March 21, 1933. N. F. HENKEL 1,902,027

RELIEF VALVE

Filed Nov. 19, 1931

Fig. 1.

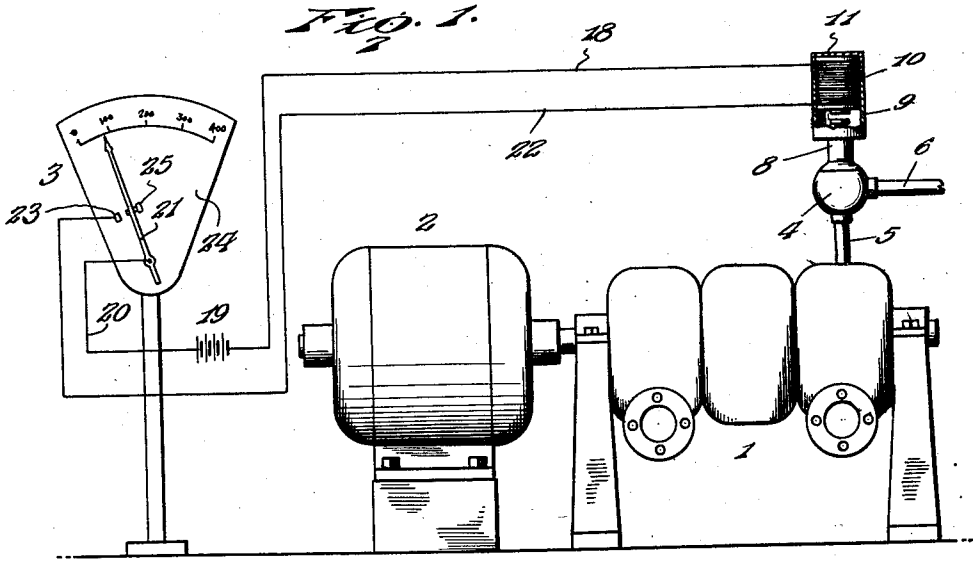
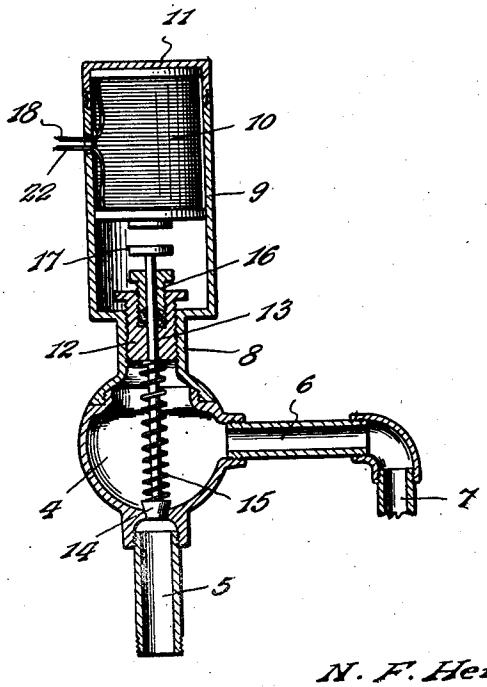


Fig. 2.



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UNITED STATES PATENT OFFICE

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RELIEF VALVE

Application filed November 19, 1931. Serial No. 576,189.

This invention has for its object the provision of simple automatic means whereby, when flow from a high compression pump or chamber ceases, for any reason, without the pump being stopped, a circulation through the pump will be maintained and overheating of the pump thereby avoided. In the operation of high pressure centrifugal pumps, it frequently happens that, although the pump is operating, the water or other liquid is not being drawn from the discharge side of the pump and the impeller rotates at such high speed that the inert water within the pump is heated and may be converted into steam. Unless some escape for this steam or heated water is provided, the pump becomes overheated and its operation and durability is seriously adversely affected. The present invention provides a very simple device whereby this overheating will be avoided.

In the accompanying drawing,

Fig. 1 is a view in the nature of a diagram showing one embodiment of the invention,

Fig. 2 is an enlarged section through the relief valve and its connections.

In the drawing, the reference numeral 1 indicates a high power pump having three stages and 2 designates an electric motor for driving the pump, these parts being of well known construction and being illustrated conventionally. At 3, there is conventionally indicated a flow meter which is operated by the outflow from the pump and is well known equipment. In carrying out the present invention, there is provided a valve casing 4 which is substantially spherical in form and has an inlet port in its bottom in direct alinement with a coupling tube or pipe 5 which is secured in the pump casing, at the high stage chamber of the same, so as to communicate therewith. In one side of the valve casing 4, there is an outlet port in which is threaded one end of an outlet pipe 6 which has its outer end coupled to a discharge pipe 7 which may discharge into the open air or may be connected with the pipe line which is fed by the pump. The top or upper side of the valve casing 4 is open and provided with a reduced externally threaded neck defining an annular stop shoulder, as shown clearly in Fig. 2, and a bonnet 8 is threaded on said neck, over said opening and bears against said stop shoulder, the upper end of the bonnet being enlarged and extended vertically to provide a housing 9 in which is secured an electro-magnet 10. A cap 11 may be secured upon the upper end of the housing 8 to prevent the entrance of foreign matter and to protect the electro-magnet from elements which might tend to cause its deterioration. A guide plug 12 is secured in the bonnet 8 and slidably fitted through said plug is a valve stem 13 having a valve 14 at its lower end adapted to seat in the inlet port of the valve casing, as shown in Fig. 2, an expansion spring 15 being coiled around the stem between the valve and the lower end of the plug 12 so as to normally hold the valve seated. The plug 12 is threaded into the bonnet 8 and it is obvious that by properly manipulating the plug, the tension of the spring 15 may be easily regulated. In practice, the spring will be put under a tension greater than the pressure normally existing within the third stage of the pump so that the valve will be held seated under all normal conditions. The upper portion of the valve stem 13 passes through a stuffing box 16 fitted in the upper end of the guide plug 12 and, at its upper end, the stem carries a head or disk 17 which constitutes the armature for the electro-magnet. One terminal of the electro-magnet merges into a conductor 18 which leads to a battery or other source of electricity 19. From the opposite side of the battery, a conductor 20 passes to and is secured to the indicator arm 21 of the flow meter. The other terminal of the electro-magnet winding merges into a conductor 22 which extends to a contact 23 set in the indicator board 24 of the flow meter and cooperating with a contact 25 carried by the indicator arm.

As long as there is a proper discharge of water from the pump, the valve 14 will be seated so that the valve casing will be closed to flow from the pump and the indicator arm 21 will be at some point spaced from the zero point of the flow meter. When the outflow from the discharge port of the pump, for

any reason, drops, the indicator 21 will swing over toward the zero point of the flow meter and, when the pump discharge ceases entirely, the indicator arm will come to rest on the zero point. In the last named position of the indicator arm, the contacts 23 and 25 will be in engagement and, consequently, the electro-magnet will be energized and will draw the armature 17 upward, against the tension of the spring 15, so that the valve 14 will be opened and the highly heated water or steam within the chambers of the pump will be permitted to escape through the pipes 5, 6 and 7. When the normal conditions are restored in the pump, the indicator arm of the flow meter will leave the zero point thereof so that the circuit through the electro-magnet will be broken and the valve 14 will then be seated under the influence of the spring 15.

It will thus be seen that I have provided an exceedingly simple and compact arrangement which will operate automatically to relieve the heated conditions in a pump so that overheating of the pump will be avoided. The device comprises few parts so that it is not apt to get out of order, and the cost of maintenance will be negligible.

Having thus described the invention, I claim,

1. A device of the class described comprising a substantially spherical casing having an inlet in its bottom and having its upper portion reduced to form an externally threaded neck defining an annular stop shoulder, a bonnet engaging the threads on the neck and bearing against said stop shoulder, the upper end of the bonnet being enlarged to form a housing, an outlet leading from one side of the casing, a valve within the casing seated in the inlet, an adjustable plug mounted in the bonnet, a stem rising from the valve and passing loosely through said plug, an expansion spring coiled about the stem between the plug and valve, an electro-magnet disposed within the housing, and a disk on the upper end of the valve stem and constituting an armature for the magnet.

2. A device of the class described comprising a substantially spherical casing having an inlet in its bottom and having its upper portion reduced to form an externally threaded neck defining an annular stop shoulder, a bonnet engaging the threads on the neck and bearing against said stop shoulder, said bonnet being provided with an intermediate reduced portion and having its upper end enlarged to form a housing, an outlet leading from one side of the casing, a valve within the casing seating in said inlet, a plug threaded in the reduced portion of the bonnet and provided with a seat, a gland disposed in said seat, a stem rising from the valve and passing through said plug and gland, a spring coiled about the stem between the lower end of the plug and said valve, an electro-magnet disposed within the housing, and a disk carried by the upper end of the valve and constituting an armature for the magnet.

In testimony whereof I affix my signature.

NORMAN F. HENKEL.