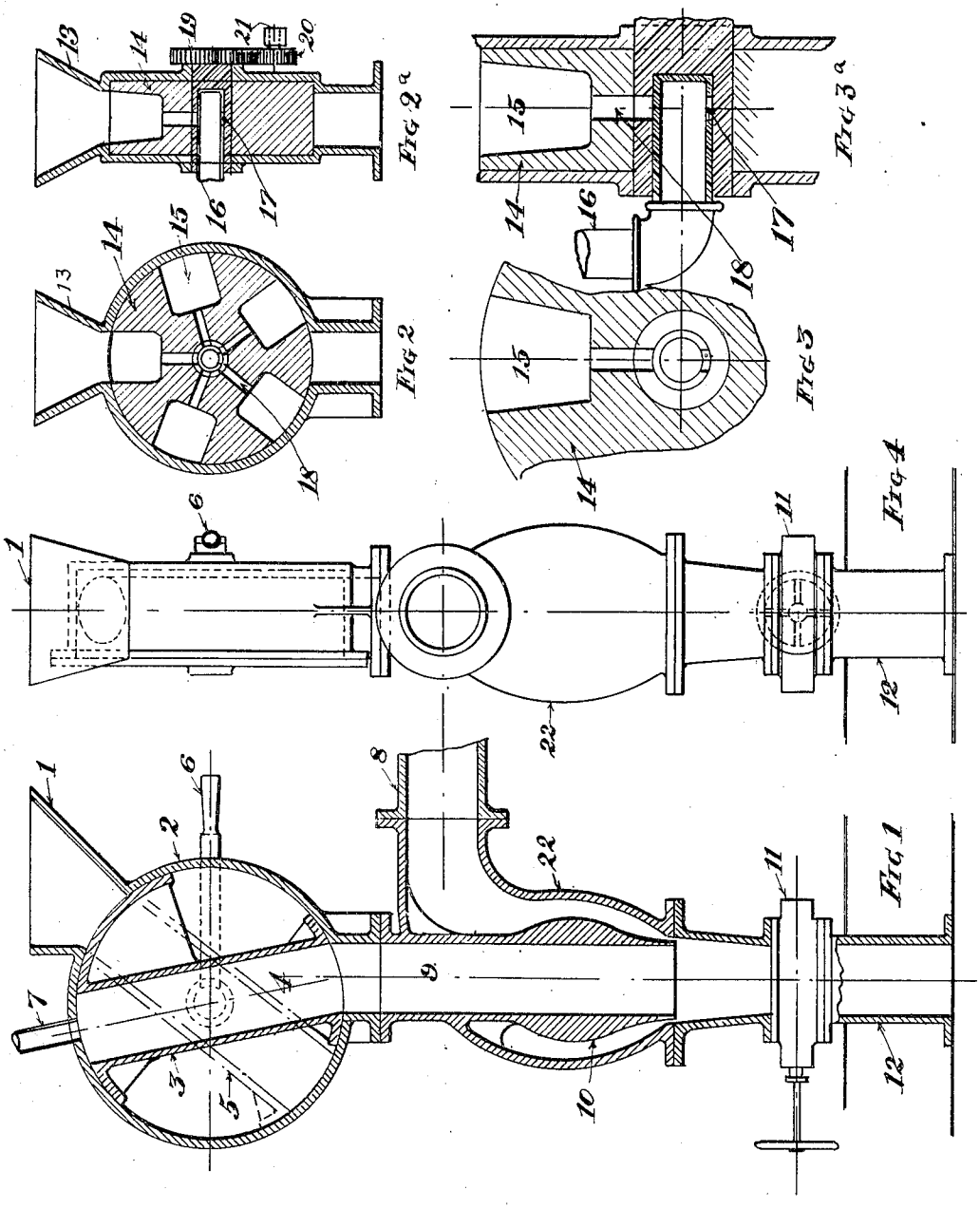
W. BURLINGHAM & F. P. PALEN

ASH DISCHARGER.

APPLICATION FILED MAY 16, 1911.

1,020,743. Patented Mar. 19, 1912.

3 SHEETS—SHEET 1.



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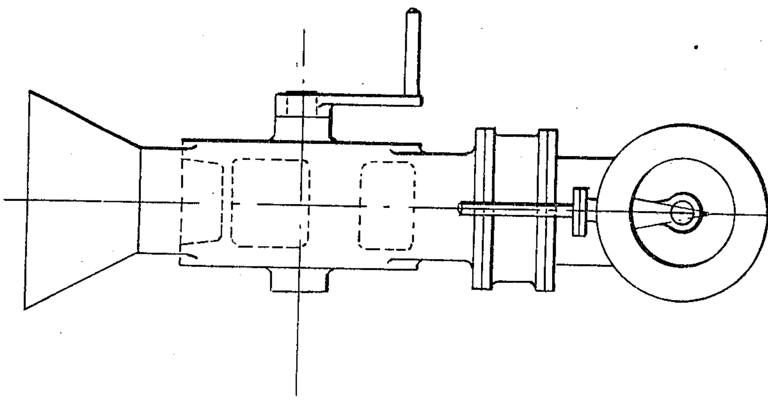

FIG 6

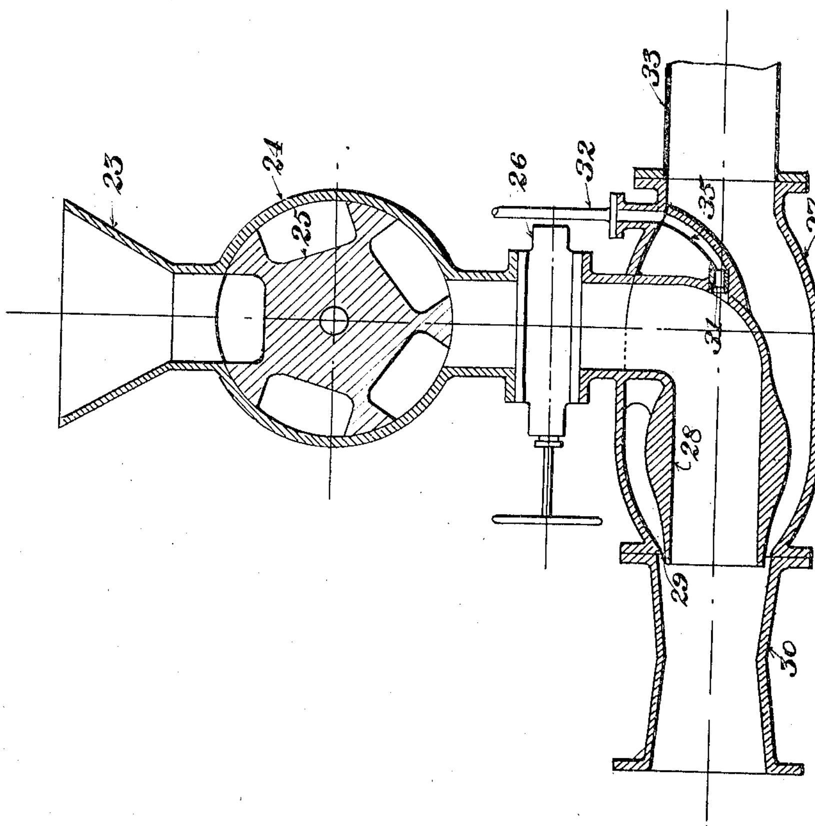

FIG 5

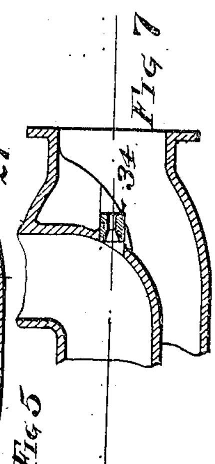

FIG 7

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3 SHEETS—SHEET 3.

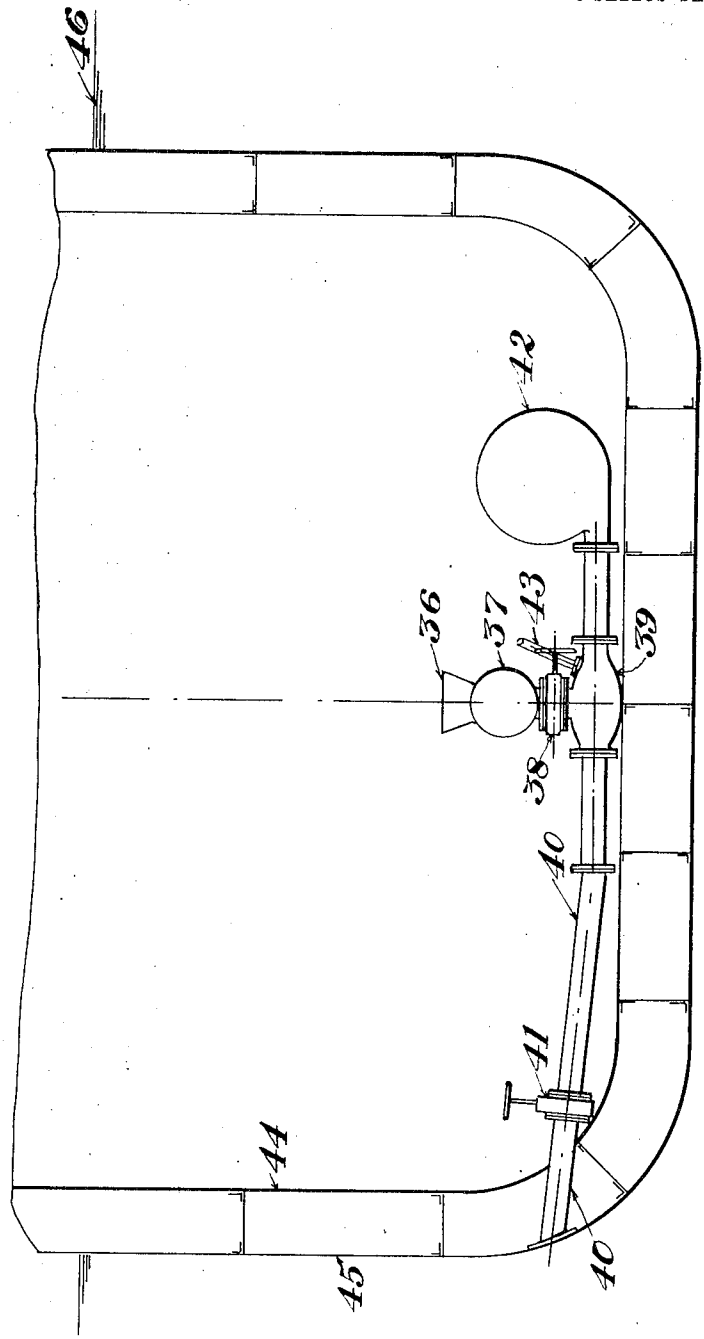

FIG. 8.

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ASH-DISCHARGER.

1,020,743. Specification of Letters Patent. Patented Mar. 19, 1912.

Application filed May 16, 1911. Serial No. 627,636.

To all whom it may concern:

Be it known that we, WILLIAM BURLINGHAM, a citizen of the United States, residing in Elizabeth City county and State of Virginia, and FREDERICK P. PALEN, a citizen of the United States, residing at Newport News, in the county of Warwick and State of Virginia, have invented certain new and useful Improvements in Ash-Dischargers, of which the following is a specification.

Our invention has reference to ash dischargers of the hydraulic type, as described in our Letters Patent No. 986,208, dated March 7, 1911, and has particular reference to a modified form for discharging ashes through the side of a vessel, and to the form of the ash pipe nozzle and the ash valve.

The objects of our invention are to simplify the construction of the above mentioned ash dischargers, and to improve the efficiency of the discharger by the location and design of the ash pipe nozzle, and to provide a modified form of the discharger for discharging through the side of the vessel, either above or below the water line.

We have ascertained that the location and form of the ash pipe nozzle has a great deal of influence upon the operation of the discharger, and we have determined, approximately, the shape and location best suited to secure the maximum vacuum in the ash pipe, with the minimum supply of water in the hydraulic stream.

The features of construction, combination and arrangement of parts are illustrated in the accompanying drawings.

Figure 1 represents a sectional view of our ash discharger. Fig. 2 represents a sectional view of a modified form of ash valve, and Fig. 2ª represents a sectional view at right angles to Fig. 2. Fig. 3 represents a sectional view of the rotating cylinder shown in Figs. 2 and 2ª, and Fig. 3ª shows a sectional view at right angles to Fig. 3. Fig. 4 represents an elevation of the complete mechanism at right angles to the view shown in Fig. 1. Fig. 5 represents a sectional view of an ash discharger constructed for discharging through the side of the vessel above or below the water line, and Figs. 6 and 7 represent an end elevation and detail view of the mechanism shown in Fig. 5, and Fig. 8 represents a transverse sectional view of a vessel, showing in elevation our ash discharger installed therein and discharging below the water line and at one side.

Referring by numeral to the drawings: the numeral 1 denotes the ash hopper for receiving the ashes, 2 the casing of the ash valve, 3 the oscillating portion of the ash valve, 4 the ash pocket in the ash valve, 6 the lever for operating the ash valve, 7 a water connection for washing out the ash valve, 8 the pipe supplying the hydraulic stream to the ash discharger, 9 the ash pipe, 10 the nozzle of ash pipe, 22 the discharger casting, 11 the stop valve for closing off the sea when the discharger is not working, and 12 the sea connecting pipe.

In Fig. 2, which represents another form of ash valve the numeral 13 represents the hopper, 14 the rotating cylinder containing the ash pockets 15, which receive the ashes from the hopper and discharge them to the ash pipe; 16 represents a water supply pipe for supplying water to the pockets 15 when they reach the position for discharging to the ash pipe. The water passes through the hole 17 to the ports 18. The gears 19 and 20 are for rotating the cylinder 14 by means of hand or other power applied to the shaft 21.

Fig. 3 represents an enlarged view of the rotating cylinder 14 with the water connection 16, the hole 17 and the port 18 for supplying water to the pockets 15 when they are delivering to the ash pipe.

In Fig. 5, which represents a sectional view of the discharger arranged for discharging through the side of the ship, above or below the water line, and Fig. 6, an elevation of the discharger, the number 23 represents the ash hopper, 24 the ash valve casing, 25 the ash valve cylinder, 26 a shut off valve, 27 the discharger casting, 28 the nozzle of the ash pipe, 29 the annular opening for the hydraulic jet, 30 the discharge pipe, 31 a water nozzle which may be supplied either by the water from pipe 33, which supplies the hydraulic stream, as shown at Fig. 7, numeral 34, or by the independent pipe 32, through the port 35.

In Fig. 8, which represents the discharger installed in a vessel and discharging through the side, numeral 36 represents the hopper, 37 the ash valve, 38 the cutoff valve, 39 the discharger, 40 the discharge pipe, 41 a valve, 42 the pump for supplying the hydraulic stream, 43 the water supply to the jet in

the ash pipe, 44 and 45 the ship structure, and 46 the water line.

The operation of the ash valve shown in Fig. 1 is as follows: The hopper 1 is located so it is not directly over or in line with the ash pipe 9, and to operate the valve the lever 6 is moved so the ash pocket 4 occupies the position under the hopper shown in dotted lines by numeral 5, and receives the ashes from the hopper 1. After receiving the ashes the lever 6 is moved to the position shown in the drawing and the pocket 4 is moved to the position 3, in which position it delivers the ashes contained in the pocket to the ash pipe 9. In this position the water from the pipe 7 assists in clearing the ashes from pocket 4. When the pocket 4 occupies the position 5 the water from the pipe 7 discharges into the casing 2 and flows freely to the ash pipe 9.

It will be seen from the drawings and the above description that the ash valve prevents the water from the sea from entering the vessel at all times, in case the hydraulic pressure from the hydraulic pipe 8 decreases so the velocity pressure is not sufficient to prevent the outside water from entering.

We have shown in Fig. 2 a rotating ash valve that consists of a cylinder 14 which is rotated by power applied to the shaft 21, and transmitted through the gears 20 and 19 to the cylinder 14. The cylinder 14 contains ash pockets 15 which pass underneath the hopper 13 and receive ashes from same. As the cylinder rotates the pockets pass over the ash pipe and discharge the ashes to same. The water connection from pipe 16 enters the center of the rotating cylinder 14 and passes out through a single hole 17 to the ports 18 as the ash pockets pass over the ash pipe, thus washing out the pockets. It will be noted that the water can enter the ash pockets only through the hole 17 which is located above the ash pipe, and therefore the water enters the ash pockets only at this position.

We do not confine ourselves to the particular forms of ash valves here illustrated, because there are a large number of simple forms, some of which are better adapted to certain conditions of installation than others. This is illustrated by referring to ash valve shown in Fig. 1, which is adapted to the discharger which opens out of the bottom of the ship, because any long piece of iron or other material, that enters the pocket 4 will pass straight out through the ash pipe 9, which would not be the case if this ash valve was used on the horizontal discharger shown in Fig. 5, Sheet 2, because the long piece of iron or other material would lodge in the elbow. It is therefore desirable to use, on the horizontal discharger, the rotating form of ash valve shown in Figs. 2 and 9, which will not pass long pieces of iron or other material that will lodge in the elbow.

In order to increase the efficiency of this discharger the ash pipe 9 should be carried into the hydraulic stream so the ashes are delivered to the stream in the direction of the flow and near the center. This arrangement was indicated on the drawings of our Patent No. 986,208, above mentioned. We have now determined the most suitable form and location of ash discharger nozzle, and we wish to draw particular attention to the advantages of delivering the ashes to the hydraulic stream by a special nozzle and near the center and in the direction of the flow. In the drawing the hydraulic stream enters the discharger casting 22 from the pipe 8 and the ash pipe 9 is carried down so the nozzle 10 delivers the ashes in the center of the hydraulic stream. The discharger casting 22 is arranged so that the stream flows around the ash pipe 9 before passing the nozzle 10. This arrangement offers the least possible resistance to the stream at the point the ashes are delivered and produces the minimum losses due to eddying effect. The nozzle also delivers the ashes in the direction of the flow and near the center of the stream. The form of nozzle 10 is made conical by increasing the thickness of the metal, or otherwise, so the water passes by the ash pipe 9 in a stream of annular section converging after passing the nozzle 10, and forms a solid annular jet or stream of circular section. This form of stream has no eddies and produces the maximum effect of vacuum in the ash pipe 9. The minimum quantity of water is required for operating the discharger with this special form of nozzle. We also prefer to use a double tapered conical pipe 30 next to the nozzle for gradually reducing the velocity of the discharging stream of water, thus avoiding the loss due to the shock from too rapid a change in the velocity of the stream.

The discharger arranged for discharging the ashes through the side of the vessel, either above or below the water line, which we term the horizontal discharger, has the ash pipe curved so that the nozzle 28, will deliver the ashes near the center of the hydraulic stream and in the direction of the flow. The water jet which flows through the nozzle 31 assists to force the ashes through the curved portion of the ash pipe and into the hydraulic stream. The suction in the ash pipe caused by the flow of the hydraulic stream past the nozzle 28 and through the annular opening 29 assists in carrying the ashes into the stream. The particular arrangement of the ash nozzle adopted, results in the minimum amount of wear on the discharge piping by delivering the ashes into the center of the

stream, where they do not rub against the sides of the pipe and are carried out with the flow of the stream. This is a distinct advantage over the form of dischargers that force the ashes through the ash pipe with a solid jet of high velocity, which causes the ashes to rub against the discharge pipe and results in excessive wear.

In order to obtain a jet of high efficiency for operating the discharger, we use a particular form of hydraulic pipe in conjunction with a conical nozzle on the ash pipe. The hydraulic pipe is spheroidal in shape adjacent to the conical ash pipe nozzle, so the stream is caused to flow toward the conical nozzle at the point where the jet is formed; this, in conjunction with the particular form of nozzle used, causes the stream to form a converging annular jet after passing the conical nozzle. Our experiments have demonstrated that the use of a conical discharge pipe 30 for confining the converging annular jet, adds greatly to the efficiency of the discharger. The conical discharge pipe and the converging water jet are made to conform to approximately the same shape and size, by adjusting the conical nozzle and the adjacent spheroidal hydraulic pipe. The high efficiency, due to the jet and the conical discharge pipe, makes it possible to discharge below the water line against the pressure of the outside water, and the high efficiency is essential to the operation of our new horizontal below water discharger, where the retarding action of the long lead of discharge pipe and the outwise water must be overcome by the hydraulic jet. We use in our horizontal discharger a curved ash pipe, bent so as to discharge horizontally, thus offering the least possible obstruction at the bend.

It will be seen that we have provided a mechanism, with which it is possible to deliver the ashes into a flowing stream of water, which is under pressure, by carrying the ash pipe into the stream and causing the water to pass the ash pipe nozzle in a stream of annular section. Our device not only delivers the ashes to the flowing stream, but utilizes the velocity of the stream to produce a suction in the ash pipe. The suction thus produced by the stream of annular section flowing passes the ash pipe nozzles, draws the ashes into the stream and they are carried overboard with the discharging water. The water will not flow back into the ash pipe and enter the vessel so long as the velocity of the stream is maintained above a certain point, and it is therefore not necessary to provide an absolutely water tight ash valve as would be the case if this arrangement of ash pipe were not used.

The leading feature of our ash discharger is the ash discharge pipe formed at its terminal or nozzle with an exterior bulging, swelling or enlargement, which produces a double tapered form from the inner to the outer end and in connection with the inclosing elliptical casing and discharge pipe insures the highest possible efficiency.

We claim:

1. In an ash discharger of the hydraulic type, the combination of an ash pipe, the discharge end of which is externally enlarged to produce a tapering form, a spheroidal shaped casing inclosing the enlarged end of the ash pipe, a discharge pipe leading from the casing and ash pipe, thereby forming an annular passage and producing a converging hydraulic jet after passing the enlarged portion of said ash pipe, and means in the ash pipe for controlling the feed of the ashes to the discharge pipe; said discharge pipe being tapered inward toward its center and outward toward its discharge end.

2. In an ash discharger of the hydraulic type, an ash pipe the discharge end of which is externally enlarged to produce a tapering form, a spheroidal shape casing inclosing the enlarged end of the ash pipe, thereby forming an annular passage for producing a converging hydraulic jet, and a discharge pipe leading from the casing, said discharge pipe being tapered inward toward its center and outward toward its discharge end.

3. In an ash discharger of the hydraulic type, an ash pipe the discharge end of which is externally enlarged to produce a tapering form, a spheroidal shape casing inclosing the enlarged end of the ash pipe, thereby forming an annular passage for producing a converging hydraulic jet, and a discharge pipe leading from the casing, said discharge pipe being tapered inward toward its center and outward toward its discharge end, and means in the ash pipe for controlling the feed of the ashes.

4. In combination with a vessel, an ash discharger mounted in said vessel and comprising a vertical ash pipe with a horizontally disposed nozzle, the exterior of which is enlarged to produce a tapering form, a spheroidal shape casing inclosing the enlarged end of the ash pipe, thereby forming an annular passage for producing a converging hydraulic jet, and a discharge pipe leading from the casing, said discharge pipe being tapered inward toward its center and outward toward its discharge end, and means in the ash pipe for controlling the feed of the ashes and a hydraulic pump for producing a pressure for operating the hydraulic jet.

5. In combination with a vessel, an ash discharger mounted in said vessel and comprising a vertical ash pipe, the end of which is enlarged to form a tapering exterior, a spheroidal shape casing inclosing the enlarged end of the ash pipe, thereby forming

an annular passage for producing a converging hydraulic jet, and a discharge pipe leading from the casing, said discharge pipe being tapered inward toward its center and outward toward its discharge end, and means in the ash pipe for controlling the feed of the ashes and a hydraulic pump for producing a pressure for operating the hydraulic jet.

In testimony whereof we affix our signatures in presence of two witnesses.

WILLIAM BURLINGHAM.
FREDERICK P. PALEN.

Witnesses:
JNO. B. LOCELL,
J. A. MASSIE.