April 29, 1930. P. BURKE 1,756,051

POWER CONTROL FOR EXCAVATORS

Filed April 18, 1928

Fig. 4.

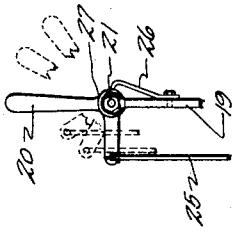


Fig. 2.

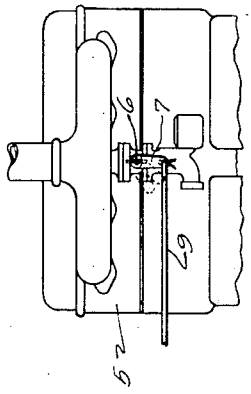


Fig. 1.

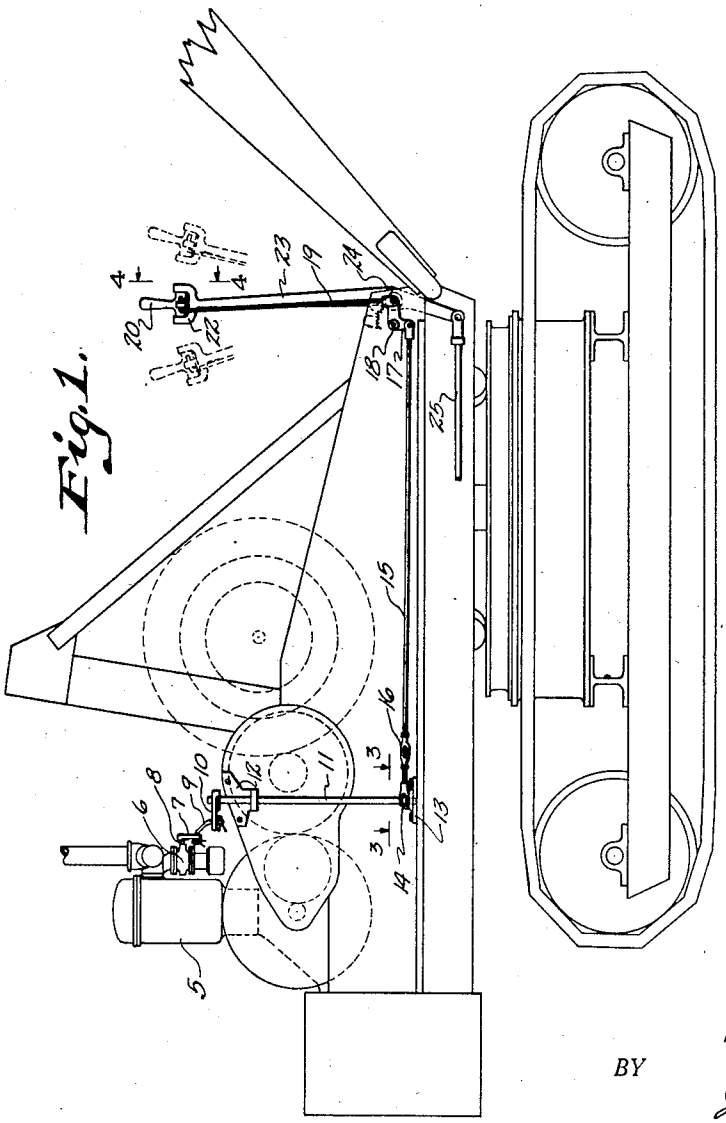
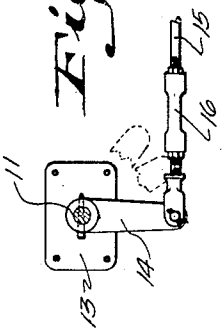


Fig. 3.



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# UNITED STATES PATENT OFFICE

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## POWER CONTROL FOR EXCAVATORS

Application filed April 18, 1928. Serial No. 271,088.

The invention relates to improvements in the control of the power and speed of prime movers for cranes, excavators and the like.

In the operation of cranes and excavators the load on the engine fluctuates rapidly. Also, the functional operation of the machine includes rotation of the machine or its boom, raising and lowering of the boom, raising and lowering the load or operation of a digging bucket and the best engine-operating speed for one function may be quite different from the best operating speed for another. Normally, when internal combustion engines are used for powering a crane or excavator the engine is run at a substantially constant speed under the control of a governor, this speed being chosen as a compromise between the lower speeds necessary for the heavier operations and the higher speeds possible when lighter operations are being performed.

One of the objects of this invention is to provide a control means permitting rapid changes in engine speed under the control of the operator, independent of the governor, and also to control the engine power according to the load requirement of the moment.

A further object of this invention is to provide such control means that may be operated with little or no increase in the skill demanded of the operator or of the tediousness of his work.

The invention further consists in the several features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawings Fig. 1 is a side elevation view of an excavator equipped with the control embodying the invention;

Fig. 2 is a detail front elevation view of a part of the control;

Fig. 3 is a detail sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a detail front elevation view of a part of the control as viewed from the line 4—4 of Fig. 1.

Referring to the drawings, the numeral 5 designates generally a prime mover, here shown as an internal combustion engine equipped with a throttle valve structure 6 which may be of any well known construction, usually a butterfly valve.

According to the present invention the arm 7 connected to the stem 8 of the throttle valve is connected by a link 9 with a crank arm 10 on an upright rotatable shaft 11 journalled in supporting brackets 12 and 13 on the machine and carrying a crank arm 14 at its lower end operatively connected by a link 15, provided with an adjustable turnbuckle 16, to one arm of a bell-crank lever 17 pivoted on the maching at 18. The other end of the lever 17 is connected by a link 19 to a manual control handle 20.

The control handle 20 is pivotally mounted on a shaft 21 carried in the forked upper end 22 of a control lever 23 which is pivotally mounted on the frame of the machine at 24 and operatively connected through the reach-rod 25 to an operating function of the machine, as, for instance, to the mechanism that controls the hoisting operation or the swinging of the boom, the movement of reach-rod 25 being effected by shifting the lever 23 backward or forward. As shown in the drawings, the center of oscillation of the link 19 with the control lever 23 is substantially alined with the pivotal point 24 of said lever 23 so that shifting of said lever 23 backward and forward does not effect a movement of the lever 17 and hence the position of the throttle.

It will be noted that the control of the throttle, by means of handle 20, is effected by rocking said handle about its pivot shaft 21 in a plane perpendicular to the axis of the pivot point 24 of the lever 23, thereby moving link 19, lever 17, shaft 11 and its crank arms 14 and 10, link 9 and arm 7 to open or close the throttle, this movement of the handle 20 being accomplished irrespective of the movement or position of the hand lever 23.

As is well known, throttle valves may be accurately balanced and by making the relation between the handle 20 and the throttle valve operating arm in such a manner as to avoid undue breakage, as, for example, in the manner above described, it will be appreciated that very little effort is required to oscillate handle 20 in order to effect variation

in the position of the throttle valve 6 and hence thereby control the speed and power of the engine. Also, it will be seen that inasmuch as handle 20 is used both to impart the controlling motions to the throttle and the controlling motions to hand lever 23, which, in turn, is connected to an operating function of the machine for its control, it is evident that handle 20 is used for both functions and that the control of the throttle has thus been added without actually requiring another lever, thus permitting the control of the throttle at the minimum increase of effort on the part of the operator.

The hand lever 20 may be tensioned to maintain it in adjusted position relative to its pivot by means of a leaf spring 26 anchored to the lever 23 at one end and bearing upon the hub portion 27 of said lever 20 at its other end.

I desire it to be understood that this invention is not to be limited to any particular arrangement or construction of parts except in so far as such limitations are included in the claims.

What I claim as my invention is:

1. In an excavator, the combination with the prime mover, the throttle control valve for said prime mover for controlling its power and speed and a hand lever pivoted to move in a single plane for controlling one of the operating functions of the machine, of a handle pivoted on said lever to swing transversely to the path of movement of said hand lever, and an operating connection between said handle and throttle for moving said throttle irrespective of the position or movement of said hand lever.

2. In an excavator, the combination with the prime mover, the throttle control valve for said prime mover for controlling its power and speed, and a pivoted hand lever controlling one of the operating functions of the machine, of an operating handle pivoted on said lever to swing transversely thereto, a lever pivoted on the machine, a link pivotally connected to said handle and to said second named lever at a point substantially alined with the pivotal axis of said hand lever whereby said hand lever is free to swing without moving said lever, and a non-flexible linkage connecting said lever with said throttle to move the same on a transverse movement of said handle.

3. In an excavator, the combination with the prime mover, the throttle control valve for said prime mover for controlling its power and speed and a pivoted hand-lever controlling one of the operating functions of the machine, of a handle for said lever pivoted to the upper end thereof to swing transversely thereto, a non-flexible linkage connection between said handle and throttle for moving said throttle irrespective of the position or movement of said hand-lever, and means for retaining the handle in any set throttle position.

In testimony whereof, I affix my signature.

PAUL BURKE.