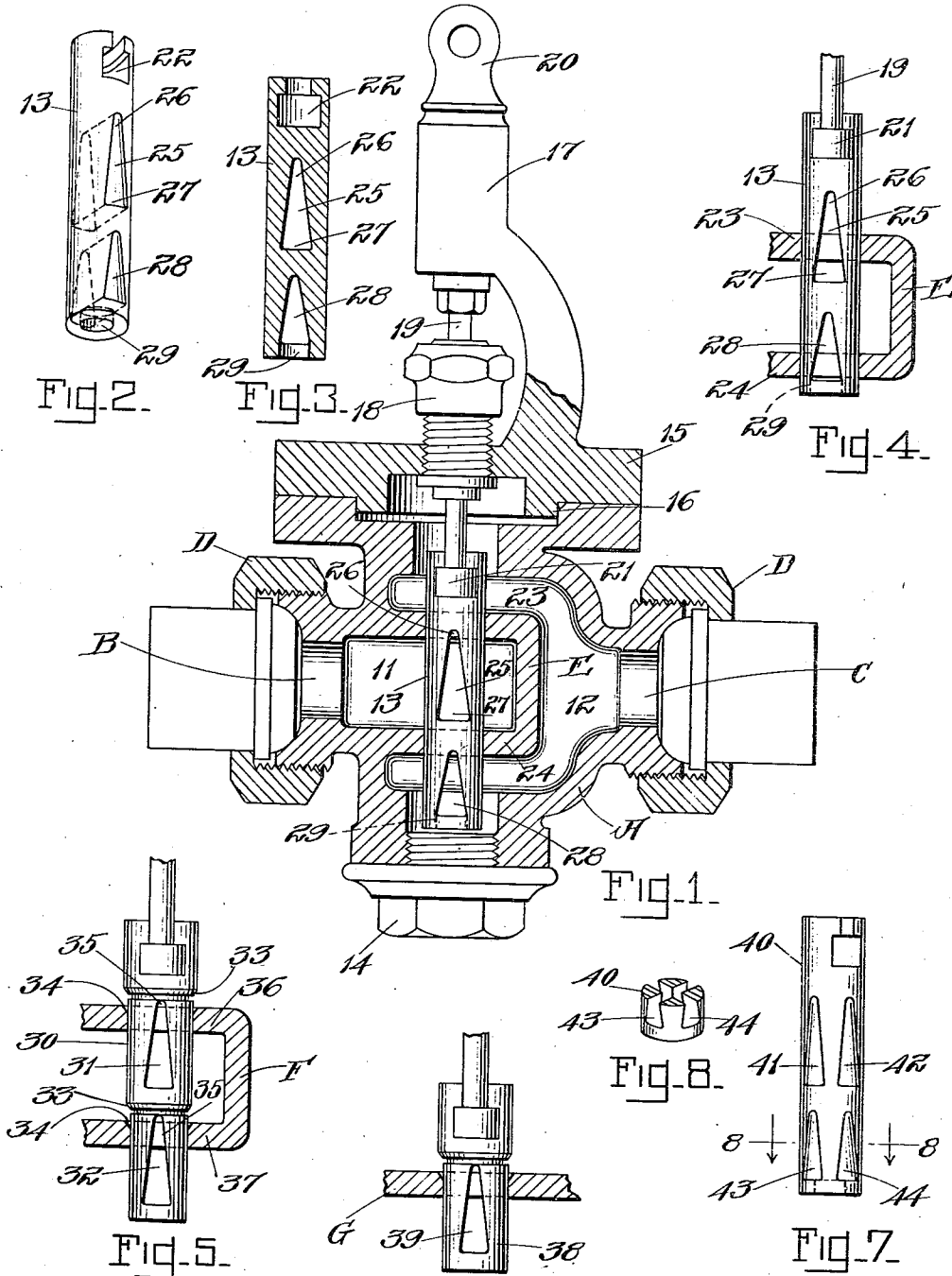


G. S. MELCHER.
VALVE.

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1,285,769.

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WITNESSES:

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Fig. 6.

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UNITED STATES PATENT OFFICE.

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To all whom it may concern:

Be it known that I, GEORGE S. MELCHER, a citizen of the United States, residing at Sharon, county of Norfolk, State of Massachusetts, have invented a certain new and useful Improvement in Valves, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to gradual opening valves and has for its object the production of a new and improved form of movable valve member for these valves which is so arranged and constructed that it may be produced with equal facility both in large and small sizes and at a relatively small cost. The movable valve members of gradual opening valves as heretofore constructed, so far as known to me, have in general necessarily been subjected to a machining process after having been cast whereby the required shape to obtain the gradual action is produced. The machining process thus rendered necessary not only materially increased the cost of manufacture so that a gradual opening valve is relatively expensive to produce, but the difficulties of manufacture render it impracticable to produce these valves in small sizes so that a small sized gradual opening valve cannot be manufactured commercially. The movable valve member described herein is so constructed that the necessary shape to obtain the gradual action required may be produced in the casting process, it being necessary only to finish or turn the exterior of the valve member to give it the fit required and to provide suitable connections for attachment to the valve stem. Many of the difficulties heretofore experienced are due to the fact that the gradual opening construction has necessitated the formation of minute sharp angular surfaces which cannot be sharply and clearly produced in the molding operation because of the tendency of the sand to crumble. The valve member embodying my invention consists of a solid metal body having a port preferably of triangular shape which may be readily formed during the casting operation in valves of all sizes by a suitable core secured at the sides of the mold. The size of the port is large relatively to the size of the valve member and is so arranged that when the metal is run into the mold about

the core a port having the necessary clean cut edges is formed.

My invention will be fully understood from the following description when taken in connection with the accompanying drawings and the novel features thereof will be pointed out and clearly defined in the claims at the close of the specification.

In the drawings,—Figure 1 is a sectional view of a valve provided with a balanced piston valve member embodying my invention.

Fig. 2 is a detail in perspective of the valve member shown in Fig. 1.

Fig. 3 is a vertical section of the valve member shown in Figs. 1 and 2.

Fig. 4 is a detail partly in section of the valve member shown in Fig. 1 showing its position in the valve partition when it is opened wide.

Fig. 5 is a modified view partly in section showing a double seated balanced valve slightly off its seat.

Fig. 6 is a modified view partly in section of a single seated valve embodying my invention located in a partition and raised slightly off of its seat.

Fig. 7 is a detail in modified form showing a balanced piston valve member having a multiplied number of openings.

Fig. 8 is a view in perspective of a section taken on line 8—8 of Fig. 7 looking in the direction of the arrows.

Having reference to Fig. 1 of the drawings,—there is shown at A a valve body having the usual inlet and outlet openings B and C provided with suitable coupling members D. The valve shown is a balanced piston valve and the valve body has a partition E dividing it into chambers 11 and 12 which are connected by oppositely disposed holes in the partition in two opposite walls thereof. A movable valve member 13 makes a sliding fit within said holes and controls the passage of fluid through said valve. A threaded cap 14 is secured to the lower end of the valve body, and a detachable member 15 provided with a circular projection 16 adapted to be received within a suitable recess in the valve body and carrying a valve stem guide 17 is secured to the upper end of the valve body by suitable bolts, not shown. A stuffing box 18 of common form

is threaded into the member 15 and surrounds a valve stem 19 secured at its upper end to a member 20 which makes a sliding fit in the guide 17 and is adapted to be operated by mechanism not shown. The valve stem 19 may be connected with the valve in any suitable manner, but preferably is connected by means of a disk 21 threaded on the end of the stem, forming a T-head connection with a horizontal slot 22 in the upper end of the valve member 13. While I have described at length the form of valve body employed I obviously do not wish to limit myself to this particular construction, the type of valve shown in the drawings being simply for the purpose of more clearly illustrating the novel features of my invention.

The valve member 13 shown in Figs. 1 and 2 consists of a solid metal body of cylindrical shape which is suitably finished on the outside to make a relatively tight sliding fit within the holes in the horizontal portions 23 and 24 of the partition E. The valve member 13 is preferably of uniform diameter as shown. It projects slightly above the portion 23 of the partition E for purposes of attachment to the valve stem 19, and extends at some distance below the portion 24 of the partition E for reasons hereinafter to be fully set forth. In the solid metal member 13 I provide a triangular shaped port 25 which preferably extends from one side of the valve member to the other. The port 25 is arranged at some distance below the upper end of the valve member so that when the valve is in the position shown in Fig. 1 the V-shaped end 26 of the port is below the upper surface of the portion 23 of the partition. The entire length of the port 25 is greater than the thickness of the portion 23 of the partition so that when the V-shaped end 26 projects above the portion 23 of the partition the lower end 27 of the port projects below it. When the port projects above and below the portion 23 of the partition fluid is permitted to pass from the chamber 11 to the chamber 12 by entering the lower end 27 of the port and passing upwardly therein and out through the V-shaped upper end 26 above the partition. In Fig. 4 of the drawings I have shown the position of the port when the valve member is open to its full capacity. The length of the port is preferably such that when the valve is fully opened the exposed areas above and below the portion 23 of the partition are equal. By this construction a graduated opening is provided above the partition controlling the flow of fluid through the valve which is at all times fully supplied by the lower end of the port below the partition. The triangular shaped port described can be readily formed during the casting operation even in very small valves

by a suitable core which may be secured at the sides of the mold. The port thus formed is large relatively to the size of the valve member so that in very small valves there is sufficient body to the core to prevent the sand from crumbling and to form the necessary clean cut edges to the port.

As stated above, a part of the member 13 extends below the lower portion 24 of the partition E. In this part I form a second port 28 at a short distance below the port 25 in order to provide for the passage of fluid through the lower portion 24 of the partition. This port is also of triangular shape and preferably extends through the valve from one side to the other as shown. It may be of the same length as the port 25, for example as shown in Fig. 5, in which case the lower end of the port should extend below the portion of the partition an amount sufficient to carry off the fluid permitted to enter the V-shaped end when the valve is opened wide. Where the ports are of equal size the lower port is formed in a manner similar to the upper port by means of a suitable triangular shaped core suspended within the mold. In order to reduce the length of the valve member and to thereby save material and space I prefer to provide a lower port which has not as great a length as the upper port. The preferred form of valve is constructed in this manner, the lower port shown at 28 being shorter than the upper port. When the valve is open to its fullest capacity the lower end of the port projecting below the portion 24 of the partition is not of sufficient size to take care of the fluid admitted through the V-shaped upper end. To provide for this I cut a hole 29 through the lower end of the valve member after it is cast. This hole is of sufficient size to adequately take care of the fluid when the valve is wide open.

In Fig. 5 I have shown my invention embodied in a double seated balanced valve. The construction of the valve is substantially similar to the valve 13 hereinabove described. The ports 31 and 32 are located in the valve member 30 with their V-shaped ends closely adjacent to the bevels 33 which are adapted to cooperate with correspondingly beveled seats 34 in the partition F so that when the valve member is raised off its seats the V-shaped ends 35 of the ports project slightly above the portions 36 and 37 of the partition to provide for the passage of a small amount of fluid.

Fig. 6 shows a single seated valve having a depending cylindrical member 38 which extends at some distance below the partition G in the valve and makes a slidable fit with the hole in the partition. It is of sufficient length to inclose a triangular shaped port 39 of the character of the port hereinabove

described. A valve member of this character may be used where a balanced valve is not desired, the port 39 projecting sufficiently below the partition to provide for the passage of a volume of fluid equal to the volume provided for by the projecting V-shaped end of the port.

While I have shown the port extending from one side of the valve member to the other, it is not necessary to extend the port completely through the valve member for where the port extends into one side of the valve only a graduated passage for fluid is obtained. In practice however, I prefer to pass the port completely through the valve member.

Where it is desired to employ a small valve to control the passage of a relatively large volume of fluid I have found it desirable to multiply the number of triangular shaped ports. In Fig. 7 is shown a balanced piston valve member 40 having an increased number of ports. In this form of valve I have provided what are in effect two ports 41 and 42 located at right angles to each other and intersecting in the middle. These ports may be formed by a suitable core having four triangular members suspended in the mold at two or four points if desired, so that when valve metal is run into the mold about the core a solid metal valve member with two intersecting ports is produced. Ports 43, 44, below the ports hereinabove described are also formed in a similar manner. The comparatively large space thus provided gives sufficient capacity through the exposed areas of the ports to take care of an amount of fluid equal to the capacity of the inlet and outlet valve passages.

What I claim is:

1. In a balanced valve, a valve member consisting of a solid cast metal cylinder formed with a slot which extends transversely through the cylinder at some distance from its ends, and which is gradually tapered in a direction longitudinally of the

cylinder, the metal of the cylinder forming a solid wall at each longitudinal end of the slot, the slot having two flat faced sides which flare away from each other from one end to the other longitudinally of the cylinder and having a flat faced base portion connecting the two side walls of the slot at the broad end thereof, said cylinder being also formed with a second slot nearer one end thereof than the first slot, said second slot extending transversely through the cylinder and having flat faced sides, the cylinder being formed with a passage extending from the adjacent end of the cylinder into communication with said second slot.

2. In a balanced valve, a valve member consisting of a solid cast metal cylinder formed with a slot which extends transversely through the cylinder at some distance from its ends, and which is gradually tapered in a direction longitudinally of the cylinder, the metal of the cylinder forming a solid wall at each longitudinal end of the slot, the slot having two flat faced sides which flare away from each other from one end to the other longitudinally of the cylinder and having a flat faced base portion connecting the two side walls of the slot at the broad end thereof, said cylinder being also formed with a second slot nearer one end thereof than the first slot, said second slot extending transversely through the cylinder and having flat faced sides, the cylinder being formed with a passage extending from the adjacent end of the cylinder into communication with said second slot, said second slot being of less length in an axial direction of the cylinder than said first slot.

In testimony whereof I affix my signature, in presence of two witnesses.

GEORGE S. MELCHER.

Witnesses:

CAMERON MACLEOD,
ALICE H. MORRISON.