

Oct. 19, 1943.

E. MARTIN

2,332,244

PRESSURE FLUID MANIFOLD

Filed April 8, 1941

3 Sheets-Sheet 1

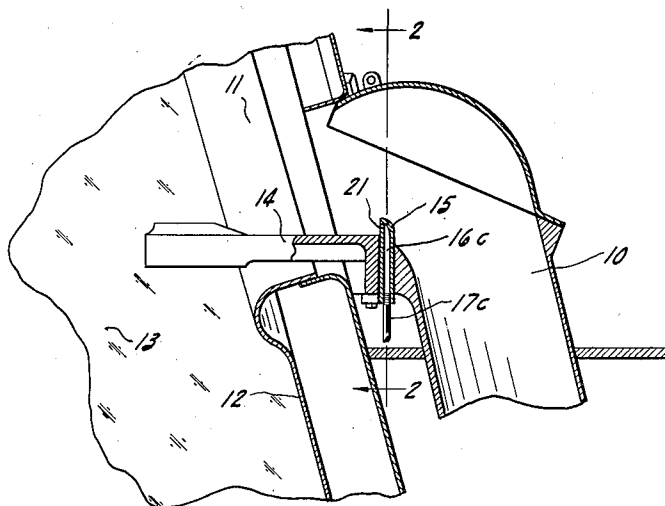


FIG. 1

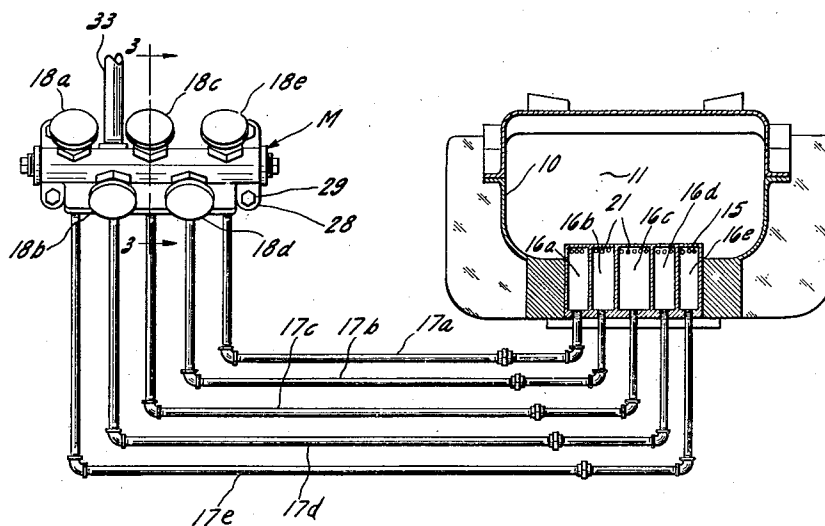


FIG. 2

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3 Sheets-Sheet 2

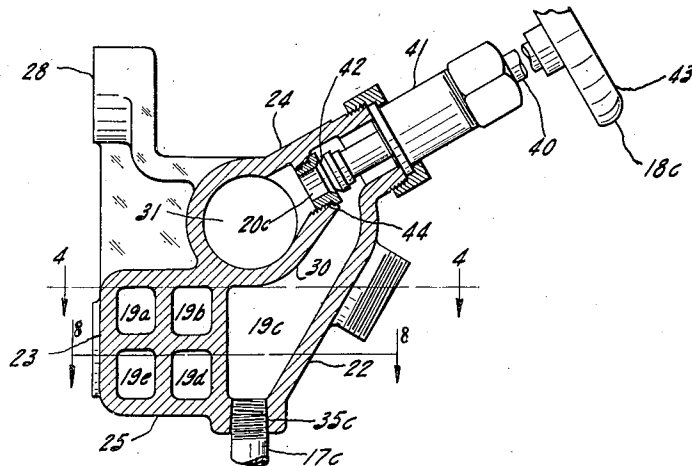


Fig. 3

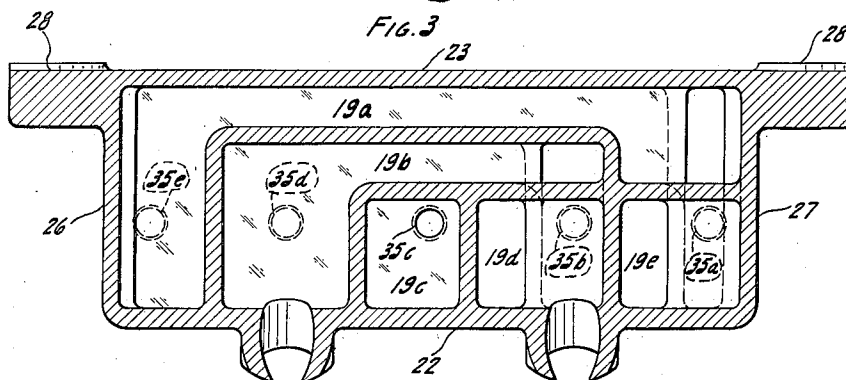


Fig. 4

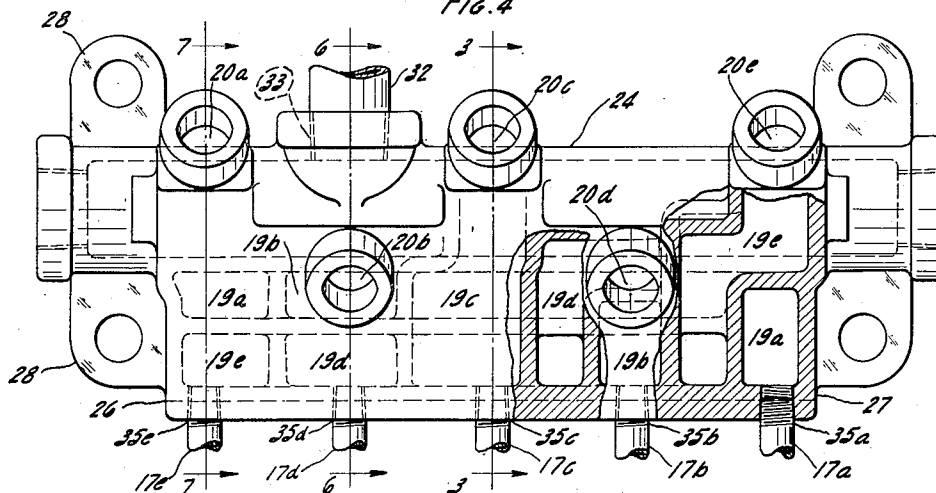


Fig. 5

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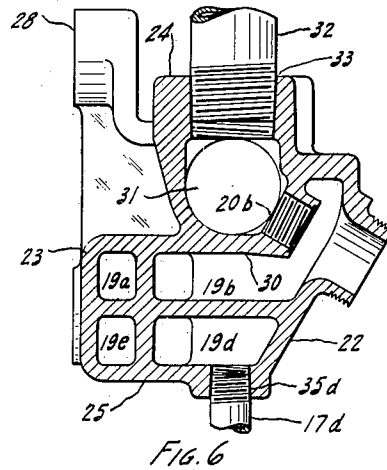
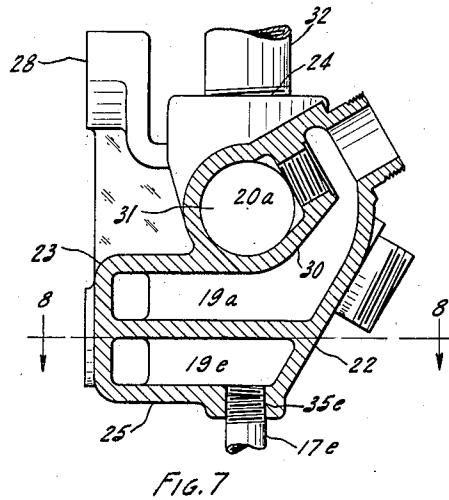
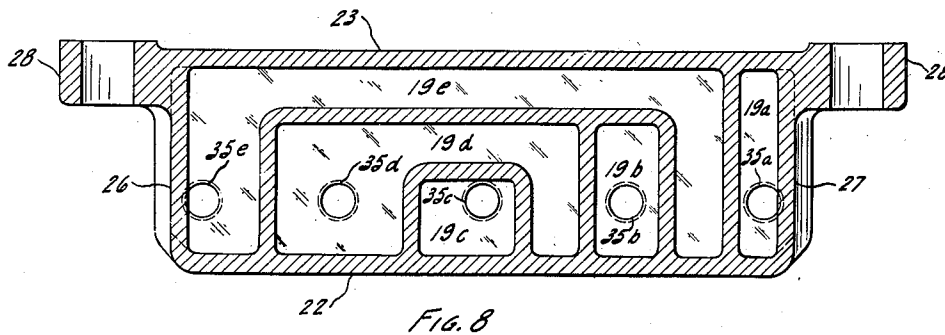
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3 Sheets-Sheet 3



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2,332,244

PRESSURE FLUID MANIFOLD*

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Application April 8, 1941, Serial No. 387,458

3 Claims. (Cl. 277—57)

This invention relates to a multi-valved pressure fluid manifold and more specifically to a manifold of this type that is particularly adapted for the control of fluid under pressure to a pressure fluid jet head of a stoker.

In many types of stokers, in fact all current types of locomotive stokers, coal is projected over the firebed by steam blasts issuing from a pressure fluid jet head. The jet head is divided longitudinally into a plurality of side-by-side disposed chambers from each of which steam issues through jet orifices, of which there may be several to each chamber. A plurality of pipes, one leading to each chamber, are connected by a manifold disposed above and to one side of the jet head within easy reach of the operator, with a main steam line leading from a suitable source of supply. The jets of steam issuing from the orifices of the several chambers are directed toward predetermined areas of the firebed, and in order to provide for adequate control of the intensity of these blasts, and thus for the effective control of fuel distribution, a valve is provided in each of the pipes subjacent the manifold, as shown in U. S. Patent No. 1,904,520, or a valve controlling the flow of steam to each pipe is provided in the manifold itself, as shown in U. S. Patent No. 2,086,692.

In order to avoid confusion as to which valve controls which steam chamber, the valves are generally arranged in the same order from left to right as the order of the steam chambers of the jet head that they are to control, i. e., the valve farthest to the left controls the flow of steam to the steam chamber farthest to the left, the second valve from the left controls the flow of steam to the second steam chamber from the left, and so on in order.

Previously, this has required crossing of the steam pipes between the manifold and the jet head, or it has required the provision of a complicated jet head structure, which, while it eliminated crossing of the pipes, necessitated disalignment of the pipes in transverse vertical planes.

The present invention eliminates the various disadvantages of past practice and one of its objects is to provide a new and novel pressure fluid manifold, so constructed that the fluid outlets are in inverse order from left to right with respect to the order of the valves controlling the emission of fluid from said outlets.

Another object of the invention is to provide a simplified and advantageous piping arrange-

ment between a pressure fluid manifold and a pressure fluid jet head of a stoker.

Other objects and advantages of the invention residing in the construction of the parts thereof and the combination and arrangement of various elements will become apparent from the following description when read in connection with the accompanying drawings, in which drawings

Fig. 1 is a fragmentary view in central vertical section through the rearward portion of a locomotive firebox and the forward portion of a stoker, portions thereof being shown in elevation, the stoker embodying a pressure fluid distributing means with which the novel manifold is employed;

Fig. 2 is a sectional view on the line 2—2 of Fig. 1 with the manifold and piping between the manifold and the stoker jet head shown in elevation;

Fig. 3 is a sectional view through the manifold taken on the lines 3—3 of Figs. 2 and 5;

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a view in front elevation of the novel manifold, with parts broken away and shown in section;

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 5; and

Fig. 8 is a sectional view taken on the lines 8—8 of Figs. 3 and 7.

With reference now to Figs. 1 and 2 of the drawings, a stoker discharge conduit is shown at 10 and it communicates with a firing opening 11 in the backwall 12 of a locomotive firebox 13. The conduit 10 delivers fuel onto a distributing table 14 extending through the firing opening 11 and from which table the fuel is projected into the firebox to the various parts of the firebed by blasts of fluid under pressure, preferably steam, issuing from the pressure fluid jet head 15.

The jet head 15 is provided with a plurality of separated chambers, such as 16a, 16b, 16c, 16d and 16e arranged to receive fluid under pressure from a suitable source of supply through the pipes 17a, 17b, 17c, 17d, and 17e respectively. The blasts of fluid under pressure for projecting fuel from the table 14 issue from the jet apertures 21 of the jet head 15, a plurality of such jet apertures, preferably, communicating with each of the chambers 16a, b, c, d and e.

The streams of pressure fluid issuing from the jet apertures of the several chambers are directed

toward predetermined areas of the firebed, and in order to provide for adequate control of the intensity of these blasts for effecting proper control of fuel distribution, delivery of pressure fluid to the pipes 17a, 17b, 17c, 17d and 17e is controlled by valves, designated, respectively, as 18a, 18b, 18c, 18d and 18e, each of which is manually controlled and carried by the manifold M.

It will be observed, as the description proceeds, that the valves 18a, 18b, 18c, 18d and 18e are arranged in the same sequence from left to right as the chambers 16a, 16b, 16c, 16d and 16e to which they respectively control the flow of pressure fluid. This is highly desirable from the standpoint of the operator, since if he desires to vary the intensity of the blast issuing from the extreme right hand chamber 16e for the purpose of increasing or decreasing the amount of coal projected to that area of the firebed affected by the blast issuing from chamber 16e, he manipulates the extreme right hand valve 18e. Similarly, if he desires to vary the intensity of the blast issuing from chamber 16d, the chamber second from the right, he manipulates valve 18d, the valve second from the right.

The desirability of arranging the valves in the same sequence as the jet head chambers has been recognized in the past, as shown in Pickard Patent 1,904,520 and Roesch Patent 2,160,563. In order to accomplish this, Roesch crossed the pipes leading from the manifold to the jet head and Pickard provided a specially constructed jet head that still necessitated the crossing of some of the pipes. My invention incorporates a novel manifold that eliminates crossing of the pipes leading from the manifold to the jet head, permitting them to be arranged in the same transverse vertical plane whereby they can be disposed closely adjacent the locomotive backhead 12 and are easily and conveniently installed and readily accessible for removal when necessary.

The construction of the novel manifold is shown in Figs. 3 to 8, inclusive, and will now be described in detail. The manifold M is generally oblong in shape and includes a front wall 22, rear wall 23, top wall 24, bottom wall 25 and end walls 26 and 27. A flange 28 is provided at each of the four corners of the manifold rear wall 23, through which flanges the manifold is secured to the back wall 12 by suitable means such as the bolts 29, as best shown in Fig. 2.

A partition wall 30, extending transversely between the end walls 26 and 27 of the manifold, forms in the upper portion of the manifold a main chamber 31. A main lead 32 conducts fluid under pressure from a suitable source of supply, such as the steam boiler of the locomotive, to the main chamber 31 through an intake opening 33 in the top wall 24 of the manifold M. A manually controlled valve (not shown) is provided in the main lead 32 between the manifold M and the source of fluid under pressure for controlling the fluid pressure in the main chamber 31.

The lower portion of the manifold M is divided by partitions into five separate and distinct passages, designated as 19a, 19b, 19c, 19d and 19e, there being the same number of passages as there are pipes leading from the manifold M to the jet head 15 and as there are chambers in the jet head 15. The passages 19a, 19b, 19c, 19d and 19e communicate at one end with the main chamber 31 and at the opposite end with the pipes 17a, 17b, 17c, 17d and 17e, respectively for the passage of pressure fluid from the main chamber 31 to the pipes 17a, 17b, 17c, 17d and

17e and thence to the jet head chambers 16a, 16b, 16c, 16d and 16e, respectively.

Communication between the main chamber 31 and the passages 19a, 19b, 19c, 19d and 19e is effected by means of inlet ports 20a, 20b, 20c, 20d and 20e, respectively, formed in the partition wall 30 and spaced in a row extending transversely between the ends of the manifold. Communication between the passages 19a, 19b, 19c, 19d and 19e and the pipes 17a, 17b, 17c, 17d and 17e, respectively, is effected by means of outlet ports 35a, 35b, 35c, 35d and 35e, respectively, formed in the bottom wall 25 of the manifold and spaced in a row extending transversely between the ends of the manifold, the axes of the outlet ports being disposed in the same transverse vertical plane.

It will be observed that the passages 19 are so arranged in the manifold that their inlet ports 20 are in inverse order of their outlet ports 35. In other words, the inlet ports 20 of the passages 19 are arranged from left to right in the order a, b, c, d and e, while the outlet ports 35 are arranged from left to right in the order e, d, c, b and a.

As was previously mentioned, the manifold M carries valves 18 for controlling the flow of pressure fluid to the jet head chambers 16, in consequence of which the distribution of fuel to desired portions of the firebed can be effectively controlled. The valves 18a, 18b, 18c, 18d and 18e control the extent of the openings of the inlet ports 20a, 20b, 20c, 20d and 20e, respectively, and therefore the volume of pressure fluid delivered to the passages 19a, 19b, 19c, 19d, and 19e, respectively.

As best shown in Figs. 3, 4 and 5, passage 19c extends vertically through the central front portion of the manifold, both its inlet port 20c and outlet port 35c being disposed centrally between the ends of the manifold. The other passages, 19a, 19b, 19d and 19e, as best shown in Figs. 4 and 5, cross over behind passage c from one side to the other side thereof, passages 19a and 19b having their inlet ports 20a and 20b at the left of inlet port 20c and their outlet ports 35a and 35b at the right of outlet port 35c, and passages 19d and 19e having their inlet ports 20d and 20e at the right of inlet port 20c and their outlet ports 35d and 35e at the left of outlet port 35c.

In Fig. 3 the valve 18c is shown in detail as applied to inlet port 20c. The details of valves 18a, 18b, 18d and 18e are not shown since the construction thereof is identical with that of valve 18c. Referring to Fig. 3, valve 18c comprises a stem 40 threaded into a bonnet 41, the stem having a valve member 42, at its inner end and the valve handle 43 at its outer end. A valve seat 44 is threaded into the body of the manifold in the inlet port 20c and is arranged to receive the valve member 42. The setting of valve 18c determines the amount of pressure fluid admitted to the passage 19c from the main chamber 31.

In operation, assuming for purpose of illustration that the operator desires to fire the extreme left side of the firebed heavier, he opens the valve 18a at the extreme left of the manifold wider. Opening of the valve 18a permits pressure fluid to pass from the main chamber 31 to passage 19a through inlet port 20a (Fig. 7). Passage 19a, as shown in Fig. 4 leads to the extreme right side of the manifold and communicates with pipe 17a through outlet port 35a (Fig. 5). The pressure fluid is thus conducted through the manifold by passage 19a from the inlet port at the left to

the outlet port at the right, thence passes through pipe 17a to the jet head chamber 16a, from which chamber the pressure fluid issues through the jet apertures 21 projecting the fuel to the extreme left side of the firebed.

If it is desired to vary the intensity of the blast issuing from the extreme right hand chamber 16e, the operator manipulates the extreme right hand valve 18e (Fig. 2), whereby the flow of pressure fluid from the main chamber 31 to passage 19e is controlled. The pressure fluid passes through port 20e into passage 19e (Fig. 5). Passage 19e, as shown in Fig. 8 leads to the extreme left side of the manifold and communicates with pipe 17e through outlet port 35e (Fig. 5). The pressure fluid is thus conducted through the manifold by passage 19e from the inlet port at the right to the outlet port at the left, thence passes through pipe 17e to the jet head chamber 16e, from which chamber the pressure fluid issues through the jet apertures 21, controlling distribution of fuel to the extreme right side of the firebed.

In similar manner, the path of the pressure fluid to chamber 16b can be traced from main chamber 31 through inlet port 20b (Fig. 6) to passage 19b, then through passage 19b (Fig. 4) to outlet port 35b, thence through pipe 17b (Fig. 5) to chamber 16b. Pressure fluid to chamber 16d passes from main chamber 31 through inlet port 20d to passage 19d (Fig. 5), then through passage 19d (Fig. 8) to outlet port 35d, thence through pipe 17d (Fig. 5) to chamber 16d.

It is apparent from the above description that my novel pressure fluid manifold provides for arrangement of the valves in the same order as the jet head chambers to which they control the passage of pressure fluid. At the same time, the piping from the manifold to the jet head is maintained closely against the firebox backwall. A symmetrical piping arrangement is provided, obviating crossing of pipes and making them conveniently accessible and easily installed or replaced.

While my invention has been shown and described as applied to the firebox of a locomotive, it is apparent that it is equally applicable to other types of fireboxes.

I claim:

1. A manifold comprising a body having a main supply chamber, and a plurality of passages extending from one end of the body toward the opposite end thereof, and with a central passage, a valve controlled central inlet port in said manifold body forming communication between said main chamber and said central passage, an outlet pipe connected to said manifold body and having communication with said central passage, two valve controlled inlet ports in said manifold body and disposed to one side of said central inlet port and each respectively having communication between said main chamber and a passage extending from one end toward the other end of said manifold body, outlet pipes connected to said manifold body and disposed on the opposite side of said central inlet port from the two said valve controlled inlet ports, each of said outlet pipes respectively having communication with one of said passages, two valve controlled inlet ports in said manifold body disposed on the opposite side of said central inlet port from the two first mentioned inlet ports and each respectively having communication with a passage extending from one end toward the other end of said manifold body, and outlet pipes connected to said manifold

body and each respectively having communication with one of said last mentioned passages and disposed to the same side of said central inlet port as said first mentioned two inlet ports.

2. A manifold comprising a body having a main supply chamber, and a plurality of passages extending from one end of the body toward the opposite end thereof, and with a central passage extending transversely with respect to said mentioned passages, a valve controlled central inlet port in said manifold body forming communication between said main chamber and said central passage, an outlet pipe connected to said manifold body and having communication with said central passage, said manifold body having a plurality of inlet and outlet ports, each of said passages having in communication therewith an inlet port at one end thereof and an outlet port at the opposite end thereof, a plurality of said inlet ports disposed at one side of said central inlet port and passage, and each of said inlet ports forming communication between said supply chamber and a respective passage, a plurality of outlet pipes disposed at the opposite side of said central passage from the said inlet ports, and each outlet pipe associated with a respective outlet port of one of said passages, a plurality of said inlet ports disposed on the opposite side of said central passage from said first mentioned inlet ports and each of said inlet ports forming communication between said supply chamber and a respective passage, a plurality of outlet pipes disposed at the opposite side of said central passage from said first mentioned outlet pipes and each outlet pipe associated with a respective outlet port of one of said passages, and means for controlling the flow of fluid through each of said passages.

3. A manifold comprising a body having a main supply chamber, and a plurality of passages extending from one end of the body toward the opposite end thereof, and with a central passage extending transversely with respect to said mentioned passages, a valve controlled central inlet port in said manifold body forming communication between said main chamber and said central passage, an outlet pipe connected to said manifold body and having communication with said central passage, said manifold body having a plurality of inlet and outlet ports, each of said passages having in communication therewith an inlet port at one end thereof and an outlet port at the opposite end thereof, a plurality of said inlet ports disposed at one side of said central inlet port and passage, and each of said inlet ports forming communication between said supply chamber and a respective passage, a plurality of outlet pipes disposed at the opposite side of said central passage from the said inlet ports, and each outlet pipe associated with a respective outlet port of one of said passages, a plurality of said inlet ports disposed on the opposite side of said central passage from said first mentioned inlet ports and each of said inlet ports forming communication between said supply chamber and a respective passage, a plurality of outlet pipes disposed at the opposite side of said central passage from said first mentioned outlet pipes and each outlet pipe associated with a respective outlet port of one of said passages, and means for controlling the flow of fluid through each of said passages, said outlet pipes connecting with the manifold body in inverse order as the inlet ports with which they are respectively connected by said passages.

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