cylinder in which the pistons work, and the fly or band-wheel.

Figure 3 is a view of the opposite end, showing the wheels for transmitting the motion of the pistons, the mechanism for reversing the motion of the same, and the band-wheel.

Figure 4 is a vertical section on line *y y* of fig. 1.

Figure 5 is a vertical section on line *x x* of fig. 1.

Figure 6 is a vertical transverse section on line *a a* of fig. 1, showing the arrangement of steam-passages and of the cylinder.

Figure 7 is a vertical section on line *b b* of fig. 1, showing the arrangement of the induction and eduction-valves and steam-passages, the abutments against which the steam presses, and of the oscillating pistons.

Figure 8 is an elevation of one of the valves, showing the steam-passages, the projection for working it, and the journal upon its end.

Figure 9 is an end view of the valve.

Figure 10 is a section on line *c c* of fig. 8, showing the arrangement of the steam-passages.

Figure 11 is an elevation of the steam-chest, showing the induction and eduction-pipes and the stops for the throttle-valve.

Figure 12 is a vertical section on line *d d* of fig. 1.

This invention relates to that class of engines which employ oscillating pistons; and

It consists in the construction, combination, and arrangement of the parts of which it is composed, as will be more fully described hereinafter.

A in the drawing refers to the frame-work of the engine, which may be of iron or wood, it being rectangular in form and of such dimensions as are required to receive the parts of the machinery.

B refers to the cylinder, which is circular in form, and is composed of two disks, one-half of the cavity being formed in each, as shown in fig. 7. These disks are provided with lugs or flanges, for attaching them to the frame, as shown in fig. 1.

B^1 B^1 refer to the pistons, which are made to fit the circular cavity formed in the disks B. They may consist of a plain piece of metal, or they may consist of an ordinary piston, with packing-rings. In either case they are to be secured to the shaft B^3, or to a collar placed upon such shaft, the disks B being provided with recesses near their centers, for such collar to rotate in, so that it shall move steam-tight, and thus prevent leakage around the shaft.

B^2 B^2 refer to abutments, which are placed in the circular recess in the disks, directly opposite each other, they being provided with grooves upon their sides, for the ingress and egress of steam from the valves to the circular recess or cylinder. The construction and arrangement of these abutments are clearly shown in fig. 7 of the drawing.

B^3 refers to the shaft of the engine, which has its bearings in the frame-work of the engine, as shown in fig. 1, and passes through the center of the disks, as above stated.

Upon the inner end of this shaft the beveled gear-wheel B^4 is secured, its office being to give motion to the other parts of the engine, as will be more fully explained hereinafter.

Upon that portion of the shaft B^3 which is outside of the disk B, there is secured a disk, B^5, its periphery being provided at certain points with projections, which, owing to the fact that its diameter is regulated with reference thereto, come in contact with similar projections upon the rotary or oscillating valves, and impart the required movements thereto, and thus cause them to admit the steam to the cylinder of the engine.

B^6 refers to a disk or arm, which is secured upon that portion of shaft B^3 which is between the cylinder B and the gear-wheel B^4, it being constructed in all respects essentially like the disk B^5, above referred to, and used for the same purpose, except that it serves to open and close the eduction-valves.

C C refer to the steam-chest of the engine, of which there are two, one upon the top, and the other upon the bottom of the cylinder, and each containing two valves, one for the induction, and one for the eduction of steam; said chests being provided with recesses or spaces C′ for the passage of steam to said valve.

C″ C″ refer to the induction-valves, the construction of which is shown in figs. 7, 8, 9, and 10, where it will be seen that they are so constructed that the two smaller passages are made to communicate with the larger one of the valve, and with the space upon either side of the abutments in the cylinder, so that as said valves are moved by the disks B^5 and B^6, steam will alternately be admitted between said abutments and the pistons B^1 B^1.

The exhaust-valves are constructed like the induc-

tion-valves above described, and are arranged parallel with them, as shown in fig. 6, so as to permit the egress of the steam from between the pistons and the abutments at the proper time.

C^3 refers to yokes, which are attached to the steam-chests, from which they extend outward, so as to receive a journal formed upon the outer end of the valves, and thus retain them in their positions within the steam-chests.

C^4 C^4 refer to the steam-induction pipes and passages.

C^5 C^5 to the eduction-nozzles.

D D refer to wheels, which have cogs or teeth formed upon a portion of their beveled surfaces, they being so arranged upon shaft D^1, which has its bearings in the main frame, that the toothed portion will mesh with the wheels upon the shaft B^3, the reciprocating motion of which they receive and convert into a continuous rotary motion by being fitted loosely to the shaft upon which they are placed, and so arranged thereon that they can only perform a partial rotation with said shaft, when they are released from its control and allowed to move in the opposite direction under the influence of the wheel B^4, until they have returned to their original positions.

It will be seen that, while one of these wheels is being used to give the rotary movement to the shaft D, the other is being moved backward upon the same shaft, preparatory to being used to propel the same when the oscillating wheel B^4 shall have commenced moving in an opposite direction, and that thus a continuous rotary movement is imparted to the shaft D^1, and the fly or band-wheel D^2, by the oscillating motion imparted to the piston of the engine, consequent upon the admission of steam alternately upon the opposite side of the abutments B^2.

E E refer to dogs or pawls, which are hinged to the plank portions of the wheel D D, and so arranged as to engage with projections formed in collars upon the shafts D^1, so that as the wheels are moved in the direction to give the proper movement to said shaft they shall engage with such notches and propel the shaft; but when the wheels are moving in the opposite direction they shall move freely upon the surfaces of such collars until they again fall behind the notches therein preparatory to another movement of the shaft.

These pawls are held down upon the surfaces of the collar by springs, as shown in fig. 4, there being two upon each of the wheels, one on the top and the other upon the bottom of each wheel, those on the lower portion being designated by E^2.

F refers to a reverse-lever, which has its fulcrum in a bracket which is attached to the frame of the engine, and is used to throw the engine into and out of gear.

It is provided with a dog, F^1, which is pivoted to its side, near its upper end, and is held in position by means of a spring, it being so arranged that when the lever is in position to hold the reversing mechanism in position the dog will enter notches formed in the surface of the bracket to which the reverse-lever is pivoted.

F^2 is the bracket above referred to, it being bolted to the side of the frame and having its outer end bifurcated to receive the reverse-lever F.

F^3 refers to a connecting-rod, which is pivoted to the lower arm of the reverse-lever, from which point it extends and is connected by a joint or other suitable device with the lower end of crank or arm F^4, which is secured upon the outer end of the rock-shaft F^6, which has its bearings in brackets secured to the frame of the engine, as shown in fig. 3.

From the under side of shaft F^6 short arms F^5 project, which are for the purpose of furnishing the means of moving the rods which operate the dogs E E.

G G refer to rods which extend from the arms upon shaft F^6, to which they are pivoted, to and under the dogs E E, as shown in fig. 1, the object being to raise such dogs out of contact with the collars upon shaft D^1, so as to permit such contact accordingly as it is desired to have the engine in or out of gear.

These rods are so arranged with reference to the pawls and the reverse-lever that, when said lever is in the proper position to cause the shaft D^1 to rotate, their outer ends pass under the projections upon the pawls, and raise them out of the notches upon the shaft D^1 just at the time when the motion of the wheels D D are to be reversed.

H refers to the throttle-valve chest, which is secured to the frame of the engine in any convenient position, its upper surface being provided with two nozzles, to one of which the pipe which leads to the steam from the generator is attached, and to the other the pipe which leads the steam to the cylinder, the induction-pipe or pipes being so arranged as to lead the steam to both top and bottom of the cylinder.

I refers to the throttle-valve, which is arranged in the chest H in such a manner that, by turning it into the position shown in fig. 12, steam will pass into the pipes which conduct to the cylinder; but by turning it so that the stop upon its outer end rests upon the other stop upon the chest the steam will be cut off from said cylinder.

The operation of our engine is as follows:

The parts having been constructed and arranged substantially in the manner shown and described, the reverse-lever is thrown forward or into the notch in the bracket F^2, which will cause its upper end to incline toward the cylinder.

When the throttle-valve lever I′ is to be put into the position shown in fig. 11, which will permit the steam to pass into the cylinder upon opposite sides of the abutments, as shown in fig. 7, which will cause the piston to move in opposite direction with a force due to the pressure upon the two pistons, this movement of the pistons will continue until they come nearly in contact with the opposite sides of the abutments, when the projections upon the disks B^5 and B^6 will come in contact with the projections upon the valves, and cause them to be turned, so as to allow the steam which has brought the pistons into the positions described to be exhausted, and soon after to admit steam to the cylinder upon the opposite sides of the abutments B^2 B^2, which will cause them to be returned to their original position.

The above-described movement of the pistons will cause the gear-wheel B^4 to move through the arc of a circle, or to oscillate to the extent of the movements of the pistons, and this movement of the wheel B^4 will cause the wheels D D to be moved in opposite directions, and, as the pawls which are pivoted to their sides engage with the projections upon the shaft D^1 or its collar only when moving in one direction, it follows that one of the wheels D will cause the shaft D^1 to move through a portion of a revolution, during which time the other wheel D will be moving in an opposite direction, with its pawl passing over the surface of the notched collar, and this movement will continue until the position of the last-named wheel is such as to allow its pawl to engage with the projections upon its collar, when, owing to the relation which these parts sustain to the oscillating piston and the cam-disks, the movement of the parts will be reversed, and the last-named wheel D will become the driving-wheel, and will cause the motion of the shaft D^1 to be continued in the same direction in which it was started by the first-named wheel, while said wheel is being returned to its original position preparatory to being again used to aid in continuing the movement of the shaft, and thus a continuous rotary movement will be

imparted to the shaft D^1, and to the wheel upon its end, from which the power of the engine may be communicated to any machinery that it may be desirable to drive with it.

Having thus described our invention,

What we claim, and desire to secure by Letters Patent of the United States, is—

1. The combination and arrangement of the cylinder B, having in an annular cavity oscillating piston R, shaft B^2, gear-wheel B^4, wheels D D, and their operative mechanism, shaft D^1, and fly or band-wheel D^2, substantially as and for the purpose set forth.

2. The combination and arrangement of the disks D^5 and D^6, and valves C″ C‴, substantially as and for the purpose set forth.

3. The combination and arrangement of the wheels D D, rods G G, and pawls E E, as and for the purpose set forth.

4. The construction and arrangement of the wheels D D, substantially as and for the purpose set forth.

In testimony whereof, we have signed our names to this specification in the presence of two attesting witnesses.

JAMES B. DAVIS.
SETH M. DAVIS.

Witnesses:
MARTIN POWELL,
ROBT. L. FOSTER.