July 1, 1941. M. H. DAMERELL 2,247,802

JACKETED STEAM HAMMER

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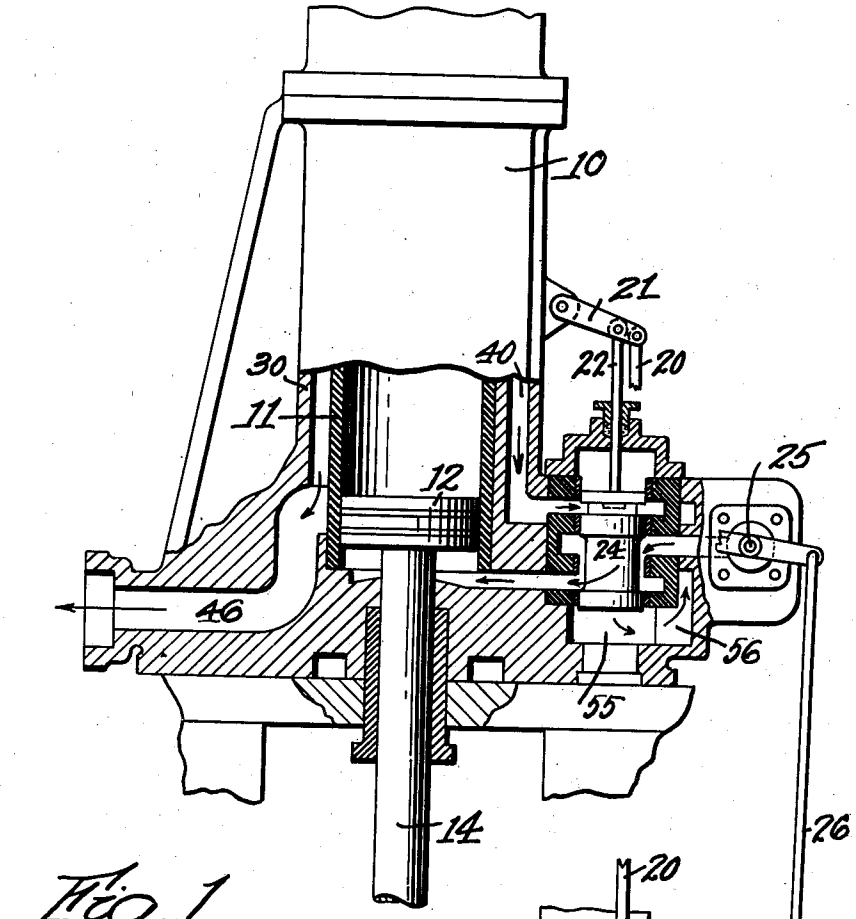
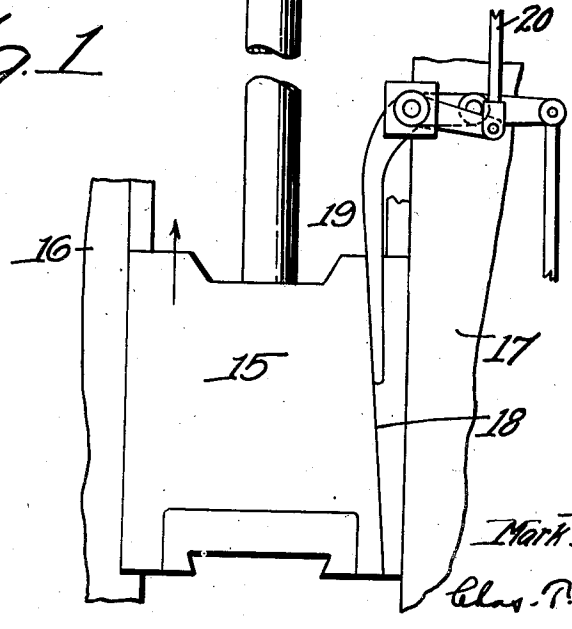


Fig. 1



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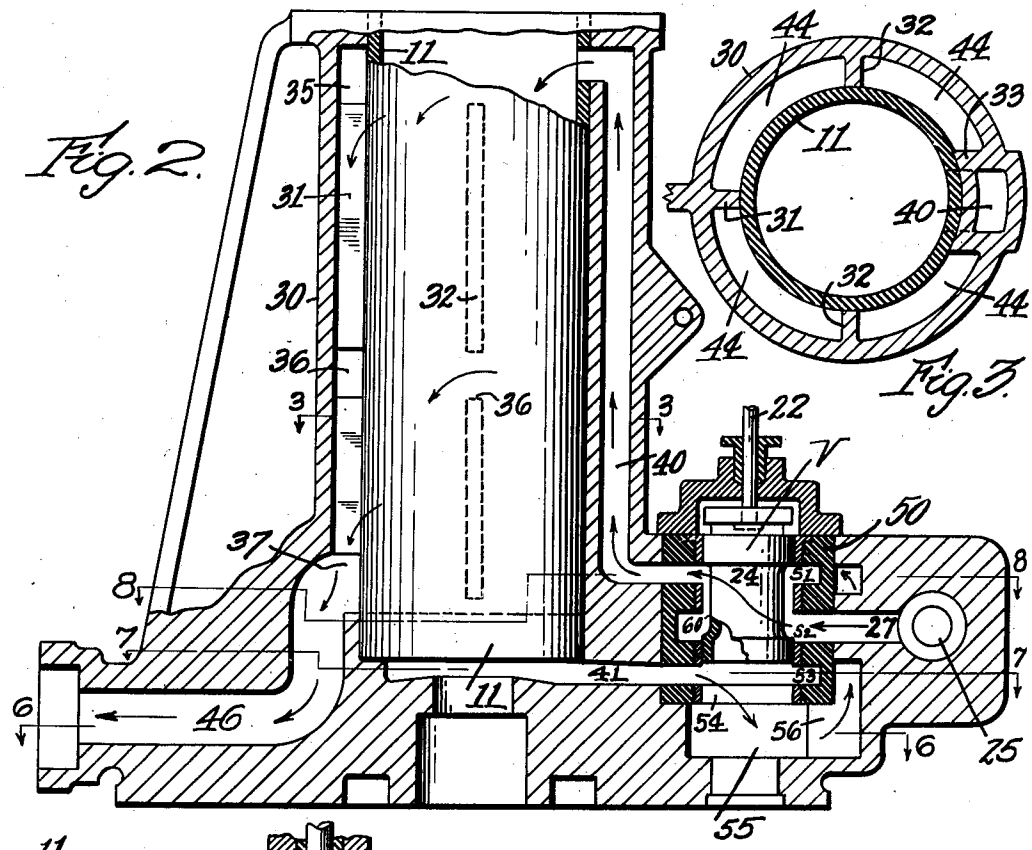


Fig. 2.

Fig. 3.

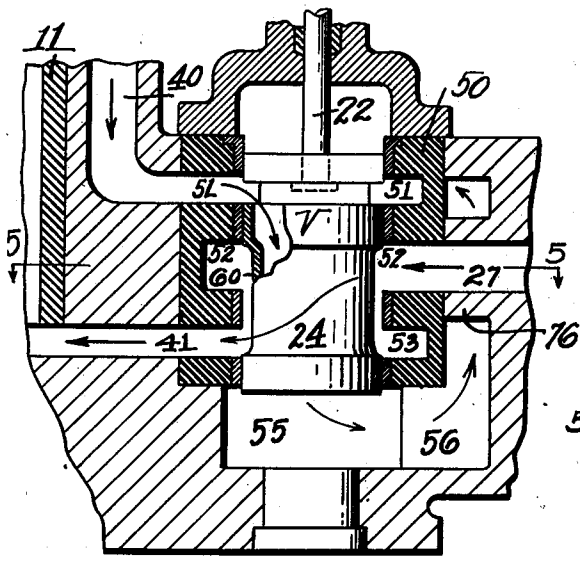


Fig. 4.

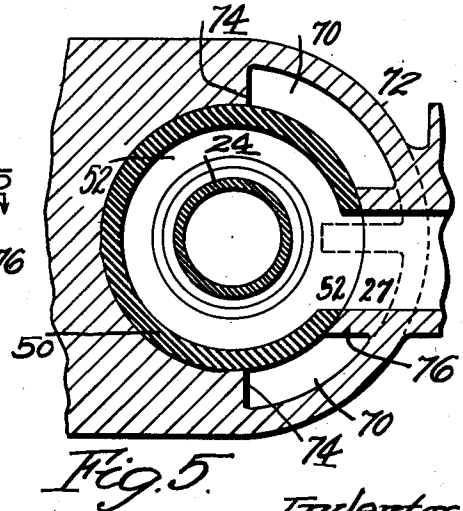


Fig. 5.

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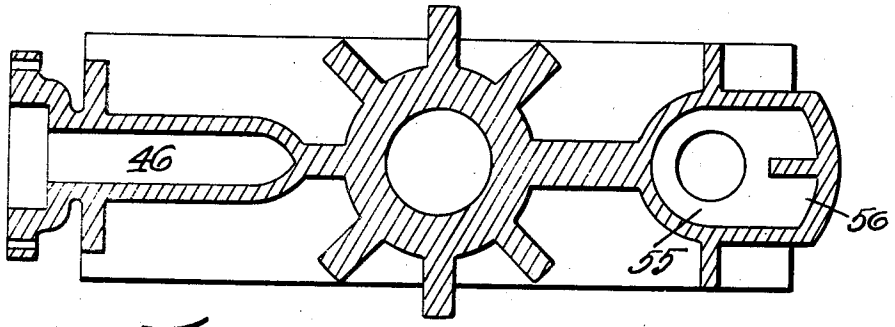


Fig. 6.

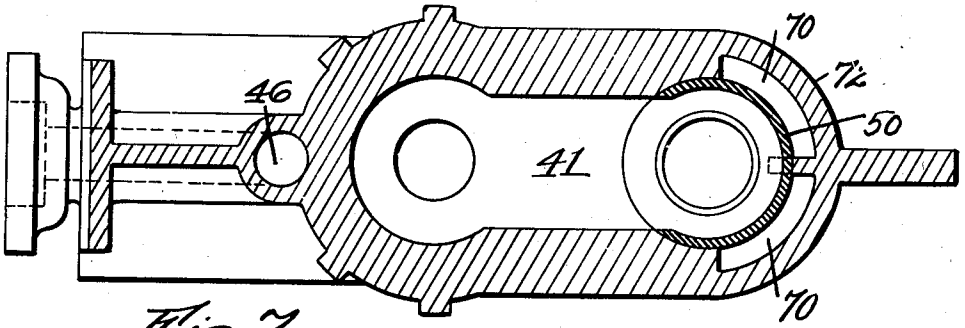


Fig. 7

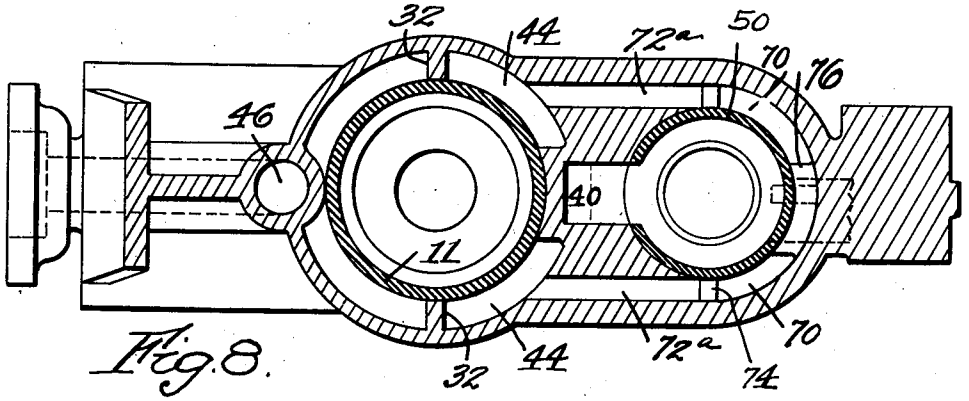


Fig. 8.

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UNITED STATES PATENT OFFICE

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JACKETED STEAM HAMMER

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Application January 4, 1940, Serial No. 312,403

1 Claim. (Cl. 121—181)

This invention relates to heavy steam hammers used in blanking and forging operations.

It is the general object of my invention to improve the construction and operation of such hammers by providing a jacket for the steam cylinder of the hammer, and by circulating exhaust steam from the cylinder through the jacket. I thus substantially reduce the loss of heat by radiation and the condensation of steam in the cylinder.

A further object of my invention is to provide a special and improved valve construction by which exhaust steam from either end of the steam cylinder will be delivered to the jacket, and live steam will be simultaneously delivered to the other end of the steam cylinder.

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

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

Fig. 1 is a front elevation, partly in section, of portions of a steam hammer embodying my improvements;

Fig. 2 is an enlarged sectional front elevation of the steam cylinder and associated parts;

Fig. 3 is a sectional plan view of the cylinder, taken along the line 3—3 in Fig. 2;

Fig. 4 is a sectional front elevation of the main valve, still further enlarged;

Fig. 5 is a sectional plan view, taken along the line 5—5 in Fig. 4; and

Figs. 6, 7 and 8 are sectional plan views, taken along the lines 6—6, 7—7 and 8—8 in Fig. 2 respectively.

Referring to Fig. 1, I have shown portions of a steam hammer which is in general of the usual construction and which comprises a head 10, a cylinder 11, a piston 12, a piston rod 14 and a ram 15 slidable between fixed guideways 16 and 17. The ram 15 is provided with the usual inclined cam surface 18 engaging a lever 19 which actuates a motion rod 20, which in turn is connected to a rocker arm 21. The arm 21 is connected by a rod or link 22 to the main valve piston 24.

The inclined cam surface 18 and the parts associated therewith act in the usual way to crack the main valve V and keep the piston 12 in oscillating motion when the hammer is idle, this method of operation being necessary to prevent the accumulation of condensed water in the bottom of the cylinder 11. A throttle valve 25, manually actuated through a rod 26, controls the admission of live steam to the main valve V through a steam inlet passage 27.

The head 10 is of the special construction shown in Figs. 2, 6, 7 and 8. As shown the cylinder 11 is in the form of a separate liner or sleeve which is mounted in spaced relation to an outer casing 30 (Fig. 3) and is held in position by ribs 31 and 32 and a steam partition 33. The ribs 31 and 32 do not extend continuously the full length of the cylinder but are stopped off at the top as indicated at 35 (Fig. 2) and also at the middle as indicated at 36. The rib 31 is also stopped off at the lower end, as indicated at 37.

The partition 33 extends the whole length of the cylinder and provides a passage 40 (Fig. 2) by which live steam is conducted from the main valve V to the upper end of the cylinder 11. A passage 41 through the base of the cylinder head similarly connects the main valve V to the lower end of the cylinder 11. The ribs 31 and 32 and the partition 33 (Fig. 3) provide jacket spaces 44 (Fig. 3) between the cylinder 11 and outer casing 30 and these jacket spaces are in communication with an exhaust passage 46 (Fig. 2).

The main valve V comprises a valve sleeve 50 having an annular port 51 (Fig. 4) connecting to the passage 40, an annular port 52 connecting to the passage 27 and throttle valve 25, and an annular port 53 connecting to the passage 41. The valve sleeve 50 also has an opening 54 (Fig. 2) at its lower end, communicating with an exhaust steam chamber 55 and passage 56.

The main valve piston 24 previously described is of hollow construction, as shown in Figs. 2 and 4, and is so connected to the link 22 that steam can freely enter the upper end of the piston. The piston 24 also has an intermediate portion 60 of reduced diameter, adapted to form an annular connecting passage between selected ports.

When the main valve is in the position shown in Fig. 2, steam entering through the throttle valve 25 and passage 27 passes from the port 52 through the port 51 to the steam passage 40 and hence to the upper end of the cylinder 11. At the same time, exhaust steam flows out through the passage 41 and opening 54 to the exhaust chamber 55 and passage 56. When the valve is in the opposite position shown in Fig. 4, live steam passes from the port 52 to the port 53 and passage 41 and thence to the lower end of the cylinder 11, while exhaust steam flows out through the passage 40, port 51 and the hollow interior of the valve 24 to the exhaust chamber 55 and passage 56.

I will now describe the connection from the exhaust passage 56 to the jacket spaces 44, referring particularly to Figs. 6, 7 and 8. The exhaust passage 56 is extended to the right, as viewed in Fig. 6, and is in free communication with the lower ends of vertical passages 70, formed between the main valve sleeve 50 and the outer valve casing 72. At their upper ends, the passages 70 communicate with side passages 72a (Fig. 8) which in turn connect into the jacket spaces 44. The main valve sleeve 50 is held in position relative to the casing 72 by a segmental contact 74 (Fig. 5) and by a boss or projection 76 through which extends the steam passage 27.

With the construction above described, it will be evident that all of the exhaust steam passes through the opening 54 to the exhaust chamber 55 and exhaust passage 56 and thence through the passages 70 and 72a to the jacket spaces 44 which surround the cylinder 11. The ribs 32 cause the exhaust steam to travel upward on one side of the cylinder on entering the jacket space and downward on the other side, and to finally enter the exhaust connection 46.

The cylinder 11 is thus effectually surrounded by exhaust steam at all times, so that loss of heat by radiation is greatly reduced. Furthermore, the cylinder 11 is maintained at a substantially higher temperature so that condensation of live steam in the cylinder is similarly reduced.

This not only leads to economy in steam consumption, but also reduces the possibility of damage to the steam hammer, if a blow is struck when any considerable amount of condensed steam is present in the form of water in the lower end of the cylinder.

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 claim, but what I claim is:

In a steam hammer, a cylinder head comprising an outer casing comprising a steam jacket having a plurality of internal longitudinal ribs, a cylinder comprising a separate lining sleeve fitting within said casing and spaced therefrom by said longitudinal ribs, one of said ribs extending from end to end of said jacket and constituting a partition dividing the jacket space into two separate portions while the other ribs terminate short of the ends of the jacket, said jacket being provided with an exhaust outlet near one end of the jacket, a main valve located externally of said steam jacket and having a valve casing provided with a lining sleeve having ports, and connections from said ports leading to both ends of said cylinder, the valve being effective for alternately supplying live steam to opposite ends of said cylinder and withdrawing exhaust gases therefrom, and connections from the valve casing to said steam jacket for supplying exhaust steam thereto.

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