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VALVE FOR FLUID ACTUATED HAMMERS

Filed June 18, 1930

FIG.-1.

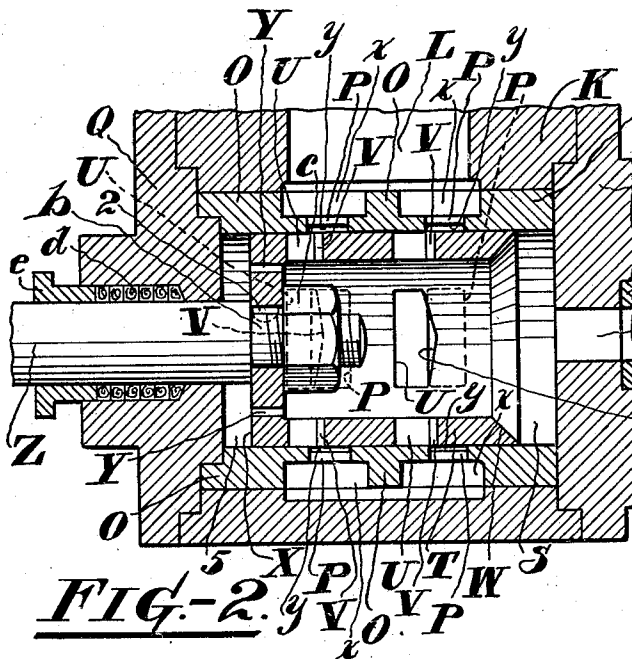
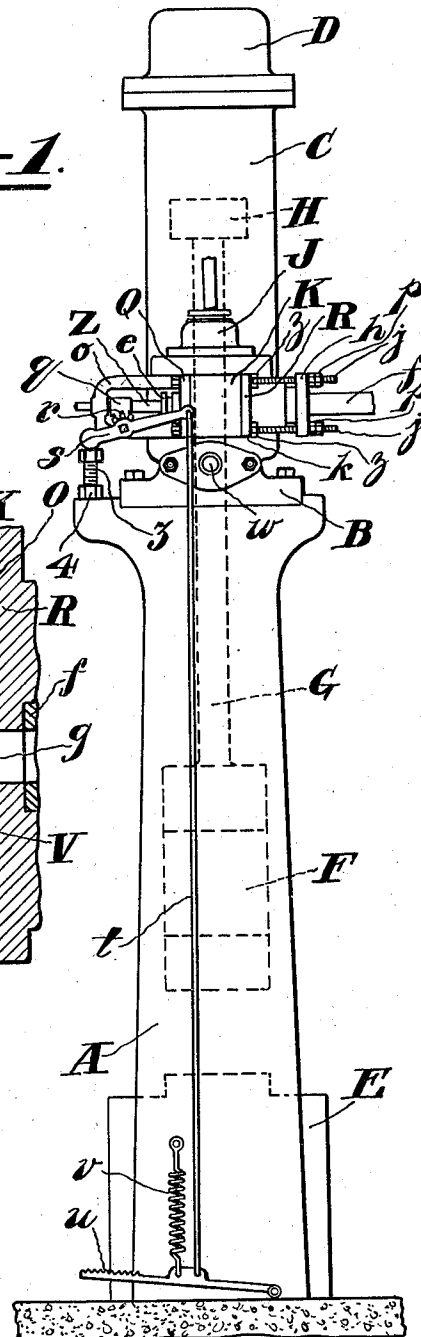


FIG.-2.



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VALVE FOR FLUID ACTUATED HAMMERS

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This invention relates to fluid actuated hammers, but more particularly to an admission valve for the same.

One object of the invention is to insure the immediate admission of pressure fluid to actuate the hammer upon the slightest effort being applied by the operator.

Another object of the invention is to keep the hammer in motion while not delivering blows and obtain a quick response to the admission of pressure fluid when the delivery of blows is required.

Other objects will be in part obvious and in part pointed out hereinafter.

In the drawings illustrating the invention and in which similar reference characters refer to similar parts,

Figure 1 is a side elevation of a fluid actuated hammer embodying the invention, and

Figure 2 is a longitudinal sectional view of the improved valve mechanism.

Referring more particularly to the drawings, A designates the base of the power hammer having a cross head B secured thereto carrying the cylinder C which is surmounted by a cylinder head D. At the lower end of the base A is the usual anvil member E, and positioned thereover is a member intended to be actuated, as for example, a die block F which may be secured to a connecting rod G carried by a reciprocating piston H in the cylinder C.

In order to control the admission of pressure fluid to both ends of the cylinder C there is provided the usual slide valve (not shown) in a casing J. An exhaust for the cylinder is provided at the lower end of the valve in the casing J by means of the port *w*.

This invention more particularly contemplates the provision of a throttle valve mechanism through which the pressure fluid from a suitable source (not shown) may be admitted to operate the slide valve. It will be readily seen that the foregoing construction is a usual one for fluid actuated hammers and it will be understood that the invention may be applied to many other types.

The throttle valve mechanism comprises a body portion K having an outlet passage L through which pressure fluid may pass to the

slide valve in the casing J. A cylindrical valve chest O having a pair of annular grooves *x* around its periphery with a series of ports P in each groove is enclosed within the body portion K with the ports P in communication with the passage L. A pair of smaller annular grooves *y* connects each series of ports around the inside of the valve chest O. An end cap Q encloses one end of the valve chest O and a support member R encloses the other end forming a chamber S in the cylindrical valve chest O.

Slidably positioned within the chamber S is a hollow cylindrical valve T having a plurality of ports U through its side which are adapted to communicate with the ports P in the chest O. The ports U are of a substantially rectangular form having one of the longer sides V formed with preferably a V-shaped contour. One of the ends of the valve T is open and has a cone shaped end W while at the other end is a wall X which has a plurality of orifices Y therethrough forming passages along which pressure fluid may pass. Also extending through the wall X of the valve is a stem Z having a threaded end *b* and a nut *c* thereon to clamp the valve securely against the shoulder formed by the reduced end of the stem Z. A key 2 may be used between the reduced end and the valve to prevent rotation of the valve on the stem.

In order to prevent the escape of pressure fluid along the stem Z the end cap Q is provided with an enlarged bore *d* into which is inserted packing held in position by the packing gland *e*.

Referring now more particularly to Figure 1, the end cap Q and support member R are clamped against the ends of the body portion K by means of the bolts *j* which extend through these members. The heads of the bolts *j* preferably abut the cap Q, and nuts *z* are used against the support member R to draw the parts together. The bolts *j* then extend through a gland member *h* which is inserted in the support member R. The portion of the bolt *j* extending from the support member R through the gland *h* is preferably threaded and lock-nuts *p* may be

used against the gland to adjust it in the support member R.

To admit pressure fluid from a suitable source (not shown) to the valve T an inlet pipe *f* is positioned in the gland *h* and extends to a passage *g* in the support member R. The valve stem Z is supported at the end projecting from the end cap Q by the U-shaped support *o* forming a part of the casing J. Intermediate the support *o* and the packing nut *e* and fixedly secured to the valve stem Z is a rack *q*.

In order to reciprocate the valve T back and forth in the chamber S by manual means, there is provided a gear *r* meshing with the rack *q* and operated by means of a lever *s* having at one end a rod *t* connected to a foot treadle *u*. At the other end of the lever *s* and projecting from the cross head B is an adjusting bolt 3 held in the desired position in the cross head B by the lock nut 4. The lever *s* may rest at this end upon the bolt 3 which may be adjusted up and down in the cross head B and thus move the lever *s*, and therefore the valve T through the gear *r* and rack *q*, to normally position the valve with its ports U in any desired position until pressure is applied to the treadle *u* to manually move it. The foot treadle *u* is pivoted at one end and has a spring *v* to return the lever *s* to position with its end resting on the bolt 3 when pressure is removed from the treadle *u*.

In the operation of the device, pressure fluid, such as steam, is admitted from a suitable source (not shown) through the pipe *f* and into the valve chamber S. The valve T in the chamber S is normally positioned by adjusting the bolt 3 against the lever *s* so that the ports U therein slightly uncover the ports P in the valve chest O permitting a slight admission of pressure fluid into the cylinder C to keep the piston H reciprocating back and forth slightly. This position of the valve preferably leaves a clearance space 5 in the chamber beyond the wall X of the valve. The small amount of pressure fluid admitted by this means is just enough to permit slight movement of the piston and the die block F but not enough to allow the delivery of a blow. It will readily be seen that the novel shape of the ports U in the valve T facilitate this adjustment of the hammer. The V-shaped side of the ports U permits a fairly large portion of the ports P in the valve chest O to be uncovered although the actual area may not be any more than that uncovered by a hair line opening if the sides were straight instead of V-shaped. Should the valve suffer a sudden jar and move slightly as may readily occur in a power hammer, the ports P in the valve chest O would still remain uncovered in the case of the V-shaped construction, but would not remain open were the sides made straight.

Due to the orifices Y in the wall X of the

valve T, pressure fluid freely flows there-through and into the space 5 thus creating an equal pressure both inside and outside of the valve to balance it in the chamber S. It will readily be seen that from this novel construction there will be an equal pressure on each side of the wall X and the pressure of the entering fluid does not act against only one side as has been the case in prior types of fluid actuated hammers.

This construction overcomes one of the main drawbacks of prior art structures wherein pressure fluid was admitted to the chamber S by the operation of an ordinary poppet valve. When, in this latter construction, any manual pressure was applied to the treadle *u*, it was necessary to apply sufficient force to overcome the pressure of the fluid acting against the head of the poppet valve before said fluid could be admitted into the chamber S. This condition was also aggravated by the fact that in order to obtain a good volume of pressure fluid in the chamber S, the head of the poppet valve was usually made of large diameter thus presenting a considerable surface to be acted against by the pressure fluid.

In the present construction, upon pressure being applied to the treadle *u*, the valve T moves in the chamber S and the ports U uncover the outlet ports in the chest O thus admitting a full supply of pressure fluid to the outlet passage L to actuate the piston H.

It will be seen that, owing to the valve T being hollow, pressure fluid is admitted therein and a large volume of fluid is present at all times directly adjacent the outlet passage L. The rate of admission of this pressure fluid is controlled in part by the V-shaped contour V of the ports U which function to uncover gradually, instead of abruptly, the inlet ports P in the valve chest O.

From the foregoing, it will be apparent that an improved type of valve has been devised whereby the slightest manual pressure applied to actuate it will be immediately responded to, thus relieving the operator from the strain to which he was subject when under the necessity of overcoming the pressure applied by the fluid to the valve. In accomplishing this improvement it will also be apparent that a simple and economical device has been employed which will not in any way add to the cost of manufacture and will be durable, sure and economical in operation.

I claim:

1. In a fluid actuated hammer, a throttle valve mechanism for controlling the flow of pressure fluid to said hammer, including a hollow valve having relatively wide ports therein of substantially V-shaped contour at one side and having passages along which said fluid may pass, and a valve chest surrounding the valve having openings therein cooperating with the ports to form a rela-

tively wide passage of small area for pressure fluid, said chest extending beyond the ends of the valve to form pressure chambers in communication with one another by the passages and passing pressure fluid from one to the other to equalize the pressure at each end of the valve.

2. In a fluid actuated hammer, a throttle valve mechanism for controlling the flow of pressure fluid to said hammer, including a hollow valve having relatively wide ports therein of substantially V-shaped contour at one side, a valve chest surrounding the valve having openings therein cooperating with the ports to form a relatively wide passage of small area for pressure fluid, and means to adjust the valve in the valve chest to constantly pass a small amount of pressure fluid therethrough to actuate the hammer between delivery of blows.

3. In a fluid actuated hammer, a throttle valve mechanism for controlling the flow of pressure fluid to said hammer, including a hollow valve having relatively wide ports therein of substantially V-shaped contour at one side and having passages along which said fluid may pass, a valve chest surrounding the valve having openings therein cooperating with the ports to form a relatively wide passage of small area for pressure fluid, said chest extending beyond the ends of the valve to form pressure chambers in communication with one another by the passages and passing pressure fluid from one to the other to equalize the pressure at each end of the valve, means to adjust the valve in the valve chest to constantly pass a small amount of pressure fluid therethrough to actuate the hammer between delivery of blows, and manually operable means to move the valve in the valve chest so that the valve ports will overlap to an increased extent the openings in the valve chest to permit the pressure fluid to actuate the hammer for delivery of blows.

In testimony whereof I have signed this specification.

PETER F. KOPLIN.