

Nov. 6, 1934.

M. H. DAMERELL

1,979,733

STROKE ADJUSTING DEVICE FOR POWER HAMMERS

Filed Oct. 6, 1932

4 Sheets-Sheet 1

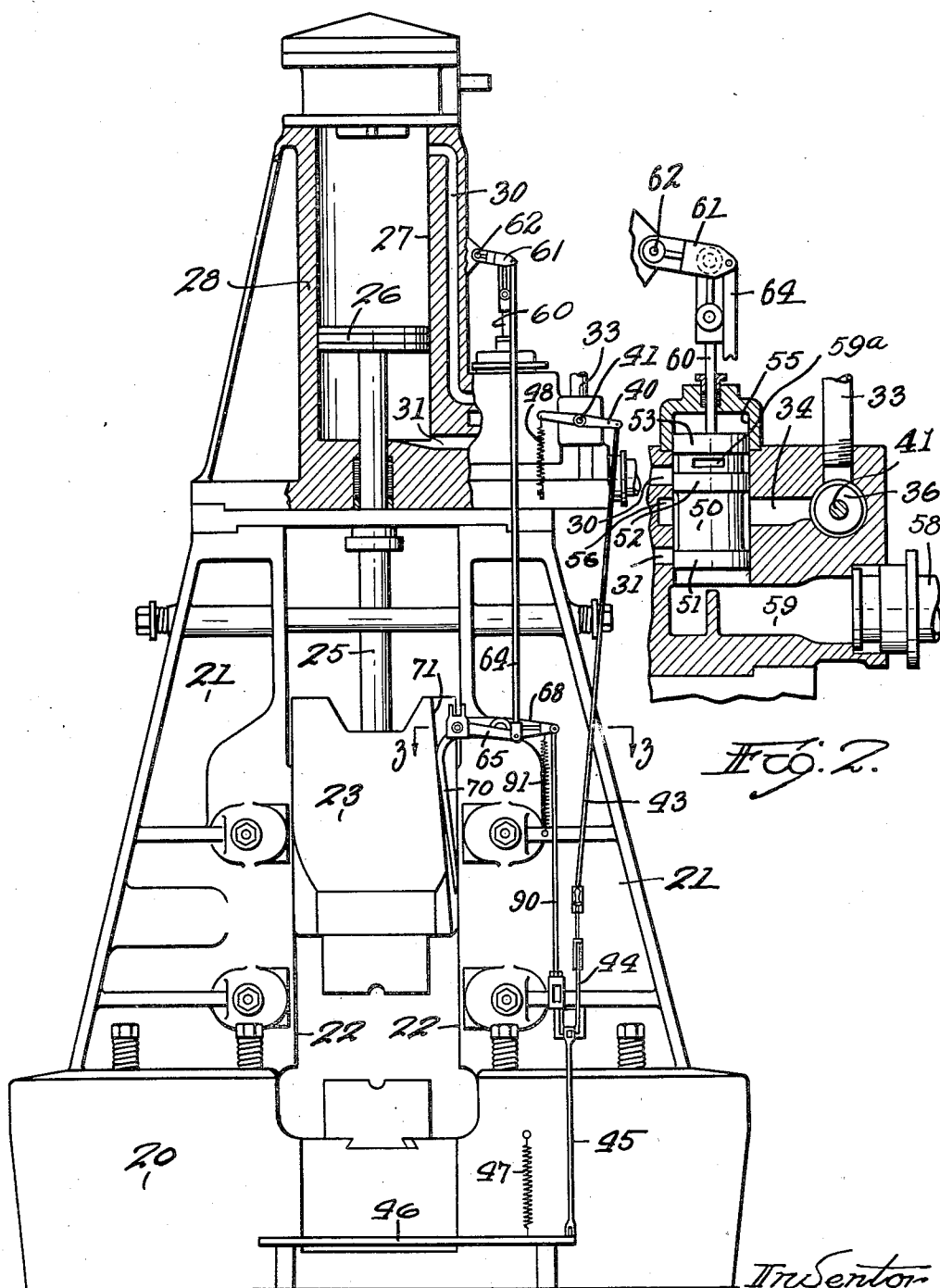


Fig. 1.

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4 Sheets-Sheet 2

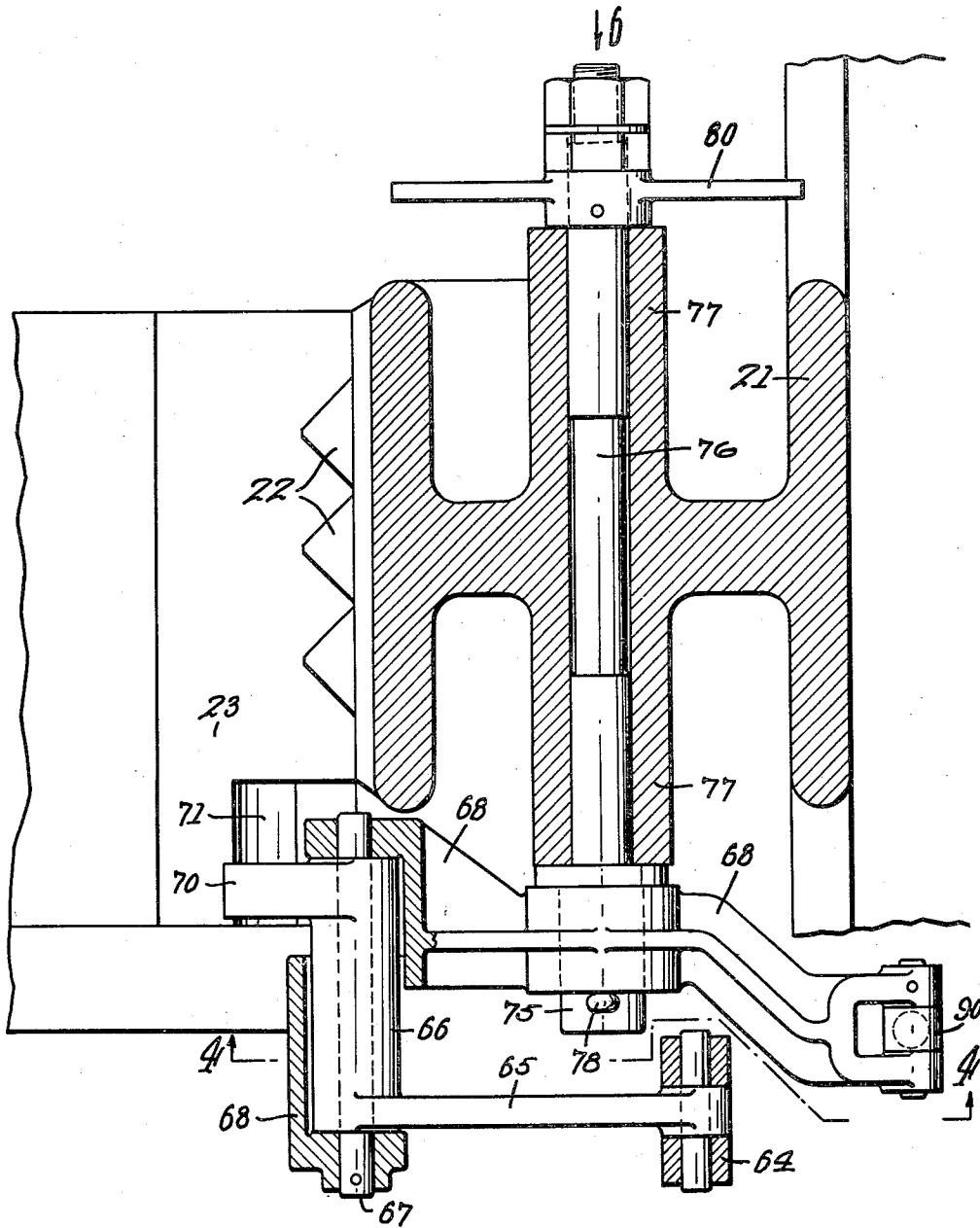


Fig. 3.

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4 Sheets-Sheet 3

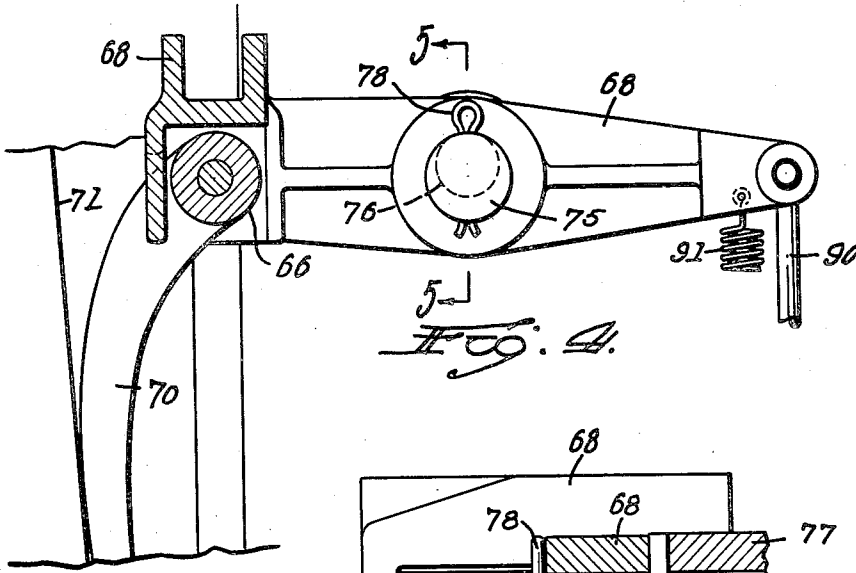


Fig. 4.

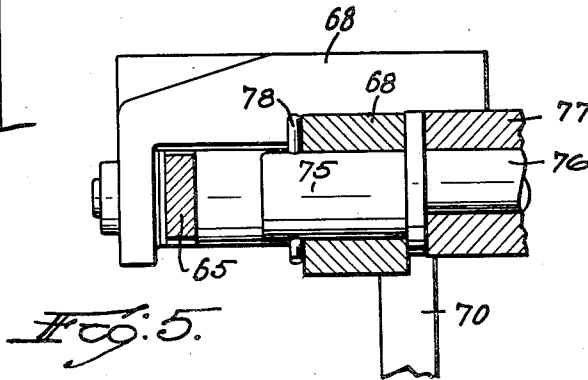


Fig. 5.

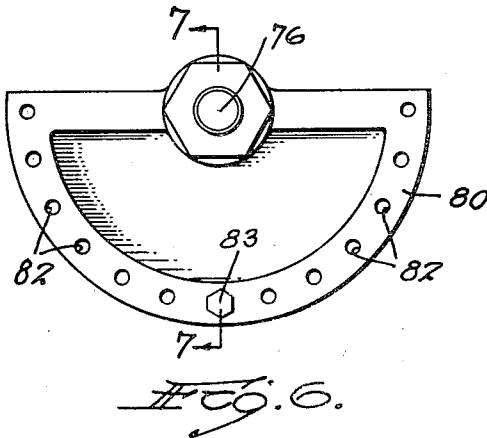


Fig. 6.

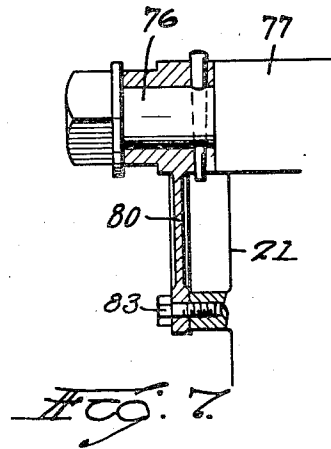


Fig. 7.

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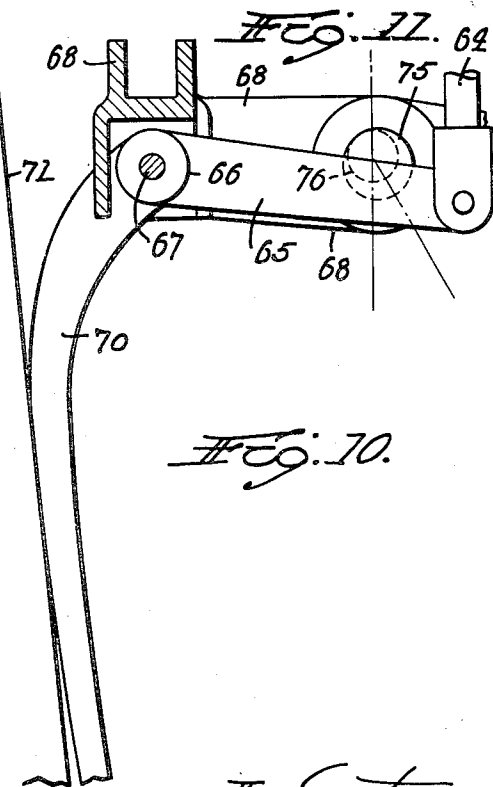
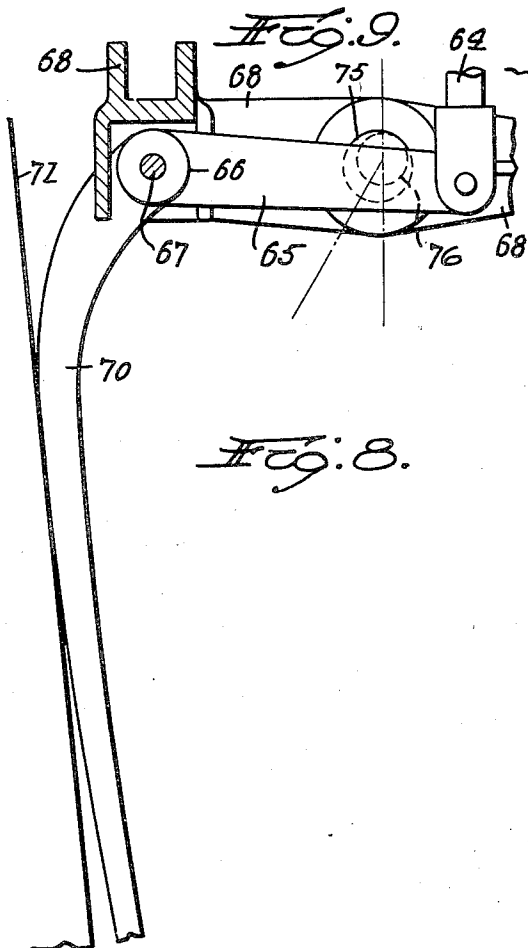
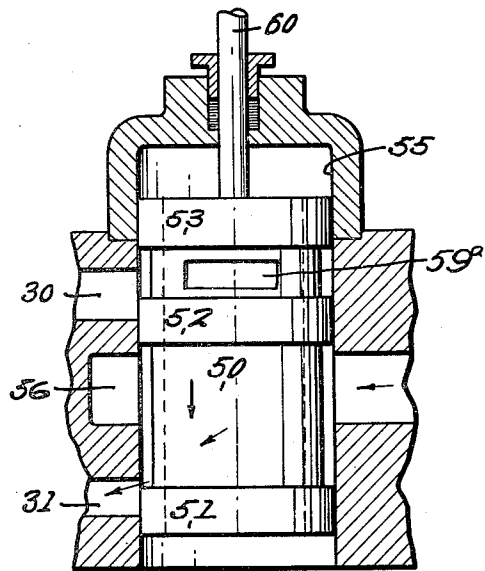
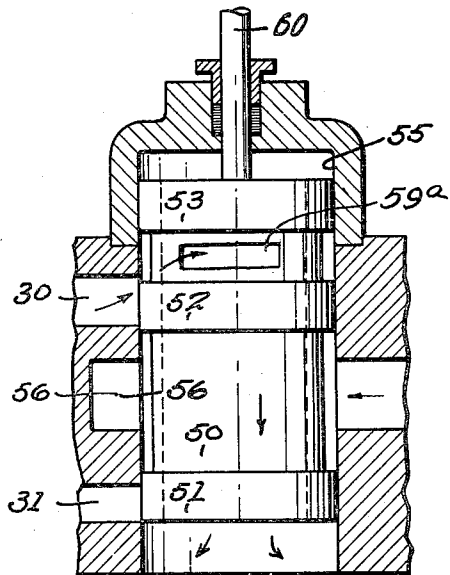
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

1,979,733

STROKE ADJUSTING DEVICE FOR POWER
HAMMERS

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Application October 6, 1932, Serial No. 636,541

1 Claim. (Cl. 121—30)

This invention relates to power hammers of the type in which the hammer head or ram floats or oscillates idly between hammer operations.

It is the object of my invention to provide improved means for controlling the extent of such idle oscillation of the hammer head and for conveniently varying the limits of oscillation to meet operating conditions.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings, in which

Fig. 1 is a front elevation, partly in section, of a steam hammer embodying my improvements; Fig. 2 is an enlarged detail sectional front elevation of the main steam valve;

Fig. 3 is an enlarged partial sectional plan view, taken along the line 3—3 in Fig. 1;

Fig. 4 is a detail sectional front elevation, taken along the line 4—4 in Fig. 3;

Fig. 5 is a detail view, taken along the line 5—5 in Fig. 4;

Fig. 6 is a rear view of certain adjusting mechanism, looking in the direction of the arrow 6 in Fig. 3;

Fig. 7 is a detail sectional view, taken along the line 7—7 in Fig. 6;

Fig. 8 is an enlarged detail front elevation, partly in section, showing one setting of the stroke-adjuster;

Fig. 9 is an enlarged sectional elevation of the main valve and showing the setting of the valve corresponding to the position of the parts shown in Fig. 8;

Fig. 10 is a view similar to Fig. 8 but showing the setting of the stroke-adjuster for a shorter oscillation, and

Fig. 11 shows the corresponding position of the main valve.

Referring to Figs. 1 and 2, I have shown a steam hammer comprising a base or body 20 on which are mounted supporting frame members 21 provided with guideways 22 (Fig. 3) for the hammer head or ram 23. The head 23 is secured to the lower end of a piston rod 25 (Fig. 1), which rod is connected to a piston 26 slidable in a cylinder 27 formed in a cylinder casing 28 mounted on the supporting members 21. Steam passages 30 and 31 are formed in the cylinder casing 28 and connect respectively to the upper and lower ends of the cylinder 27 above and below the piston 26.

Steam is supplied to the hammer through an

inlet pipe 33 (Fig. 1) and an inlet passage 34 (Fig. 2). The flow of steam from the pipe 33 to the passage 34 is controlled by a throttle valve 36 which may be manually adjusted as desired to increase or decrease the normal steam opening between the pipe 33 and passage 34.

A lever 40 (Fig. 1) is secured to the outwardly projecting end of the valve stem 41 of the throttle valve 36. One end of the lever 40 is connected by links 43, 44 and 45 to a foot lever or pedal 46 normally held upward against a stop by a spring 47. A spring 48 (Fig. 1) holds the throttle valve 36 toward closed position.

It is usual in the operation of such steam hammers to allow the hammer head or ram to float or oscillate idly between hammer operations, this action being effected by the intermittent introduction of small amounts of live steam through the lower passage 31. This floating or oscillating movement is of great importance, as it prevents the accumulation of water in the bottom of the cylinder which might otherwise cause breakage of the cylinder head during the working stroke.

This idle swing of the hammer is also important in increasing the available force of the hammer blow, for the reason that steam admitted as is customary on the upward stroke of the hammer will be compressed in the upper end of the cylinder by the inertia of the hammer head. This compressed steam then exerts its expansive force on the hammer piston as soon as the downward movement of the hammer begins and substantially increases the normal acceleration due to gravity. This is not the case where steam is simply admitted above the piston of a hammer at rest in raised position, as steam cannot enter the cylinder through the usual port opening as rapidly as the cylinder volume above the piston is increased by the normal fall of the hammer. The steam above the hammer piston under such conditions serves no useful function whatever. Consequently, the swing of the hammer makes it possible to substantially increase the force of the blow without increase in steam pressure.

The admission of steam to the cylinder 27 is controlled by a main steam valve 50 (Fig. 2) having spaced piston portions 51, 52 and 53. The valve 50 is slidable in a valve chamber 55, to which the steam passages 30 and 31 and the inlet passage 34 are connected, the passage 34 being enlarged to form an annular port 56 surrounding the valve 50 as shown in Fig. 9.

An exhaust pipe 58 (Fig. 2) is connected to

an exhaust passage 59, which in turn connects with the lower end of the main valve chamber 55. As the main valve 50 is shifted upward, the steam inlet passage 34 is connected to the upper passage 30 and the lower passage 31 is connected to the exhaust passage 59. When the main valve 50 is shifted downward, the steam inlet passage 34 is connected to the lower passage 31 to raise the piston 26 and hammer head 23, and the steam above the piston 26 flows out through a port 59^a in a main valve 50 and through the hollow interior of the valve to the exhaust pipe 58 and exhaust passage 59.

The valve 50 is connected by a piston rod 60 (Figs. 1 and 2) to an arm 61 pivoted at 62 on the cylinder head 28. The arm 61 is in turn connected by a link 64 to an arm 65 (Fig. 3) having a hub portion 66 loosely mounted on a stud 67 secured in a supporting lever 68. A cam arm 70 is also formed on a rear portion of the hub 66 and engages a cam surface 71 on the hammer head or ram 23. The arm 70, hub 66 and arm 65 preferably form a single unitary device in the nature of a bell crank.

The lever 68 is pivoted on an eccentric bearing member 75 (Figs. 3 and 5) formed at the front end of a shaft 76 supported in a fixed bearing 77 in one of the side frame members 21. The lever 68 may be retained on its eccentric bearing member 75 in any convenient manner as by the use of a cotter-pin 78.

A segmental disc 80 (Figs. 3, 6 and 7) is secured to the rear end of the shaft 76 and is provided with a plurality of holes 82 adapted to receive a screw 83 threaded into an opening in the side frame member 21. By removing the screw 83 and angularly adjusting the segmental disc 80, it is obvious that the position of the eccentric bearing member 75 may be selectively adjusted.

The outer end of the lever 68 is connected by a link 90 (Fig. 1) to the link 45 previously described and thus to the foot lever 46. A tension spring 91 is secured to the lever 68 and tends to hold the cam arm 70 firmly against the cam surface 71.

Assuming that the foot lever 46 is in normal raised position, the withdrawal of the cam 71 from the cam arm 70 as the head 23 moves downward permits a slight lowering of the main valve 50, thus "cracking" the valve and allowing a small amount of live steam to enter the lower steam passage 31 as indicated in Fig. 2. This will force the piston 26 and hammer-head 23 upward.

The subsequent action of the cam 71 on the arm 70 as the head moves up will thereupon lift the main valve sufficiently to connect the passage 31 to the exhaust. The hammer head then swings downward, again "cracking" the valve

to admit additional live steam to the passage 31 and the hammer thus continues to oscillate and to clear itself of condensed water through the exhaust passage 59.

It is desirable to increase or decrease the limits of such oscillating or floating movement of the hammer head in accordance with working conditions. This may be readily accomplished by removing the screw 83 (Figs. 6 and 7) and selectively adjusting the segmental disc 80, correspondingly adjusting the eccentric bearing member 75. Such adjustment moves the pivot 67 of the arms 65 and 70 toward or away from the cam surface 71 as indicated in Figs. 8 and 10.

When the parts are in the position shown in Fig. 8, a longer swing or oscillation of the hammer head will occur, while with the parts in the position shown in Fig. 10, a shorter swing will take place.

The positions of the parts shown in Figs. 9 and 11 both correspond to the position of the ram shown in Fig. 1. It will be obvious that a substantial additional downward movement of the valve 50 is necessary in Fig. 9 before the connection to the lower steam passage 31 is cracked, whereas in Fig. 11 such connection has already been completed.

I have thus provided simple and convenient means for accurately adjusting the extent of swinging movement of the hammer head without actually changing the contour of the cam arm 70.

While I have described a hammer operated by steam, my invention is not so limited and embraces operation by other expanding media such as compressed air.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:—

The combination in a power hammer actuated by an expanding medium and having a hammer-head, of a main valve, actuating mechanism for said valve including an actuating lever, a cam element having a substantially vertical movement with said hammer-head and engaging and operating said actuating lever, a supporting member having a pivot bearing for said actuating lever, manual means to shift said pivot bearing in a direction substantially parallel to the path of movement of said cam element, a pivot bearing for said supporting member, and additional manual means effective to move said pivot bearing for said supporting member toward or away from the path of movement of said cam element, said latter adjusting movement being in a direction substantially perpendicular to said path of movement.

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