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MEANS FOR CLEANING FLUID CONDUCTING PIPES

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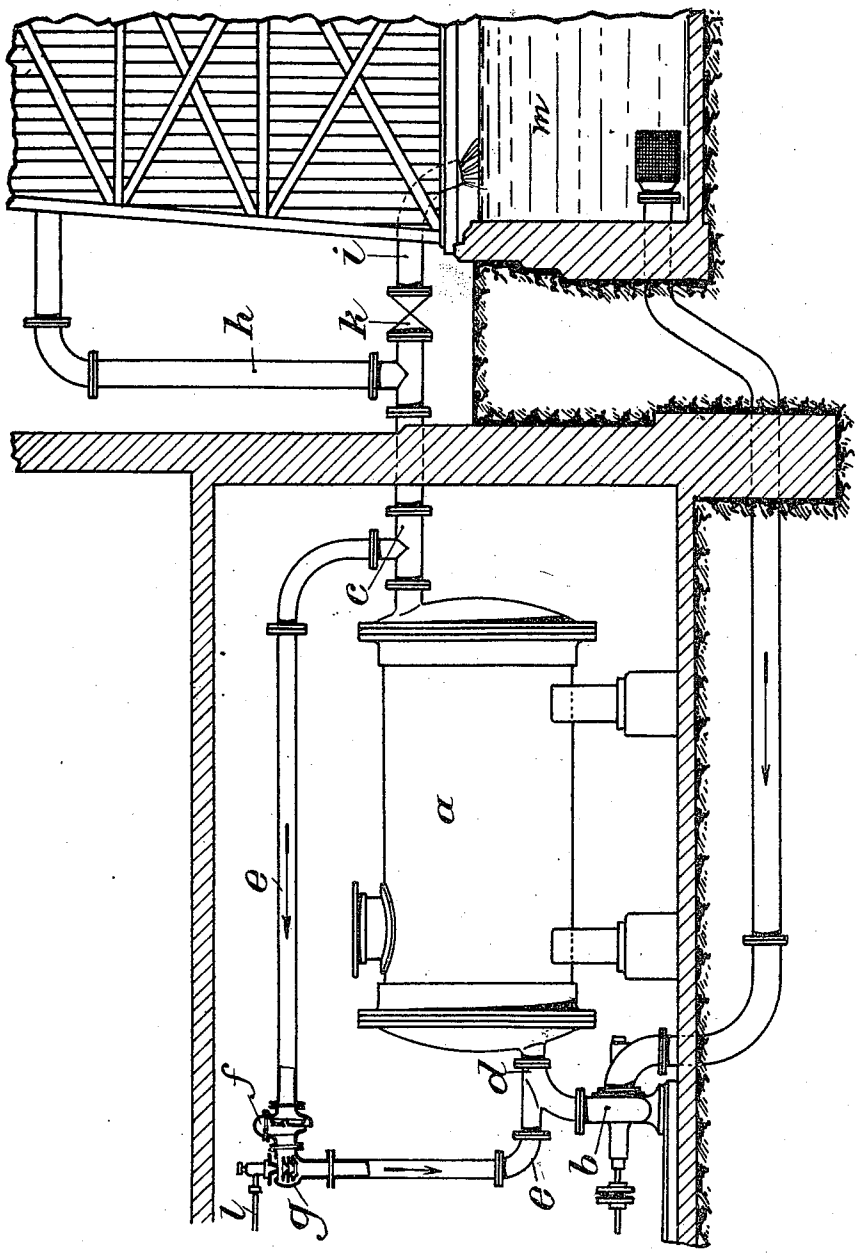


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## MEANS FOR CLEANING FLUID-CONDUCTING PIPES.

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(GRANTED UNDER THE PROVISIONS OF THE ACT OF MARCH 3, 1921, 41 STAT. L., 1313.)

*To all whom it may concern:*

Be it known that I, CHRISTIAN HÜLSMEYER, a citizen of the German Republic, and resident of Dusseldorf, Germany, have invented certain new and useful Improvements in Improved Means Applicable to Heat-Interchanging Devices for Cleaning Fluid-Conducting Pipes (for which I have filed applications in Germany, October 9, 1916, and December 5, 1916; Belgium, March 24, 1921; France, March 26, 1921; Great Britain, March 21, 1921; and Italy, March 29, 1921), of which the following is a specification.

In heat interchanging and refrigerating plants such as exhaust steam heaters, smoke heaters, economizers, refrigerators, surface condensers and the like, the interchange of heat is usually effected by means of liquid flowing through pipes, which absorbs heat and discharges or distributes the same by circulation. In most cases said stream of liquid deposits or settles a film of sludge or mud within the pipes, which sediment will progressively become a crust, unless the film of sludge is removed in due time in any well known way, either mechanically or by the increase of the velocity of the stream of liquid. To this end the pipes are frequently cleaned in a mechanical way by means of rubbers, drills or scrapers, which requires the stopping of the operation of said plants. However in rinsing the pipes by the increase of the velocity of the stream of liquid, it is not necessary to stop the operation, but the apparatus may be arranged and constructed in such a way that more than the normal amount of water can be passed through the same. A special spare or cleansing pump may be used to cause the extra flow of water through the apparatus.

For existing plants the last named means is the most practical. But in many cases water is supplied by means of centrifugal pumps, the discharge from which decreases —this is a well known fact—as soon as the resistance is increased by the addition of the discharge from a second pump. Another objection is in the fact that in cooling plants the mud or sludge in the water settles within the trickling troughs of the cooling towers.

According to my present invention which relates to means, applicable to heat interchanging devices, for cleaning fluid conducting pipes and rinsing the same by the temporary increase of the velocity of fluid, I make use of a jet apparatus, by the connection of which a pump supplying said fluid will be assisted.

In the accompanying drawings I have illustrated an example of practical embodiment of my invention comprising a jet apparatus inserted into a branch pipe.

The necessary amount of cooling water is supplied to the surface condenser *a* by the centrifugal pump *b*, such cooling water being conducted through a discharge pipe *c* to a cooling tower. The inlet pipe *d* is connected to the discharge pipe *c* by means of a branch pipe *e*. Into this branch pipe is inserted a check flap valve *f* in such a way that water may flow only from the discharge pipe towards the inlet of the condenser.

Arranged within the branch pipe *e* is a jet apparatus *g* having an annular nozzle mouth and adapted to be operated by means of steam or water under pressure. As shown in the drawings the discharge pipe *c* is divided into two branch pipes, the ascending one *h* of which leading to the cooling tower, whilst the extension *i* leads into the cool water tank.

The plant normally operates in such a way that cooling water is forced by the pump *b* through the pipe *d* into the condenser *a*, from which it is discharged through *c*, whereupon it will be led through the upright pipe *h* into the cooling tower, whence it will flow into the cool water tank *m*, from which the pump *b* sucks it through a pipe provided with a rose. A pipe *i* controlled by a valve *k* leads from pipe *c* directly into the tank *m*.

In normal operation no water flows through the branch pipe *e* and the extension pipe *i* is closed by means of the sliding valve *k*. If it is desired to rinse the tubes of the condenser for cleaning purposes, the jet apparatus *g* will be supplied with steam or pressure water through a feed pipe *l* connected to the same, the suction produced by said apparatus causing the check-valve *f* to be opened, whereby water will be sucked through the branch pipe *e* from the discharge pipe *c*, such water being supplied by the jet apparatus *g* under correspondingly increased pressure to the pipe *d* of the condenser, producing an injector like

effect owing to the acute-angled connection between the branch pipe *e* and the inlet pipe *d*. As the jet apparatus *g* sucks water from the pipe *e* and forces the same into *d*, it is obvious that said apparatus has merely to furnish the work of circulation. In order to prevent the mud or sludge detached by the rinsing from being brought upon the trickling surfaces of the cooling tower, the pipe *h* will be shut off and the slide valve *k* will be opened, whereby the cooling water will be discharged directly into the storage tank. In this way such water will not be cooled, but as the rinsing operation will be complete after a short time, this will not be objectionable for the normal operation, especially because the velocity of cooling water will be increased at this time. The shutting off of the ascending pipe *h* has also the advantage, that the pump will thus be released from a considerable manometric resistance, whereby the capacity of said pump may be increased in certain limits to enhance the rinsing action.

The jet apparatus may also be arranged in any other suitable way; for instance said apparatus may be arranged directly in the discharge pipe *c*, thus avoiding the use of a branch pipe *e*, so that said apparatus will suck water from the condenser and force the same through the pipes *h* or *i*.

The present device enables more than the normal amount of water to be forced through the condenser without producing prejudicial or excessive pressure within the same. As the circulating water is taken from the discharge pipe *c*, it is obvious that prejudicial back pressure on the water pump and therefore the decrease of its capacity will be avoided. The use of steam as a jet producing agent has the advantage that the circulating water will be further heated, and it is well known that hot water acts as a dissolvant particularly on slimy or like sediments. In as much as the heating of the water might be prejudicial to the condensation, the rinsing of the condenser will be effected at the moment the plant works under reduced charge. Furthermore only a small amount of steam is required for the circulation according to the short-circuited resistances of the movement.

By the use of the simple means in the form of a jet apparatus for assisting the pump, the application of the rinsing method for the cleaning of the tubes will be possible to the greatest extent. By suitably selecting the strength of the supply jet the velocity of the rinsing stream required for the respective kind of sediment, may be adjusted within wide limits for detaching sediments deposited within the tubes of heat interchanging devices. The arrangement described may also be applied to tubular steam boilers of locomotives for the purpose of cleaning the heating tubes thereof and removing soot therefrom.

Having now fully described my said invention, what I claim and desire to secure by Letters Patent, is:

1. In a device of the character described, the combination with a heat interchanging device having an inlet pipe, a discharge pipe and a pump, of means for temporarily increasing the velocity of fluid through the pipes of said heat interchanging device, comprising a branch pipe connecting the discharge pipe and the inlet pipe, and means communicating with said pipe for creating a flow of fluid through the branch pipe towards the inlet pipe.

2. In a device of the character described, the combination with a heat interchanging device, a pump, and an inlet pipe and a discharge pipe for the said device, of means for temporarily increasing the velocity of fluid through said heat interchanging device comprising a branch pipe connecting said inlet and discharge pipes, and a jet apparatus inserted into said branch pipe, substantially as set forth.

3. In a device of the character described, the combination with a heat interchanging device, a pump, and an inlet pipe and a discharge pipe for the said device, of means for temporarily increasing the velocity of fluid through said heat interchanging device comprising a branch pipe connecting said inlet and discharge pipes, a suitable jet apparatus inserted into said branch pipe, and a check-valve provided in said branch pipe and opening in the direction of the circulating stream, substantially as set forth.

4. In a device of the character described, the combination with a heat interchanging apparatus, a pump, an inlet pipe and a discharge pipe for said apparatus, a cooling tower suitably connected to said apparatus, and a water storage tank, of means for temporarily increasing the velocity of fluid through said heat interchanging device comprising a suitable jet apparatus associated with said pump, and means for reducing the friction resistances produced by the acceleration of water during the rinsing operation including a valved bypass to the storage tank, substantially as set forth.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

CHRISTIAN HÜLSMEYER.