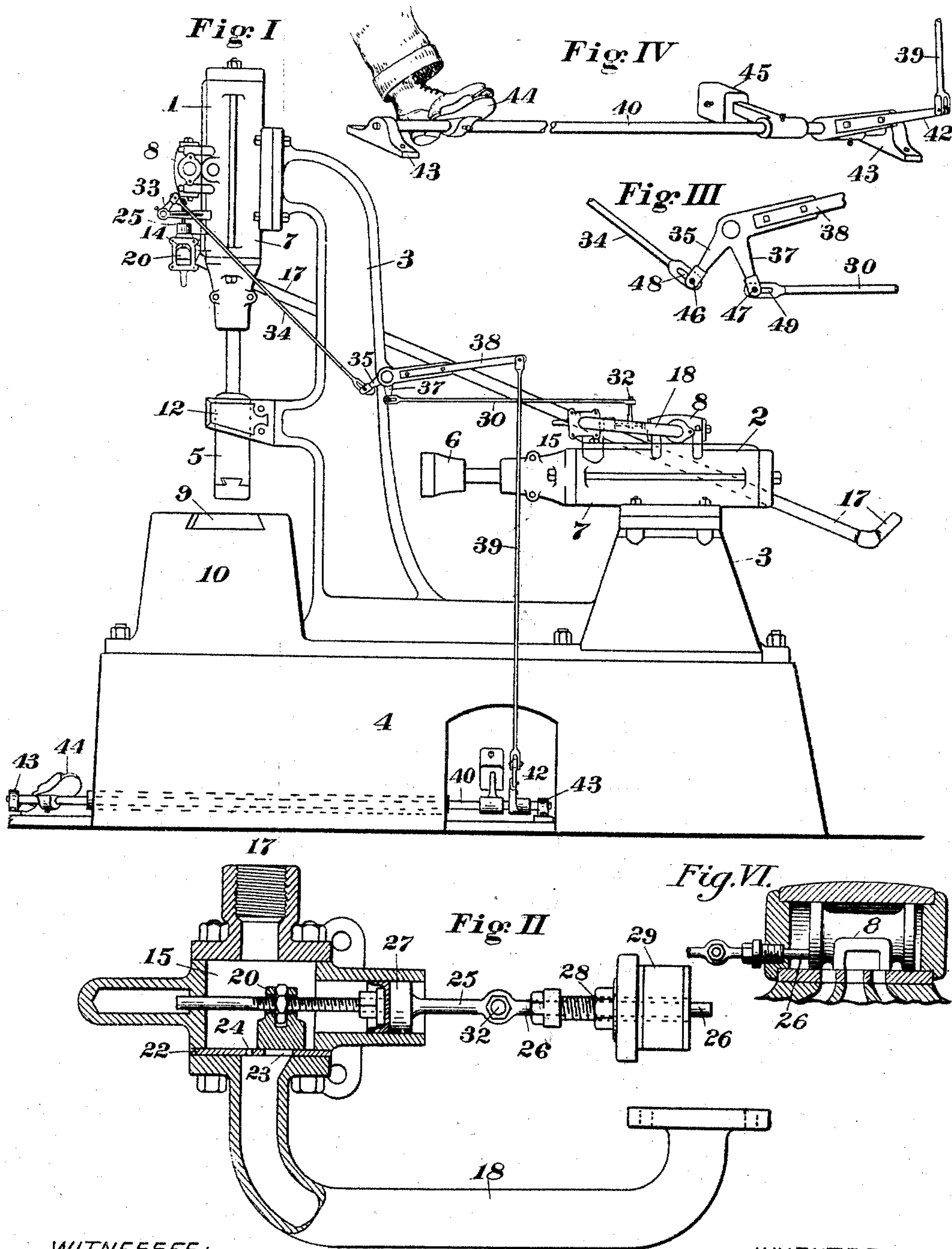


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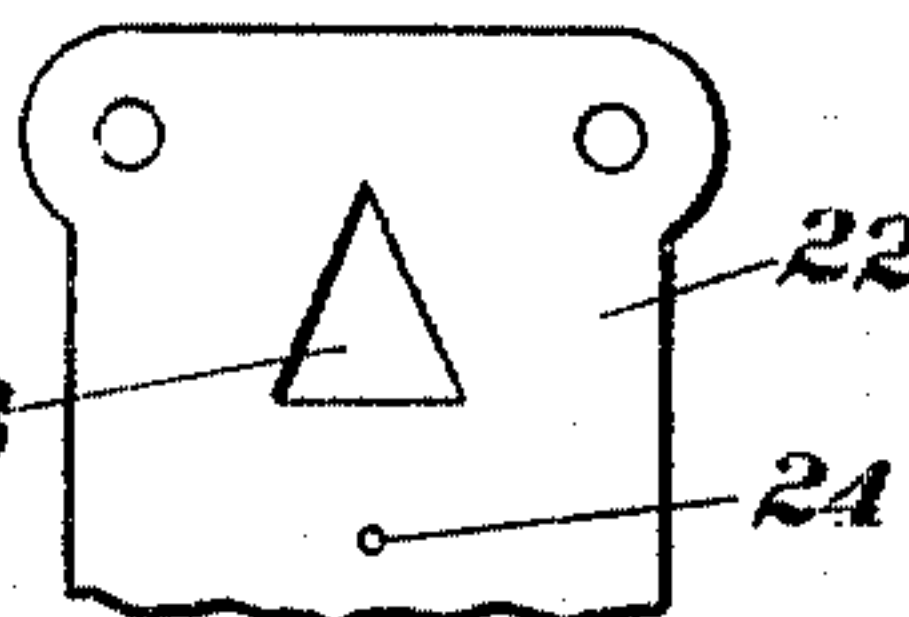
W. W. WORD.
DUPLEX POWER HAMMER.
APPLICATION FILED SEPT. 25, 1903.

NO MODEL.



WITNESSES:
A. M. Lander,
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Fig. V



INVENTOR:

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attys

UNITED STATES PATENT OFFICE.

WILLIAM W. WORD, OF SOULSBYVILLE, CALIFORNIA.

DUPLEX POWER-HAMMER.

SPECIFICATION forming part of Letters Patent No. 766,861, dated August 9, 1904.

Application filed September 25, 1903. Serial No. 174,624. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM W. WORD, a citizen of the United States, residing at Soulsbyville, county of Tuolumne, and State of California, have invented certain new and useful Improvements in Duplex Power-Hammers; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to certain improvements in distributing-valves for duplex power-hammers operated alternately on the same work and when two hammers and two sets of forming-dies are required, as in the process of forging rock-drills, described in Letters Patent No. 731,728, dated June 23, 1903, and No. 731,727, dated June 23, 1903, for improvements granted to me on the dates above named.

Speaking in the singular, my improvement consists in a throttling-valve with a graduated port or passage to control the flow of air or steam to the hammer-pistons, provided with an extension of the valve-rod, and a piston that when the throttling-valve is closed moves the distributing-valves of the hammer-engines outward or in position to admit air or steam to the inner ends of the hammer-pistons, so as to hold the hammer-heads and dies clear of the work; also consists in devices to operate these throttling-valves relatively one at a time by an oscillating pedal operated by the foot of an attendant, so he can set either of the hammers in motion at will with varying degrees of force or hold them clear of the work when required, leaving his hands free to manipulate the work and the implements applied thereto.

The object of my invention is to give complete control over all the required motions of the machinery by the foot of an attendant, add to the celerity of the work, prevent false or interfering action of the hammers and dies, and permit completion of the work at a single heat. To this end I construct devices as shown in the drawings herewith and forming a part of this specification.

Figure I is a side elevation showing the hammers and arrangement of my improved

valves and devices to operate the same; Fig. II, an enlarged transverse section through one of my improved throttling-valves. Fig. III is an enlarged side view of the slotted links that give motion relatively to the two throttling-valves, and Fig. IV is a perspective view of the oscillating pedal and shaft that operates the valves. Fig. V is a flat view of the seat of the throttling-valve. Fig. VI is a sectional view of the distributing-valve.

In operating dual power-hammers that act in conjunction, but alternately on one piece, both hands of an operator are engaged in the adjustment of the work and control of the dies, so pedals have to be employed for controlling the hammers, which as the work proceeds are frequently and rapidly changed so a forging can be completed at a single heat, and such pedal action must be performed with a single motion and without the operator moving his foot therefrom. This is attained in the manner now to be described by reference to the drawings.

1 and 2 in Fig. I represent two power-hammers to be operated by steam or air set at relative angles of ninety degrees or vertically and horizontally.

3 is the framing to support the hammers 1 and 2, the fixed dies and other parts resting on a subbase 4.

The hammer-heads 5 and 6, motive cylinders 7, and distributing-valves therefor are all of the common construction and will be understood without detail description.

The dies, which vary with the form of work to be done, are inserted at 9 in the anvil-block 10. These not being directly relevant to my invention and of various forms are omitted from the drawings.

12 is a guide for the vertical hammer-head 5. None is required for the horizontal one 6.

The steam or air distributing valves at 8 for the cylinders 6 and 7 are of the common sliding type, as shown in Fig. VI. Steam or air is admitted to the throttling-valve chamber 14 through pipes 17, connecting to a boiler or an air-receiver, and passes to the cylinder 7 through the side pipes 18.

In the throttling-valve chambers 14 and 15 are slide-valves 20, that move on perforated

seats 22, the ports 23 being of triangular form, so that when the slides 20 are moved to uncover this port the air or steam is admitted cumulatively, increasing with the range. A small passage 24 through the seat 23 admits to the side pipes 18 a small amount of air or steam when the port 23 is closed, which affords sufficient pressure to hold the hammer-heads 5 and 6 in a retracted position, as hereinafter explained. The valve-rod 25 connects the throttling-valve 20 to the piston 27 and extends into the distributing-valve chamber, where it contacts the distributing-valve 8, and when the hammer is out of action pushes the said valve back, admitting steam that escapes through the port 24 to the inner end of the cylinder 2. The same operation takes place with each one of the hammers.

The throttling-valve 20 for the horizontal hammer 2 is moved by a link 30 to a stud 32, as seen in Figs. I and II, and for the vertical hammer 1 the corresponding valve-stem 25 is moved by a bell-crank 33, operated by a link 34. The links 30 and 34 are operated by the levers 35 and 37, connected by a longer lever 38 and a link 39 to the oscillating shaft 40, as shown at 42 in Figs. I and IV. This shaft 40 is placed near the floor in bearings 43 and is operated by a pedal 44, as indicated in Fig. IV, by the foot of the attendant. A counter-weight 45 balances the weight of the link 39 and other parts requiring gravity compensation.

The operation is as follows: Supposing the horizontal hammer 2 is to be set in motion, the operator presses downward with his toe on the pedal 44. This draws the link 30 backward, opening the throttle-valve at 20 in a degree proportionate to the distance moved, at the same time withdrawing the stem 26 clear of the distributing-valve of the engine 7, so the latter may operate in a normal manner. In this operation the link 34 remains fixed by reason of the slot 49. When the hammers are to be stopped, the operator releases the pedal 44 and the pistons 27 instantly bring the oscillating shaft 40 to its central or neutral position, the ends of the stems 26 bearing against the distributing-valves and determining such neutral position. In this position the pins 47 and 48 are at the ends of the slots 48 and 49, as seen in Fig. III, and hammer-heads 5 and 6 are held in a retracted position by the elastic fluid which escapes through the small port 24. The other throttling-valve at 14 is operated in the same manner by the operator pressing the pedal 44 downward with his heel, moving the links 39 and 34 and the valve-stem 25 by means of the bell-crank 33, which is introduced to change the direction of movement.

To produce independent action of the two engines and hammers and to guard against both being started at the same time, the links 30 and 34 are slotted at the ends, as shown in

Fig. III, so that when either is moved by means of the pedal 44 the pin 46 or 47 of the link not in use slides in the slot 48 or 49. This latter-described device permits a central inert point to which the shaft 40, pedal 44, and links 30 and 34 instantly return by action of the pistons 27 when the foot of the operator is taken from the pedal 44, both hammer-heads 5 and 6 standing in their receded position.

To supply air or steam to the inner end of the cylinders 7 when the throttle-valve 20 is closed, I provide a small hole 24 through the valve-seat 22, as shown in Fig. V. When the throttle-valve 20 is closed, this passes enough of the fluid to fill the inner ends of the motive cylinders 7 and hold the hammer-heads outward, as just described. The port or passage 23 in the valve-seat 22 is made of triangular form, as shown, so that the admission of air or steam is graduated to produce light or heavy strokes of the hammers in proportion to the distance the pedal 44 is moved. This latter is an important feature of my invention, without which the action of the hammers could not be controlled as the nature of the work demands, and reduces the operation to the same nature as if performed by hand-hammers. It will be understood that this device for holding the hammer-heads in a retracted position relates especially to the vertical hammer 1; but to have uniformity of fittings and because the horizontal hammer might stop in a forward position I provide like fittings for each.

I do not confine my invention to the particular valve-operating mechanism as shown in the drawings, as other equivalent gearing could be employed to transmit motion from a pedal to the controlling-valves; but

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

1. In a duplex power-hammer, a vertically-acting hammer, a horizontally-acting hammer, power mechanisms for operating said hammers separately, power mechanisms for starting and stopping each hammer separately, a treadle centrally pivoted to oscillate on its center, and separate connecting means to convey the positive and negative movements of said treadle to each of said mechanisms for starting and stopping the respective hammers, with a provision whereby said hammers may be started and stopped separately and alternately by said oscillations, and held at rest when the treadle is in the central neutral position between the extreme oscillations, substantially as specified.

2. In a duplex power-hammer, a vertically-acting hammer, a horizontally-acting hammer, power mechanisms for operating said hammers separately, power mechanisms for starting and stopping each hammer separately, a treadle centrally pivoted to oscillate on its center, separate connecting means to

convey the respective positive and negative movements of said oscillatory treadle to each of said mechanisms for starting and stopping the respective hammers alternately, and a provision for lost motion, whereby the oscillations of the treadle shall operate but one of said starting and stopping mechanisms at a time and leave an inert point between the extreme oscillations where both hammers will be held at rest until positively set in motion by the further movement of the treadle, substantially as specified.

3. In a duplex power-hammer, a vertically-acting hammer, a horizontally-acting hammer, power mechanisms for operating said hammers separately, power mechanisms for starting and stopping each hammer separately, a treadle centrally pivoted to oscillate on its center, and separate connecting-rods to convey the respective positive and negative

movements of said oscillating treadle to each of said mechanisms for starting and stopping the respective hammers alternately, said connecting-rods being provided with slots in the connecting ends thereof to afford lost motion, whereby the movements of the treadle shall operate but one of the said starting and stopping mechanisms at a time, having an inert point between the extreme oscillations where both hammers will be held out of action until positively moved by the further movement of the treadle, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM W. WORD.

Witnesses:

P. W. J. LANDER,
JAMES L. KING.