H. L. DOHERTY.

HYDRAULIC MAIN.

APPLICATION FILED APR. 13, 1911.

1,043,409. Patented Nov. 5, 1912.

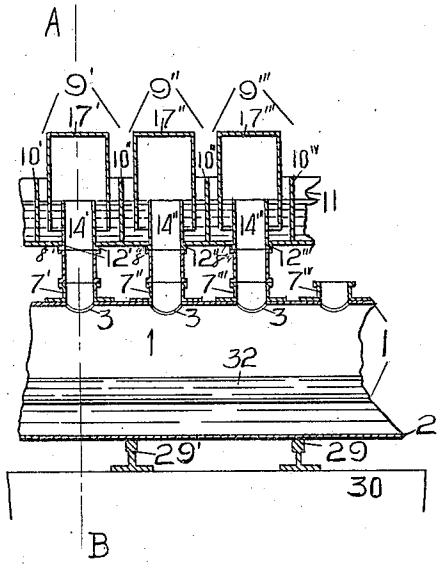

FIG. 1.

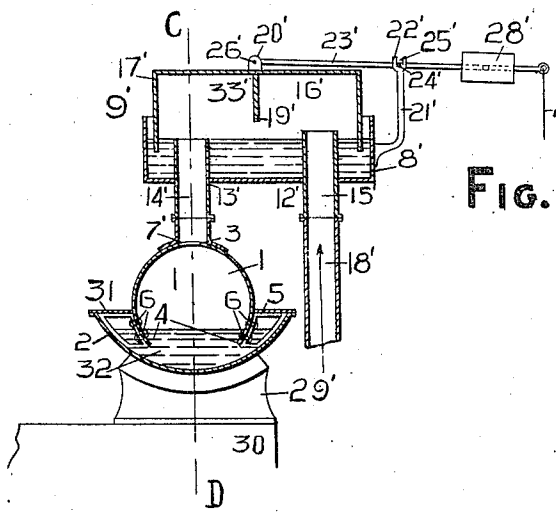

FIG. 2.

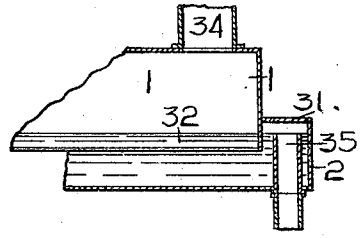

FIG. 3.

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HYDRAULIC MAIN.

1,043,409. Specification of Letters Patent. Patented Nov. 5, 1912.

Original application filed December 27, 1909, Serial No. 535,038. Divided and this application filed April 13, 1911. Serial No. 620,858.

To all whom it may concern:

Be it known that I, HENRY L. DOHERTY, a citizen of the United States, and a resident of New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Hydraulic Mains, of which the following is a specification.

This invention relates to a hydraulic main for gas benches.

The object of my invention is to provide a hydraulic main and seal of a novel construction which permits of ready and easy cleaning.

To this end I have invented the hereinafter described device which, briefly, consists of a two-piece hydraulic main, made up of sheets of metal bent to an open curve on different radii, the larger forming a trough for the reception of the condensation from the gas and the other being set inverted in such trough with its edges immersed in the liquor in the trough so that the inclosed portion above the liquor forms a gas conduit, said conduit having connection through short connecting pipes with the gas space of each individual seal box.

This application is a division of my application Ser. No. 535,038, filed Dec. 27th, 1909, in which latter application I have claimed the sealing device shown.

In the accompanying drawings, Figure 1 is a vertical cross-section through my hydraulic main and a seal box on, say, the line C—D of Fig. 2. Fig. 2 is a vertical section through a seal box on the line A—B of Fig. 1 but showing the movable box or bell in its raised position and with communication between the hydraulic main and its stand-pipe established. Fig. 3 is a vertical longitudinal part section through one end of the hydraulic main showing the liquor off-take.

1, is the gas conducting portion of my hydraulic main, while 2 refers to the trough or liquid conducting portion of the same. The part 1 is made up, preferably, of sheets punched at suitable intervals on their medial line with slightly elliptical holes, 3, preferably so shaped that when the sheets have been bent to their finished shape the projection of the hole on a horizontal plane will be substantially a circle. These sheets are then bent on a mandrel to the proper curve and joined together endwise, preferably by a riveted joint, the whole forming in effect a pipe with a wide horizontal slot, 4, cut out of it. The trough 2 is made up of similar sheets, unperforated. As shown, the trough 2 is, preferably, bent to a considerably larger radius than 1 and has only about 120 degrees of curvature while the gas-conduit 1 may have, say, 270 degrees of curvature. It is, of course, obvious that I am not limited to the use of the curvatures specified. Spiders, 5, having their upper frames curved to correspond with the curvature of gas conduit 1, maintain the part 1 in a fixed position in the trough 2. As shown, these spiders are preferably bolted to the gas-conduit 1 by bolts, 6, before the latter is inverted in the trough 2, although they may, if preferred, be supported by or fastened to the trough.

In assembling the apparatus, the trough 2 is first placed in position, resting in a plurality of cradles of which two, 29, 29′ are shown, and which cradles are, in turn, supported by the walls of the gas benches themselves.

30 represents the partial outline of the top of a bench.

It is not necessary, in my invention, to have the hydraulic main (2) set on a perfect level such as is the case with the present devices of that sort. This constitutes one of the greatest advantages of my construction since it greatly cheapens the cost of erection as well as obviates, altogether, the frequent readjustment of level necessary with the present type of structures. This is due to the fact that instead of having the seal for the retort connections in the hydraulic main itself it is in a separate vessel. The hydraulic main in my invention acts simply as a receptacle for the liquids condensed from the gas. A considerable change in level of the main—due to unequal expansion of the walls of the gas benches, for instance—does not in my invention affect the seal in the slightest degree.

The trough 2 being placed in position, the gas-conduit 1 with the spiders 5 attached is set in the trough 2, and the flanges 7′, 7″, 7‴, 7⁗, (and as many more as may be necessary to correspond with the number of retort connections) bolted or otherwise fastened in place on the holes 3. As shown,

the lower or fixed boxes, 8′, of the seals 9′, 9″, 9‴, are formed by introducing vertical partitions, 10′, 10″, 10‴, 10⁗, in the single box 11, at suitable intervals. If preferred, these boxes, 8′, 8″, 8‴, may be individual boxes for each seal, and such change would not constitute any departure from my invention. The number of connections to the hydraulic main and, consequently, the number of seal boxes is, of course, not limited to the number shown, but they may be multiplied to any extent required.

As shown, each of the compartments, 8′, 8″, 8‴, has an opening (numbered 12′, 12″, 12‴, respectively,) in its bottom to which is attached one of the threaded flanges 13. Short pipes, numbered respectively 14, 14″, 14‴, are screwed or otherwise fastened to these flanges so that their inner extremities are at the level in the respective boxes 8′, 8″, 8‴, at which it is desired to carry the seal. Another set of pipes, 15′, are similarly fastened into the respective seal boxes, 8′, 8″, 8‴, in such a position that they will communicate, respectively, with the compartments 16′ of the several movable bells, 17′, 17″, 17‴. These pipes 15′ are inserted farther into the respective boxes 8′, 8″, 8‴, than the pipes 14′, 14″, 14‴. This is so that under no circumstances can the liquid of the seal overflow down the respective connections 18′ into the retorts. The pipes 14′, 14″, 14‴, join the respective flanges 7′, 7″, 7‴, while the pipes 15′ join the respective ascension pipes 18′.

The movable sealing bells 17′, 17″, 17‴, are simply open-bottomed boxes with transverse vertical partitions, numbered 19′, having yokes 20′ fastened at the center of their respective tops. Brackets 21′, terminating in coöperating slotted yoke bearings, numbered 22′, are attached to the fixed boxes 8′, 8″, 8‴, or to any other suitable support. The respective operating levers 23′ of the several bells 17′, 17″, 17‴, are fulcrumed in the respective yoke bearings 22′, the fixed pins 24′ resting in the open bearing formed by slots 25′ in yokes 22′. One end of levers 23′ is attached to the yoke 20′, of the movable bell of the seal with which it is coöperating, by one of the pins 26′. The other ends of the levers 23′ have each attached to them a wire, rod or chain which permits them to be operated from the charging floor of the retort house by the stokers. The balancing of the bells 17′, 17″, 17‴ and the levers 23′ should be adjusted to suit the conditions of working. Under normal operating conditions it is usually desired to maintain substantially atmospheric pressure in the retorts. With my invention this condition can be secured with the maintenance of substantially the same pressure in the gas conduit 1, since there is free and open communication between the retort and the main 1, and the only pressure difference between the two is that resulting from the friction between the gas and the walls of the passages. In the old type of hydraulic mains, it was necessary to maintain a vacuum in the main sufficient to overcome the seal carried on the dip pipes. As stated, with my apparatus this is not necessary. The bells 17′, 17″, 17‴ are so weighted that they will fall and close the connection to the retort with which they are coöperating whenever the operating wires 27′ are released. To permit of thus balancing the bells or lifts of the seals some device should be provided such as the adjustable counterweight 28′. A number of light removable plates, 31, are laid over the part of the trough 2 which is not covered by the part 1. The function of these covers, 31, is simply to prevent the free circulation and escape of the gases evolved from the body of condensed liquor, 32, in part 2, of the main. The ends of both parts 2 and 1 are, of course, closed and suitable connections made to the tar well and foul mains, respectively.

The method of operating my invention is as follows:—The apparatus having been assembled, sufficient water or other liquid is pumped into synclinal trough 2 to seal the opening 4 in the anticlinal trough 1, of the main. Sufficient liquid is also placed in the seal boxes 8′, 8″, 8‴, to seal the compartments 16′, and 33′, of the respective lifts 17′, 17″ 17‴ of seals 9′ 9″, 9‴, when the lifts are in their lowest positions. The retorts of the gas benches are now charged—the fires, of course, having been previously started, the benches brought up to the proper temperature conditions and whatever exhausting device is to be used in connection with the main set in operation. The bells or lifts 17′, 17″, 17‴, are raised by the operator on the charging floor after the charging of the retorts with which they are respectively coöperating, by hauling down and fastening the wires or rods 27′. The gas evolved from the charges in the retorts ascends through the stand-pipes 18′, into the respective compartments 16′, passes under the respective partitions 19′, into compartments 33′, down through the corresponding one of the connections 14′, 14″, 14‴, into the gas conduit 1 of the hydraulic main. From this it passes, under the influence of the exhauster through the pipe 34, to the foul main and the usual condensing and purifying apparatus. The tarry liquid which condenses from the gas collects in the seal boxes 8′, 8″, 8‴, and finally overflows through the connections 14′, 14″, 14‴, into the part 2 of the hydraulic main, from which it passes through a suitable overflow 35, at one end, to the tar well or other reservoir.

When the charges in any set of retorts are fully carbonized and the retorts are about

to be opened for the purpose of "drawing", the operating wires, 27', of such retorts are released, when the corresponding lifts drop, shutting off communication between the retorts and the hydraulic main. When the retorts have been charged the wires 27 are again hauled down and fastened, again putting the retorts in free and unobstructed communication with the hydraulic main.

In order to clean the seal boxes 8', 8'', 8''', or the connections 14', 14'', 14''' it is only necessary to lift the corresponding bells out of their seal boxes and to insert the cleaning tool in the said boxes or pipes as the case may be. Since it is the practice to carry practically atmospheric pressure in the hydraulic main, this momentary exposure of the inlet end of the connections 14', 14'', 14''' to the atmosphere will not result in any serious influx of air to the main. The cleaning of connections 14', 14'', 14''' should, of course, be performed at such times as the retorts have been drawn.

Should it be desired to clean the stand-pipes 18' from the top, also, by simply placing a suitable loose cap over the end of the corresponding hydraulic main connection so that the lower edge of the cap is immersed in the liquid this stand pipe is completely sealed. When the pipes have been cleaned the caps are removed and the lifts 17', 17''', 17''' replaced, when the seals are again in operative condition. The ascension pipes 18' will usually, however, be cleaned by the insertion of an auger from the mouth-piece of the retort in the customary manner. While this is being done, the corresponding lift should, of course, be down to seal the connection of the retort with the hydraulic main.

To clean an obstruction from the hydraulic main it is only necessary to remove one of the covers 31 at the proper place and insert a suitable scraper, by means of which the obstructing material may be scraped out of the main. It is to be noted that the method by which I support the gas main 1, leaves the lower portion of the synclinal part 2 free and unobstructed.

It is obvious that I may, if I prefer, make the synclinal main, 2, in the shape of a straight sided trough instead of giving it a curved section as shown, and that I may materially modify many parts of my invention without changing the mode of operation or the results which I secure. For instance, the two mains 1 and 2 may be cast instead of being made from sheet metal. The construction shown, however, is the one which I deem most advantageous and is the preferred form of my invention.

While I have only shown the design of apparatus which I deem preferable, it is clear that I may, if I prefer, increase the size of my individual seal boxes and arrange them so that one box will include all the stand-pipes of a single bench, so that the whole set of retorts may be sealed or put in communication with the hydraulic main at the same time; or, I may so arrange the device that one-half or any number of the stand-pipes may enter a single seal box. Such a modification would necessitate merely a simple alteration in the design of apparatus which I herein show which could be made by anyone skilled in the art.

Having described my invention, what I claim is:—

1. A hydraulic main, comprising an anticlinal and a synclinal trough, the former being supported within the latter, one or more conduits connecting the said anticlinal trough with a source of gas, a discharge conduit for conducting gas away from said anticlinal trough, and a conduit connected with said synclinal trough for conducting away therefrom the surplus liquid condensed from said gas.

2. A hydraulic main comprising in combination an anticlinal trough adapted to furnish passage for gas, and a synclinal trough adapted to receive liquid condensed from the gas passing through said anticlinal trough, said anticlinal trough being supported in said synclinal trough in such manner that the lower edges of the walls of said anticlinal trough are immersed in the liquid held by said synclinal trough, whereby the interior of said anticlinal trough is sealed against the atmosphere, one or more passages connecting the said anticlinal trough with a source of gas, one or more passages for discharging gas from said anticlinal trough, and one or more conduits for discharging from said synclinal trough the surplus liquid condensed from the gas.

3. A hydraulic main comprising in combination an anticlinal trough adapted to form a conduit for gas, and a synclinal trough adapted to receive liquid condensed from gas passing through said anticlinal trough and having a length greater than the length of said anticlinal trough, said anticlinal trough being supported in said synclinal trough in such manner that the lower edges of the walls of said synclinal trough are immersed in liquid held by said synclinal trough, whereby the interior of said anticlinal trough is sealed, suitable end members closing both ends of both of said troughs, and suitable covers covering the space included between the walls of said synclinal trough and the walls of said anticlinal trough, one or more conduits connecting the said anticlinal trough with one or more gas generating chambers, one or more conduits for conducting gas away from said anticlinal trough, and an overflow conduit located in that portion of said synclinal trough beyond the end of said anticlinal

trough for conducting from said synclinal trough the surplus liquid condensed from the gas passing through said anticlinal trough.

4. A hydraulic main which comprises in combination an anticlinal trough and a synclinal trough each formed from sheet metal bent to an appropriate shape, the said anticlinal trough being shorter than said synclinal trough and supported within said synclinal trough, one or more conduits connecting the said anticlinal trough with one or more seal boxes, each of said seal boxes being connected with a gas generating chamber.

5. A hydraulic main which comprises in combination an anticlinal trough and a synclinal trough, each formed from sheet metal bent to an appropriate shape, the said anticlinal trough being shorter than said synclinal trough and supported within said synclinal trough, one or more passages connecting the said anticlinal trough with one or more seal boxes, each of said seal boxes being connected with a gas-generating chamber.

6. A hydraulic main comprising in combination an anticlinal trough and a synclinal trough, each formed from sheet metal bent to the appropriate shape, the said anticlinal trough being shorter than the said synclinal trough and supported within said synclinal trough, a plurality of spiders supporting said anticlinal trough, one or more conduits connecting the said anticlinal trough with one or more seal boxes, each of said seal boxes being in communication with one or more stand-pipes of a gas bench, a conduit communicating with said anticlinal trough to conduct away gas therefrom, and an overflow conduit communicating with a seal at one end of said synclinal trough for conducting away condensed liquid therefrom.

7. A hydraulic main comprising in combination an anticlinal trough and a synclinal trough, each formed to the appropriate shape, the said anticlinal trough being shorter than the said synclinal trough, a plurality of supporting members supporting the said anticlinal trough within said synclinal trough, a conduit for withdrawing gas from said anticlinal trough, and an overflow conduit communicating with that portion of said synclinal trough without the said anticlinal trough.

8. A hydraulic main comprising in combination an anticlinal trough and a synclinal trough, each formed from sheet metal bent to the appropriate shape, the said anticlinal trough being shorter than said synclinal trough and supported within said synclinal trough, a plurailty of supporting and spacing members supporting said anticlinal trough and spacing the same away from the walls of said synclinal trough in such manner as to permit of access to said synclinal trough for the removal of obstructive accretions therefrom, one or more gas conduits communicating with said anticlinal trough, and an overflow conduit communicating with that portion of said synclinal trough between corresponding ends of the two troughs.

9. As an article of manufacture, a hydraulic main comprising in combination an anticlinal trough and a synclinal trough, both formed from sheet metal bent to the appropriate shape, the said anticlinal trough being supported in said synclinal trough, said synclinal trough being adapted to retain a sufficient body of liquid to immerse and seal the edges of said anticlinal trough.

10. As an article of manufacture a hydraulic main comprising in combination an anticlinal trough and a synclinal trough, each formed from sheet metal bent to the appropriate shape, the said anticlinal trough being shorter than said synclinal trough and supported in said synclinal trough, said synclinal trough being constructed to retain a sufficient body of liquid to immerse and seal the edges of said anticlinal trough, whereby the interior of said anticlinal trough is sealed, an overflow passage in that portion of said synclinal trough without the end of said anticlinal trough for discharging the surplus condensed liquid from said synclinal trough, and a conduit for discharging gas from said anticlinal trough.

Signed at New York city in the county of New York and State of New York this 12th day of April A. D. 1911.

HENRY L. DOHERTY.

Witnesses:
J. M. McMillin,
F. L. Blackburn.