

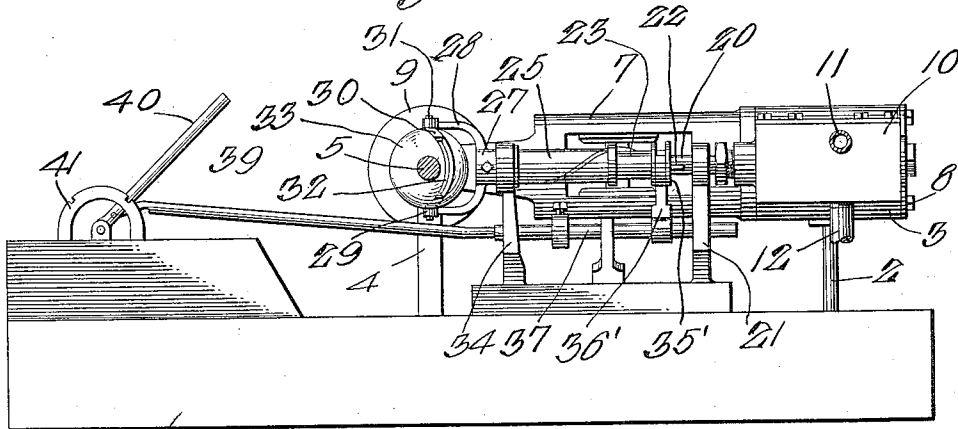
H. BUCHMANN.  
 STEAM ENGINE.  
 APPLICATION FILED JUNE 30, 1911.

1,042,196.

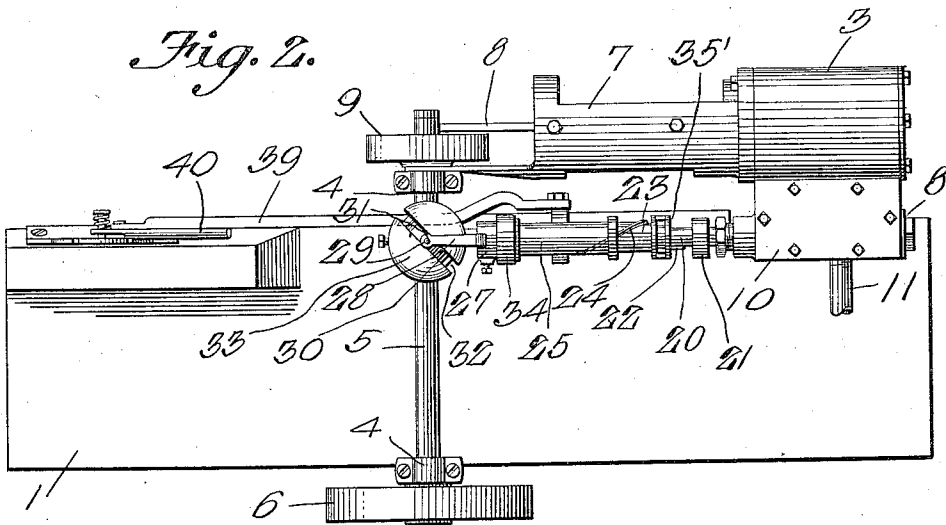
Patented Oct. 22, 1912.

2 SHEETS-SHEET 1.

*Fig. 1.*



*Fig. 2.*



Witnesses

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2 SHEETS—SHEET 2.

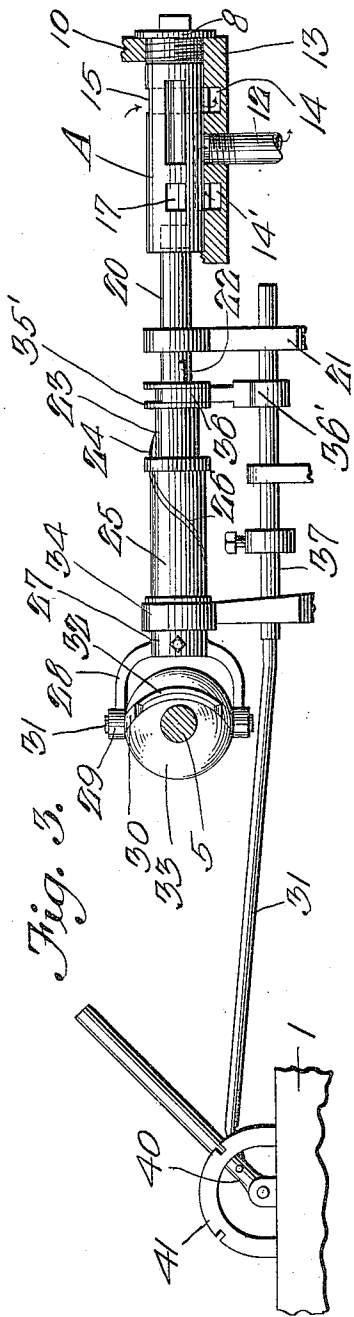


Fig. 3.

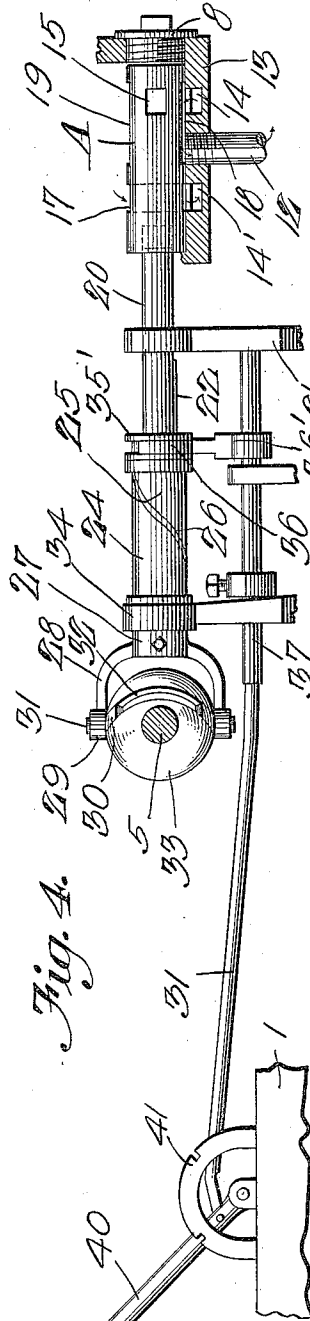


Fig. 4.

Fig. 7.



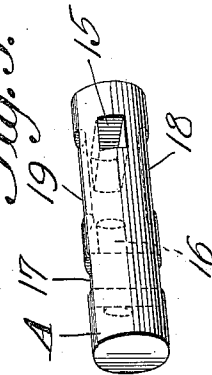
Fig. 6.



Fig. 8.



Fig. 5.



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# UNITED STATES PATENT OFFICE.

HEINRICH BUCHMANN, OF MANNHAVEN, NORTH DAKOTA.

## STEAM-ENGINE.

1,042,196.

Specification of Letters Patent.

Patented Oct. 22, 1912.

Application filed June 30, 1911. Serial No. 636,166.

*To all whom it may concern:*

Be it known that I, HEINRICH BUCHMANN, a citizen of the United States, residing at Mannhaven, in the county of Mercer and State of North Dakota, have invented a new and useful Steam-Engine, of which the following is a specification.

This invention relates to improvements in steam engines, the primary object of this invention being the provision of a novel form of valve and means for oscillating the same, in combination with a novel means for actuating said valve to produce in the engine a forward or reverse movement, the connection between the valve and the engine, imparting to the valve instead of a sliding or reciprocatory movement, a rotary or oscillatory movement, the mechanism for reversing the movement or direction of the steam through the steam chest, and into the cylinder, being mounted upon the valve actuating rod so as to regulate the distance of oscillation of the valve and to change the same so that the inlet and exhaust ports thereof, are changed so that the direction of the admission and exhaust of the steam through the cylinder is changed at will.

A further object of this invention is the provision of a universal joint connection mounted upon the drive shaft of the engine and carried by the valve shaft thereof, whereby the rotation of the crank shaft of the engine imparts to the valve shaft and its respective valve, a rotary or oscillatory movement, thus reducing the wear upon the valve and the distance of movement of the valve as compared to a sliding valve.

A still further object of this invention is the provision of a novel co-acting worm mechanism, mounted upon the valve shaft for imparting to the valve thereon the desired movement to change the direction of projection of steam to actuate the piston in a forward or reverse direction.

With the foregoing and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the drawings,—Figure 1 is a side elevation of an engine constructed in accord-

ance to and embodying this invention, the view being taken from the steam chest side thereof, the fly wheel being omitted. Fig. 2 is a top plan view of the complete engine. Fig. 3 is a sectional view through the steam chest with the valve and its operating parts in the position it assumes when admitting steam to the cylinder in a reversal direction. Fig. 4 is a similar view with the parts in the position they assume imparting to the piston a forward direction. Fig. 5 is a perspective view of the valve removed from the steam chest. Figs. 6, 7 and 8 are detail views of the various portions of the valve shaft detached.

Referring to the drawings, the numeral 1 designates the base having the standard 2 carrying the cylinder 3, and the journals 4, carrying the drive shaft 5 of the engine, a fly or balance wheel 6 being mounted upon the outer free end thereof.

Carried by the cylinder 3 is the usual piston guide frame 7, the piston rod 8 being connected eccentrically to the disk or eccentric 9 carried upon the other end of the shaft 5. Adjacent to the cylinder is the usual steam chest 10, having the inlet pipe 11, and the exhaust pipe 12. Provided in the lower wall 13 of this steam chest are the steam inlet ports 14 and 14', which are shown, disposed one upon each side of the exhaust outlet 12, in Figs. 3 and 4, these ports 14 and 14' being in communication with the respective ends of the cylinder 3, so that the piston, not shown, may be actuated by the steam admitted through either one of the ports 14 or 14' to produce in the said piston a reciprocatory movement. Mounted in the lower portion of said steam chest is a cylindrical valve A, provided with the two transverse ports 15 and 17, respectively, near the ends thereof substantially in alinement with the respective ports 14 and 14' of the steam chest, the said valve being further provided with the three elongated slots 16, 18 and 19, which are adapted at the proper time, that is when the steam is being exhausted from the respective end of the cylinder, to cover either one of the ports 14 or 14' and the inner end of the exhaust port 12, as will presently appear.

As shown in Fig. 2, when the steam is admitted to the upper portion of the steam chest, the same will enter the upper end of the port 15, passing through the valve A into the port 14 of the steam chest into the

outer end of the cylinder actuating the piston to move from right to left, while at the same time the exhaust steam in the other end of the cylinder will be permitted to flow through the port 14' into the elongated slot 16 of the valve A and be exhausted through the exhaust port 12. As soon as the piston has reached its full stroke in that direction, the valve A is oscillated so as to bring the valve in the position as shown in Fig. 4, at which point the steam is admitted at the upper end of the port 17, and enters the cylinder of the engine through the port 14', the opposite end of the cylinder at this time exhausting through the port 14, the elongated slot 18 of the valve A and the exhaust port 12.

In order to transmit the proper oscillatory movement to the valve A, the shaft 20 has its reduced shouldered end 20' removably mounted in the inner end of the valve A, the removable plug 8 retaining the said valve in such position and at the same time providing a steam tight joint at that end of the steam chest. The shaft 20 is mounted for oscillation in the upper end of the bracket 21 mounted upon the base of the engine and is provided with a longitudinally disposed key 22, which permits a sliding connection of the sleeve 25 upon the shaft 20 between the standards or arms 21 and 34 respectively, the sleeve 23 being provided with the worm or spiral projection 24, by means of which the same is operatively connected to the outer or enlarged sleeve 25, provided with a worm slot 26 therein to correspond with the worm 24 of the sleeve 23. The reduced end 25' of the large sleeve 25 is journaled in the upper end of the bracket 34 and has keyed thereto a sleeve 27, carrying the fork 28, and eyed terminals 29 are pivotally connected to the pin 31 of the segmental plates or strips 30 mounted for sliding movement within the circumferential slot or groove 32 of the ball or sphere 33 which is keyed upon the shaft 5 so that when rotated the same will impart to the fork 28 an oscillatory movement, the plates 30 riding within the groove 32 so as to travel substantially one half the distance of the circumference of the ball or sphere 33, thus permitting the rotation of the shaft 5 to actuate said fork 28 and such oscillatory movement imparting through the sleeves 23 and 25 and shaft 20, an oscillatory movement of the valve A, within the steam chest so as to intermittently rotate the respective ports in alinement, so that steam admitted to the steam chest, will impart to the piston within the cylinder 3, the desired reciprocatory movement.

When the parts are in the position as shown in Fig. 4, the engine is operated in a forward direction, and in order to reverse the direction of movement, the lever 40 is

moved so as to assume the position as shown in Fig. 3, at which time the sleeve 33 is formed integral with the sleeve 23 and having the collar 35' to receive the yoke 36 of the arm 36', keyed upon and movable with the reciprocatory shaft 37 mounted in the standards 21 and 34 respectively, and connected to the lever 40 through the link 39, is moved from the direction shown in Fig. 4, to that shown in Fig. 3, the worm connection between the sleeves 23 and 25, imparting to the sleeve 23 and the shaft 20, a spiral movement so as to bring the ports 15 and 17 into opposite directions for receiving the pressure fluid, and at the same time permitting the exhaust through the ports 19 and 16, instead of 16 and 18, thus imparting to the piston a reverse movement. In order to lock the lever 40 in the desired position a segment 41 is provided.

From the foregoing description, it is evident that an engine provided with a valve, and operably connected with a spirally operated reversing and adjusting mechanism is provided, and by this mechanism, the speed of the engine may be controlled smoothly without any jars or jerks as is generally occasioned by the mechanism for operating sliding valves, and that by reason of the peculiar construction of the valve herein employed, that the said valve is only moved a slight distance to bring into play the outward reverse or forward peripheral slots for causing communication between the proper ports of the steam chest and the exhaust port, so as to impart to the piston of the engine a proper reciprocatory movement in the forward or reverse direction. It will also be noted that the said valve is provided with two transverse bores or channels, whereby the steam is conducted from the upper portion of the steam chest to the proper end of the cylinder and with a series of three elongated circumferential slots disposed so that the central one is employed at all times as an exhaust slot or duct, while either one or the other elongated slots or ducts forms the forward or reverse exhausting device for the valve. It will also be noted that by reason of the universal joint connection with the drive shaft 5 of the engine, that the proper oscillatory movement is imparted to the valve and its connecting means through the rotation of the drive shaft and that a very smooth movement is imparted thereto by reason of the avoidance of a dead center, as is the occasion with crank shafts as used generally.

By providing the sliding sleeves 23 and 25 and their operating mechanism, the co-acting worm strip 24 and slot 26 will adjust the valve or more properly speaking the shaft 20, so that the valve may be oscillated as desired to cause the desired reciprocation to be imparted to the piston and

that the manipulation of the said sleeve 23 within the sleeve 25 is very easily accomplished through the medium of the link 39 and the lever 40. It is therefore evident that with a construction as herein set forth, that the oscillatory valve is given a very smooth and even operation, so as to be properly timed with the operation of the drive shaft 5 and its operating piston; so that the intake and exhaust in the respective ends of the piston is accomplished at the desired time; and that the reversal of said piston is very readily accomplished by the use of the lever 40.

15 What is claimed is:—

1. In an engine, the combination of a cylinder, a piston, a drive shaft, a steam chest, a cylindrical valve mounted in said steam chest and capable of an oscillatory movement, a shaft having one end operably connected to said valve, two sleeves telescopically fitting together, co-acting means between said sleeves to permit one of the sleeves a spiral sliding movement with relation to the other, manually operated means for moving the sleeves to regulate the oscillation of the valve, co-acting means between the sleeves and the valve shaft to cause the valve shaft to rotate with said sleeve, a ball keyed upon the drive shaft, and co-acting means between said ball and the outer sleeve to impart to the valve an oscillatory movement.

2. The combination with a cylinder and steam chest, said steam chest having ducts leading to the respective ends of the cylinder and provided with oppositely disposed inlet and exhaust ports, and a cylindrical valve mounted for oscillation in said steam chest and provided with co-acting ducts to permit the flow of steam from the steam chest to the respective ends of the cylinder and be exhausted therefrom, of means for oscillating said valve, and regulating the oscilla-

tion thereof, comprising a series of three 45 telescopically mounted members, said members being operably connected to said valve and the driving element of the engine, a yoke mounted upon the outer end of said elements, a grooved ball operably connected 50 with the drive shaft of the engine and the terminals of said yoke whereby the rotation of the shaft imparts to said yoked end an oscillatory movement, means for operating the intermediate member to impart thereto 55 a sliding spiral movement to regulate the positioning of the valve, and means connecting the intermediate members and the opposite end member whereby said opposite end member is retained in the same relative 60 position at all times to the intermediate member.

3. The combination with a crank shaft, a cylinder and steam chest of a steam engine, and a valve capable of an oscillatory 65 movement disposed in said steam chest of means for operating said valve to give thereto an oscillatory movement, said means comprising a rod connected at one end to the valve, a sleeve keyed thereon, and capable of a sliding movement thereon at the 70 other end, another sleeve surrounding the first sleeve, co-acting means between the said sleeves for regulating the distance of the oscillation of the valve, a yoke connected 75 at the other end of said second sleeve, and a grooved ball rotatable with the crank shaft of the engine and operably connected to said yoke for imparting an oscillatory movement 80 to the sleeves, rod and valve.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

HEINRICH BUCHMANN.

Witnesses:

CARL SEMMLER,  
FRED BOHRER.