J. S. SHIELDS & W. LAMB.

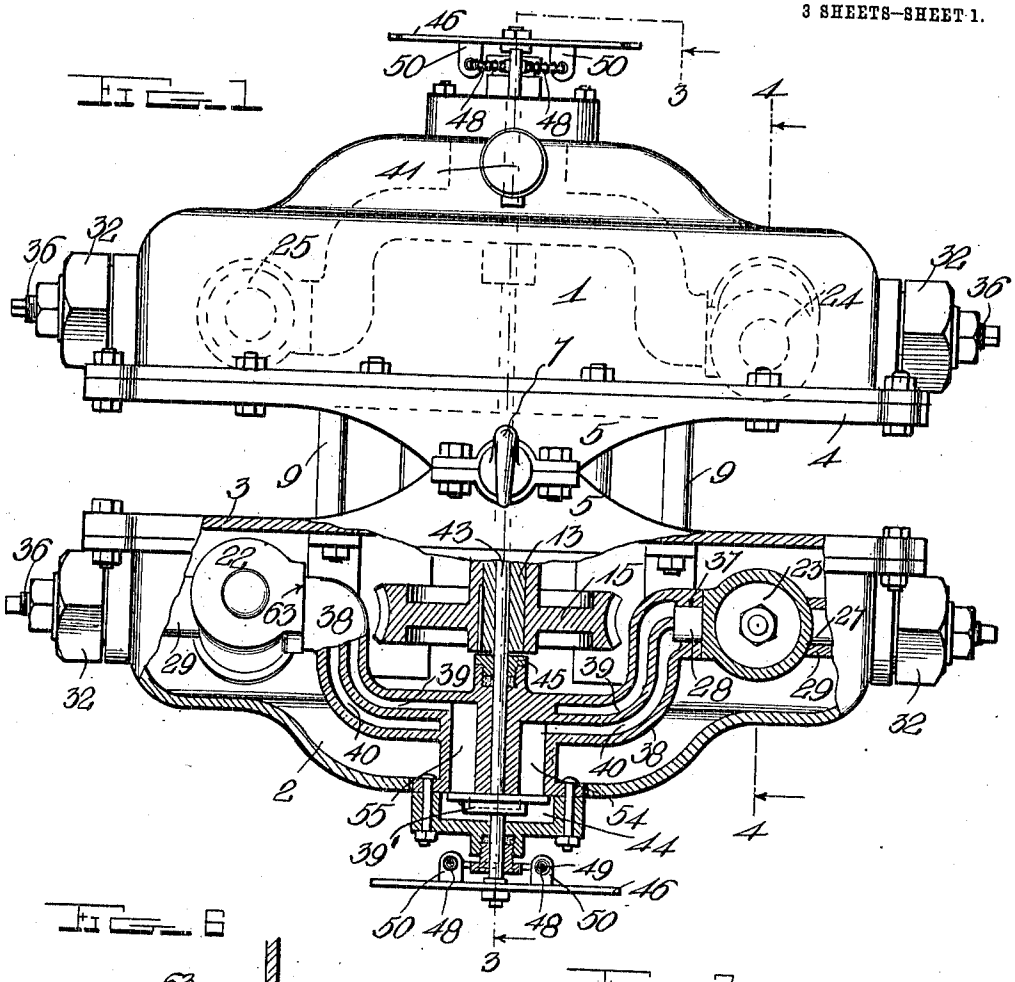
PNEUMATIC HOISTING ENGINE.

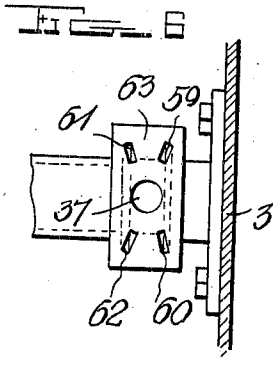
APPLICATION FILED MAY 20, 1909.

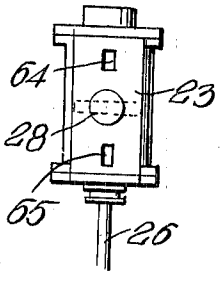
986,949.

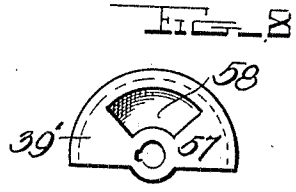
Patented Mar. 14, 1911.

3 SHEETS—SHEET 1.









Witnesses

C. H. Griesbauer.

Inventors

W. Lamb

and J. S. Shields

by H. B. Williamson & Co

Attorneys

J. S. SHIELDS & W. LAMB.

PNEUMATIC HOISTING ENGINE.

APPLICATION FILED MAY 20, 1909.

986,949.

Patented Mar. 14, 1911.

3 SHEETS—SHEET 2.

FIG. 2

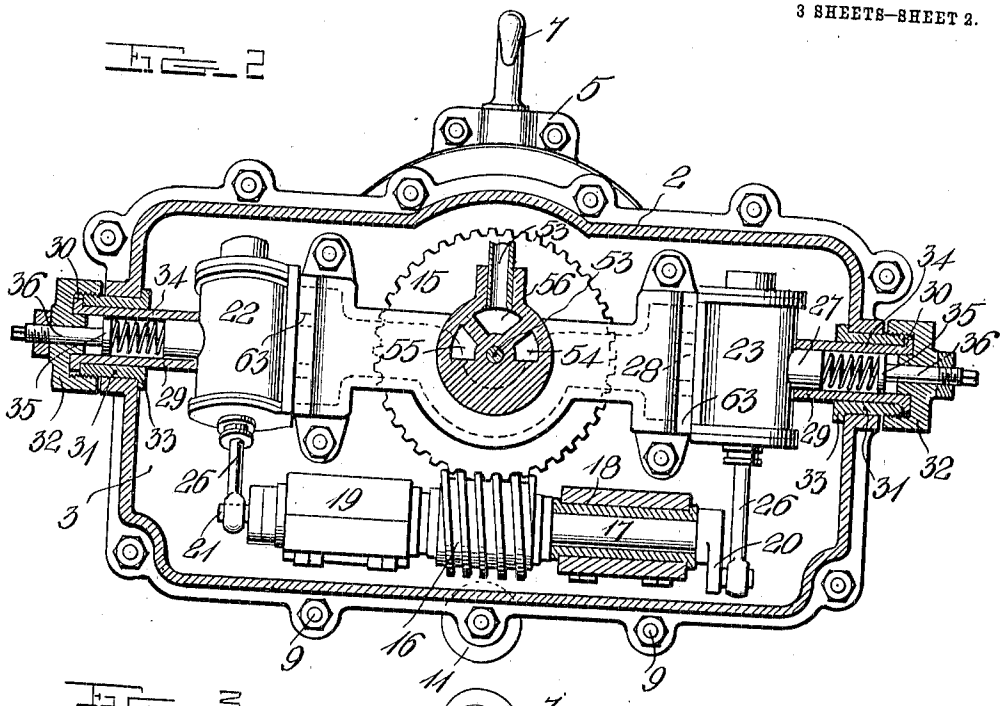
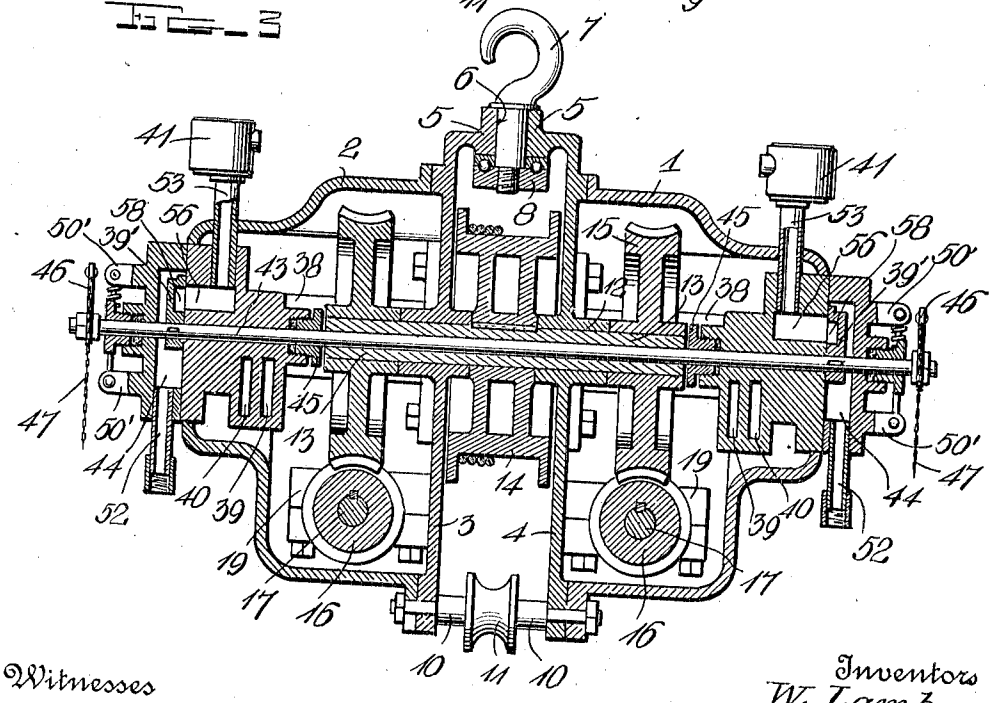


FIG. 3



Witnesses

C. A. Griesbauer.

Inventors

W. Lamb

and J. S. Shields

by A. B. Wilson & Co

Attorneys

J. S. SHIELDS & W. LAMB.

PNEUMATIC HOISTING ENGINE.

APPLICATION FILED MAY 20, 1909.

986,949. Patented Mar. 14, 1911.

3 SHEETS—SHEET 3.

Fig. 4

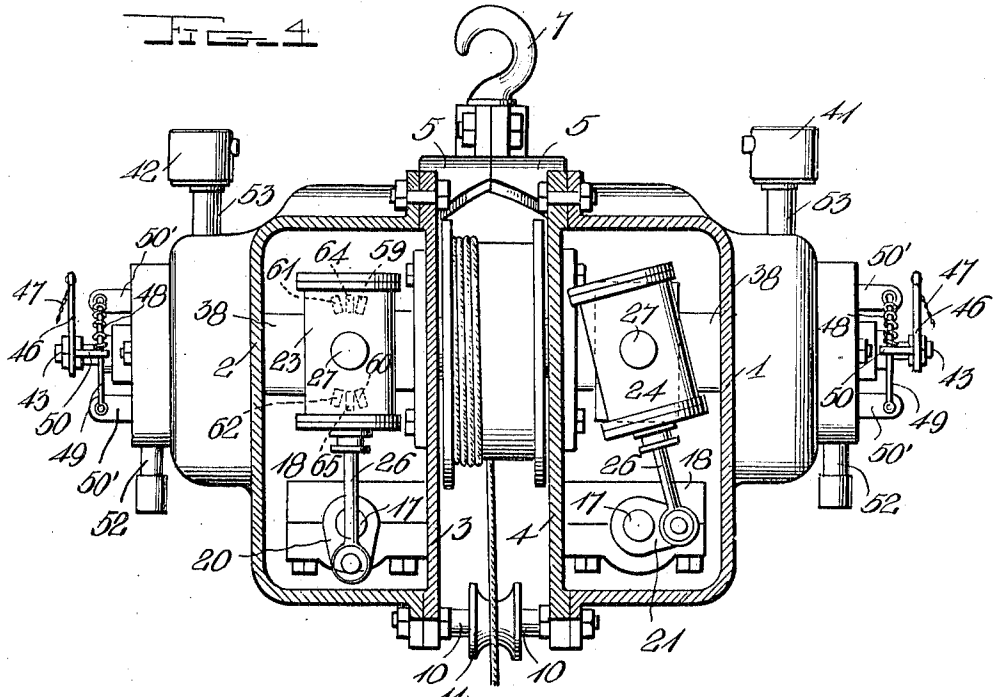
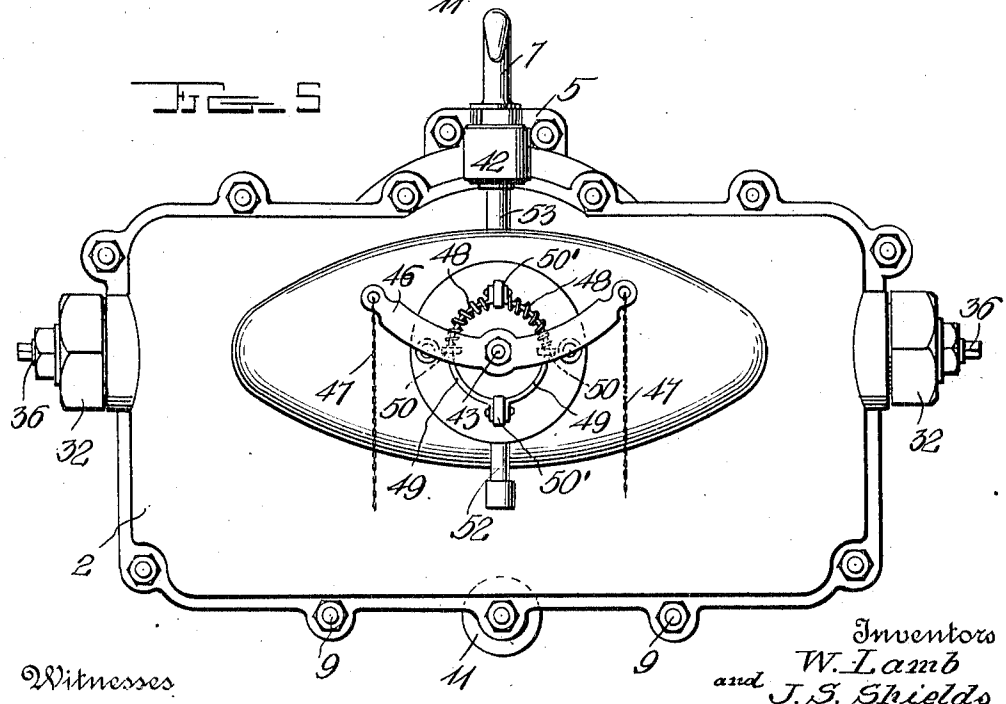


Fig. 5



Witnesses

C. H. Griesbauer.

Inventors

W. Lamb

and J. S. Shields

by H. B. Williamson & Co

Attorneys

UNITED STATES PATENT OFFICE.

JOHN S. SHIELDS AND WILLIAM LAMB, OF DETROIT, MICHIGAN.

PNEUMATIC HOISTING-ENGINE.

986,949. Specification of Letters Patent. **Patented Mar. 14, 1911.**

Application filed May 20, 1909. Serial No. 497,248.

To all whom it may concern:

Be it known that we, JOHN S. SHIELDS and WILLIAM LAMB, citizens of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Pneumatic Hoisting-Engines; and we 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.

Our invention relates to pneumatic hoisting engines, and it consists in the construction and arrangement of parts, as will be hereinafter described and particularly pointed out in the claim.

With the foregoing and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be more fully described and particularly pointed out in the appended claim.

In the accompanying drawings, Figure 1 is a top plan view, with parts broken away and parts in section; Fig. 2 is a vertical longitudinal section taken on an irregular line through Fig. 1. Fig. 3 is a vertical transverse section on the line 3—3 of Fig. 1; Fig. 4 is a detail side elevation, with parts in section; Fig. 5 is a front elevation; Fig. 6 is a detail elevation of one of the journal plates and its mounting; Fig. 7 is a detail elevation of one of the cylinders; and Fig. 8 is a detail elevation of one of the valves.

Referring more especially to the drawings, 1 and 2 represent the casings of the engines which are open on their inner adjacent sides and have closing the same the connecting plates 3 and 4 which are connected together by the yoke 5 having the central aperture 6, through which the eye bolt 7 is adapted to pass and be secured on the inner side by the locking nut 8. The casings are braced apart at their lower ends by the struts 9 and the central guiding sheave 10 on which the guiding sheave 11 is mounted.

Extending through the closing plates 3 and 4 and journaled in bearings 12 on the interior of each is a cylindrical shaft 13 upon which is keyed the drum 14 lying in between the plates 3 and 4 arranged above the sheave 11. On either end of this shaft 13 are secured worm gears 15 one in each casing adapted to engage and be driven by the worms 16 mounted on the longitudinal shafts 17 arranged parallel to each other and mounted in the bearings 18 and 19 extending outwardly from the plates 3 and 4 on opposite sides of the worms 16. At the ends of the shafts 17 we provide crank arms 20 and 21 which are arranged at right angles to each other at an eighty degree off-set so as to prevent dead centers in the engine cylinders 22 and 23 and 24 and 25. These crank arms 20 and 21 are connected, respectively, to the piston rods 26 which carry upon their ends the piston heads, not shown. As the piston rods 26 are shown to be rigid and as the wrist pins on the cranks 20 and 21 have rotary movement, it will be seen that the cylinders have to oscillate.

In order that the cylinders may oscillate properly, we provide the same with laterally extending trunnions 27 and 28, the former of which are journaled in bearing bushings 29 having flanged ends 30 adapted to be clamped against the ends of the collars 31 by the set or locking cup 32 which threads upon the collars and pulls their flanged ends 33 against the casing. In the bushing 29, we secure the spiral spring 34 and the washer 35 which is adapted to be engaged by the set screw 36 so that the tension of the spring may be adjusted. This spring bears upon the end of the trunnion 27 and forces the opposite trunnion 28 into close engagement with the bushing socket 37 of the valved tubes 38.

In Fig. 1 two separate passages ways 39 and 40 are shown in the tubes 38 leading to the opposite trunnions of the respective cylinders of each engine and in Fig. 3 there is shown a pair of mufflers 41 and 42 which are connected to the valves 39′ so that as the air or steam is exhausted from the cylinders to the valves and out through the mufflers, it is muffled or hushed. In Figs. 1 and 3, there is shown a transverse shaft 43 rigidly connected to the valves 39′ and passing through the air chambers 44 and through the bushings 45 to and through the sleeve-like shaft 13 so as to connect these valves together whereby they may be operated to discharge the air from either one passage or the other for forward or rearward motion of the engines. To the outer end of this shaft 43, we secure a double ended lever 46 which has pull cords or chains 47 on each end thereof, and which is shown in intermediate position with both ports 39 and 40

cut-off from the source of supply by means of the pair of springs 48 surrounding the guide rods 49 and having one end of each resting upon the shelves 50 which are carried by the lever on opposite sides of the shaft and their opposite ends are seated against the lugs 50′ on the casing which support the rods 49. The inlet pipe is shown at 52 leading to the inlet port 52′. 53 shows the exhaust connected to the muffler 41.

As both of the valves 39′ are the same, a description of one only will be given. The air chamber 44 comprises four separate and distinct ports 52′, 54, 55 and 56, the latter being connected to the exhaust pipe 53. The valve 39′ for each engine comprises a semicircular disk 57 hollowed out to form a pocket 58 adapted to communicate with either one of the ports 54 or 55 and with the exhaust port 56. This disk is pivoted to the casing of the air chamber 44 and is normally in communication with the air inlet 52 so that either one of the passages 39 or 40 may be put in communication with and are adapted to receive air from the source of supply. When the lever 46 has its right hand cord pulled downwardly, the air enters the opposite or left hand port 55 and passes to the passage 39 leading in opposite directions to the cylinders 22 and 23, while the passage 40 is in communication with the exhaust through the passage 54, pocket 58 and exhaust port 56. When the left hand cord is pulled, the reverse is true and the air is in communication with the port 54 and the passage 40 to the respective cylinders. As either one of these positions may be the forward or reverse one, it is unnecessary to make any distinction. As shown in Fig. 1, the port 54 is connected to the passage 40 and the port 55 connected to the passage 39. In the opposite engine, the reverse of this arrangement will be carried out in order to allow the engine in this casing to be driven in the opposite direction to operate a left hand screw and worm gear. The ends of the passages 39 and 40 are branched so as to extend in opposite directions to connect with the ports 59, 60, 61 and 62 in the upper and lower faces of the trunnion plates 63. The cylinders being pivoted and provided with ports 64 and 65 in their upper and lower ends, respectively, are adapted to oscillate so as to have these ports in communication with diagonally opposite ports at the same time. For instance, if air is entering the passage 39, it will come into the cylinder through the inlets 59 and 64 at one time and exhaust through the outlets 65 and 62 and in the opposite movement of the cylinder, air will come in through the ports 65 and 60 and exhaust through 64 and 61 into the passage 40. If the engine is reversed, the air will come in first through the ports 62 and 65 from the passage 40 and exhaust through the ports 64 and 59 on one stroke and on the opposite stroke, air will come in through the ports 61 and 64 and exhaust through the ports 65 and 60 into the passage 39. As the shaft 43 connects the two valves 39′, they will be operated simultaneously and the engines in both casings will be therefore operated simultaneously and in opposite directions, to drive the drum continuously in one direction or reverse to thereby balance the wear.

While this type of structure has been described as adapted for hoisting cranes and the like, we also propose to use this engine as a steam reverse engine for marine engines or for a steering engine on boats or on traction engines. When the disk is in normal position, both ports 54 and 55 are cut off and the engine is held at a standstill.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of the invention, as defined in the appended claim.

Having thus described our invention, what we claim is:

In a device of the class described, a tubular driven shaft, a pair of engines at each end of the shaft, a driving shaft connected to each end of said driven shaft, a connection between the driving and driven shafts, a pair of valves, each one of which is adapted to control a separate pair of engines, and a shaft passing longitudinally through the driven shaft and operable for causing simultaneous action of the valves.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JOHN S. SHIELDS.
WILLIAM LAMB.

Witnesses:
GEO. P. FRASER.
W. HALICKI.