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E. H. TARTRAIS

AUTOMATIC VALVE WITH FLEXIBLE BLADES FOR HIGH SPEED PUMPS

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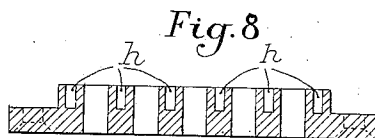
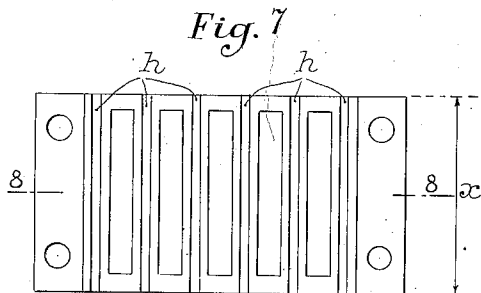
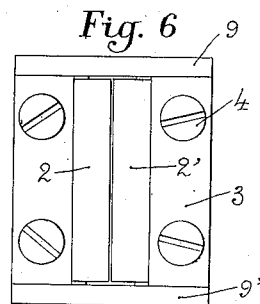
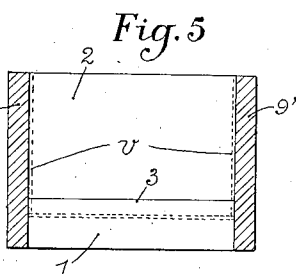
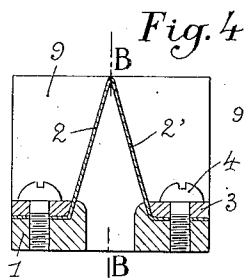
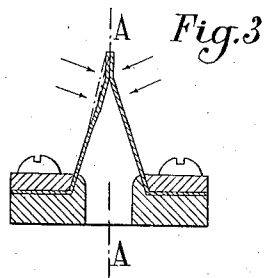
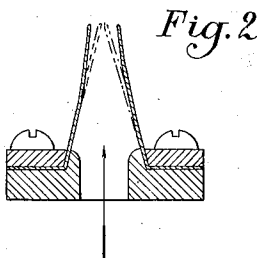
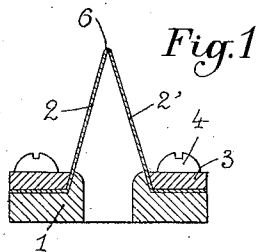


Fig. 9

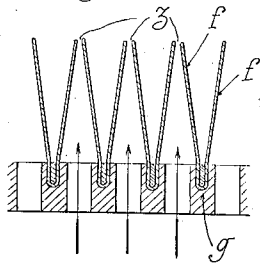


Fig. 10

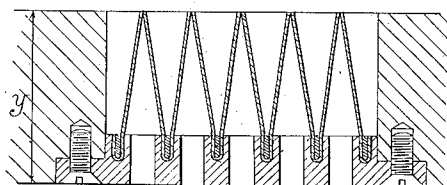
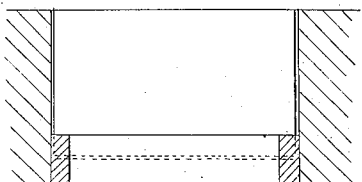


Fig. 11



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UNITED STATES PATENT OFFICE.

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AUTOMATIC VALVE WITH FLEXIBLE BLADES FOR HIGH-SPEED PUMPS.

Application filed August 30, 1924. Serial No. 735,139.

My invention relates to automatic valves with flexible blades, and is chiefly applicable to pumps operating at high speed or of the type comprising one or more elements, each being composed of two flexible metallic strips or blades which are fitted at one edge into the end wall of the pump chamber or to the piston and are in elastic contact with each other at the opposite edge, thus forming a dihedral angle.

According to the invention, the said blades are constructed of very thin sheet metal, for instance of tempered steel, say of a few hundredths of a millimeter thickness, the fluid tightness at the sides of the said plates being obtained by simply adjusting the same between the two lateral walls which are perpendicular to the edge of the said dihedral angle formed by the blades; the said walls not comprising any special seating for the plates.

In the appended drawings:

Figs. 1 to 3 show in transverse section an embodiment of the invention;

Figs. 4 to 6 show a modified form of the device according to the invention.

Figs. 7 to 11 show the arrangement of a valve constituted by the assembling of various valves according to the invention.

In accordance with the invention the valve consists of two like blades or strips 2, 2' which engage along their longitudinal edges 6, Figs. 1 to 3, the opposite edges being secured to the pump body. The dot and dash lines in Figs. 2 and 3 indicate the inoperative position as in Fig. 1, in order to better show the deflection of the plate. It will be observed in Fig. 3 that the said blades will not slip upon each other under the deflection caused by the pressure acting in the direction of the arrows. Since the two blades are similar, the deflection will take place according to surfaces which are exactly symmetrical with reference to the middle plane A—A, so that the said blades will roll upon each other without slipping. For this reason, there will be no breakage of the blades in the lengthwise direction. Further, the valve according to the invention will offer a direct passage for the fluid. By giving the blades a suitable initial curvature, I am even enabled to obtain for the fluid under the effect of the pressure a passage having the form of a nozzle and providing for the optimum discharge.

It should be further observed that an ex-

remely thin blade can be used without any risk of deterioration, and hence the length of the blade in the direction of the bending may be very small without diminishing the flexibility. This advantage is still further increased from the fact that as compared to a simple clack valve disposed upon a trough, for a given flow section the lift of the valve is now divided by two. It is observed that all of the said features are those which are the most effective in preventing the vibration of the blades. The frame 1 may be provided at the ends with the sides or walls 9 between which the ends of the said blades are loosely slidable; in order to secure the necessary fluid tightness for the edges of the blades adjacent the walls of the said passage, the blades are adjusted therein with great precision, so that if by accurate construction the clearance at *v* Fig. 5, is reduced to a very small value, for instance on the order of 0.01 mm., the leakage will be practically negligible.

In all the devices described, a single valve or element is provided. But obviously, in the case of a high speed pump, the requisite output cannot be obtained by the use of a single element, and a considerable number of elements must be disposed at the end of the pump, or in some cases upon the piston itself. The valve according to the present invention is particularly well adapted for the construction of standard sizes of elements which can be replaced upon the pump with facility.

A particular arrangement for the construction and mounting is shown by way of example in Figs. 9 to 11, Fig. 8 being a section on the line 8—8 of Fig. 7. The said arrangement consists of a plurality of elements, each comprising two flexible blades or strips *f* which are mounted in a bar *g*, Fig. 9; said elements are assembled in such manner as to leave between them a space for the passage of the fluid, and they form a comb-like construction which can be manufactured and mounted in place with great facility.

After having obtained the grid or grate shown in Fig. 7 by the milling or punching operation, the narrow slots *h* are formed throughout the entire width. In each slot are disposed two blades, or if desired a plate folded in two, the said blades having a somewhat larger size than the finished piece, i. e. they are longer than the indicated length *x*,

Fig. 7. When the comb-like device has been thus constructed, the grid portion is dipped in a bath of solder in order to secure the lower part of the said blades.

5 The blades can be opened if necessary by means of a special tool in order to give them the shape represented in Fig. 9. It will then suffice to cut off the blades to the definite length upon the three sides, i. e. according to the dimensions x and y , Figs. 9 and 10, in order to obtain the finished comb-like device, which may then be inserted without clearance in a slot having the length x in the end of the pump or in the piston, whose thickness should be at least equal to the height y . This arrangement is shown in Figs. 10 and 11 in longitudinal and transverse section.

10 In the inoperative position, it is not necessary to provide a perfect contact for the blades f at z , Fig. 9, for a slight play will not be prejudicial to the operation of the valve, since the latter will at once close under the effect of a slight pressure.

25 Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a valve for high speed pumps the combination of flexible and elastic thin metallic blades extending from each side of the valve passage and converging to each other thus constituting a dihedral angle, and two lateral plane metallic surfaces perpendicular to the edge of said dihedral angle and constituting lateral walls between which the blades are adapted to move with the minimum clearance.

2. In a valve for high speed pumps the combination of a grate adapted to closely fit into the fluid passage of the valve, with several flexible and elastic thin metallic blades extending in pairs from the bars of said grate, said blades being disposed so as

to converge opposite the adjacent grate space, thus constituting a dihedral angle, and two lateral plane metallic surfaces perpendicular to the edges of the dihedral angles and constituting walls between which the blades are adapted to move with the minimum clearance.

3. In a valve for high speed pumps the combination of a grate adapted to closely fit into the fluid passage of the valve, each bar of said grate being provided with a groove, with several rectangular flexible and elastic thin metallic blades folded along their middle line, said blades being soldered in said grooves along their folding edge and bent in such manner that the extending parts of said blades converge opposite the adjacent grate space, thus constituting a dihedral angle, the lateral plane faces of the passage aperture, which are perpendicular to the edge of the dihedral angles, constituting walls between which the blades are adapted to move with the minimum clearance.

4. In a valve for high speed pumps the combination of, a grate adapted to fit into the fluid passage of the valve, each bar of said grate being provided with a groove, and rectangular flexible and elastic thin metallic blades, soldered by pairs in said grooves said blades being disposed so as to converge opposite the adjacent grate space thus constituting a dihedral angle, the lateral faces of said passage which are perpendicular to the blades and the lateral edges of the latter being accurately adjusted so as to closely fit into each other, the lateral faces of said passage thus constituting two walls between which the blades are adapted to move with the minimum clearance.

In testimony whereof I have signed my name to this specification.

EUGÈNE HENRI TARTRAIS.