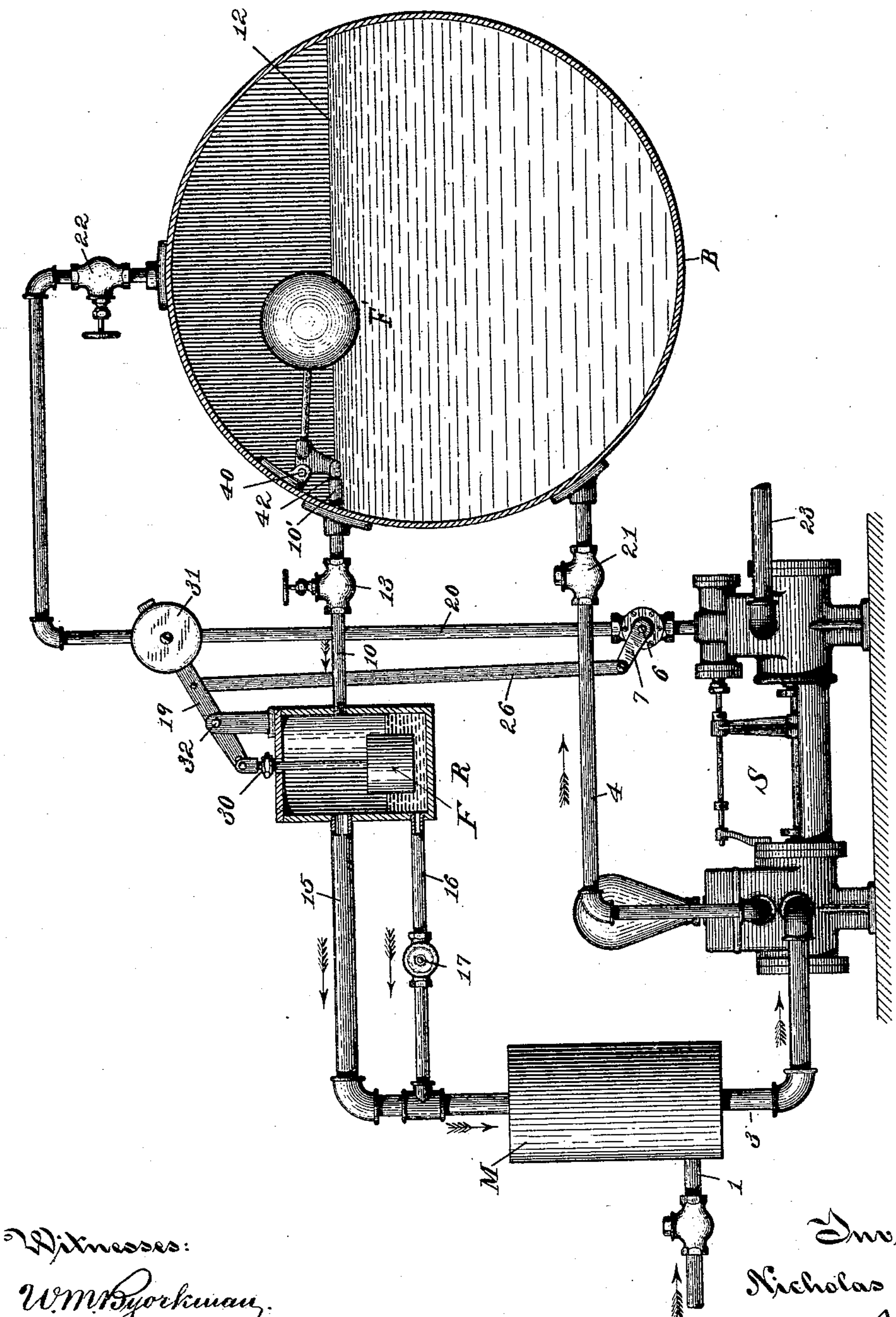
(No Model.)

N. CLUTE.

METHOD OF FEEDING BOILERS.

No. 454,899. Patented June 30, 1891.



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METHOD OF FEEDING BOILERS.

SPECIFICATION forming part of Letters Patent No. 454,899, dated June 30, 1891.

Application filed September 29, 1890. Serial No. 366,489. (No model.)

To all whom it may concern:

Be it known that I, NICHOLAS CLUTE, a citizen of the United States, residing at Schenectady, in the county of Schenectady and State of New York, have invented certain new and useful Improvements in Methods of Feeding Boilers, of which the following is a specification.

This invention relates to the feeding of boilers by regulated pumping; and it consists in the improved methods therefor hereinafter more fully set forth.

The object of my invention is to properly supply feed-water to boilers requiring a variable supply, and to control such supply by regulating the operation of the supply-pump in a reliable and economical manner.

The drawing accompanying and forming a part of this specification illustrates an apparatus suitable for practicing my present invention, the several portions and principal parts of the apparatus being referred to in the following description by the aid of reference-characters.

In carrying into practice my improved method of boiler-feeding I employ a feed-pump having a working capacity in excess of the supply to be delivered to the boiler, and a regulator which is operated by the accumulation of the oversupply of drainage-water and which is connected to regulate the operation of the feed-supply pump. The feed-pump may properly consist of a suitable steam-pump—as, for instance, the pump S—of any well-known kind, properly proportioned and connected for feeding the boiler B in any particular instance. Said pump should have a capacity sufficient to normally oversupply said boiler. The feed-pump is connected to supply the boiler through a discharge-pipe 4, leading from the water-chamber of the pump to the boiler. This pipe usually has therein a check-valve, as 21, for preventing any outflow of water from the boiler through said pipe 4. The pump is supplied with water through the suction-pipe 3, which in practice may be the discharge-pipe of a suitable feed-water heater—as, for instance, the cylinder M—to which heater cold water may be supplied through the supply-pipe 1 in a well-known manner. The steam-pump is actuated by steam taken from the boiler B through the pipe 20, which is connected to the top of the boiler, substantially as indicated in the drawing, and is provided with a shut-off valve, as 22, for stopping the pump as occasion requires. The pipe 23 represents the usual exhaust-pipe of the steam-pump, which may be conducted away in any preferred manner, or may be connected with the heater M, so that the exhaust-steam from the pump may be used for heating the water coming into the heater through the aforesaid supply-pipe 1. This feature, however, is not a part of my present invention, but will be sufficiently understood without further explanation.

In the pipe 20 I provide a suitable regulator-valve 6, which may be any well-known and effective form of throttle-valve adapted to regulate the admission of steam to the feed-pump. In one well-known form of throttle-valve the valve-disk or valve proper is operated by means of a lever, as 7, through a rod, as 26, that is connected to the regulator apparatus. This apparatus, according to my present improvements, consists of the regulator, herein designated in a general way by the letter R, located at one side of the boiler B, and connected thereto by the drainage-pipe 10, which enters the boiler (or stand-pipe thereof) at the height of the normal water-line 12. In the pipe 10 there should be a suitable valve, as 13, for adjusting the drainage-outlet. A waste-pipe 15 leads from the regulator (at about the height of the pipe 10) to convey the used drainage-water to the receiver or heater M when this is employed, or to join the supply-pipe 3 when a receiver or heater is not employed. From a point lower than the pipes 10 and 15 a vent-pipe 16 leads from the regulator R to the waste-pipe, and a suitable valve, as 17, usually similar to the valve 13, is provided in said pipe 16 to adjust the said regulator-vent, which vent, during the operation of the machine, is continuously open and of a less capacity than the inlet from the boiler to the chamber of said regulator R. The regulator R, as shown herein, is supposed to be the same apparatus described and claimed in Letters Patent of the United States No. 404,683, granted to me June 4, 1889. Said regulator consists, essentially, of the regulator-chamber having therein a float F, connected through a rod, as 30, with the pump-regulating valve. This connection may be made through said rod 30, connected to the lever 19, and through the aforesaid rod 26 to the arm 7 of said regulating-valve 6. In practice I provide the lever 19 with a suitable counterpoise, as 31, (the lever being pivoted at 32,) for reducing the effective weight of the float within the chamber R, so that said float may be of solid metal, (usually a casting of iron,) being thereby secure against any change of weight due to the accidental filling of a hollow float. It will be understood, of course, that the several details of said connecting apparatus may be varied by substitution and otherwise within the scope and limits of my invention.

In addition to the regulator apparatus, and especially in connection with large steam plants, I sometimes employ an auxiliary device consisting of the float F′, borne upon the water of the boiler, being suitably supported—as, for instance, by the pivot 40—and having a small valve, as 42, closing the inner end 10′ of the pipe 10 when the normal water-line falls below the level of said pipe. This auxiliary device does not affect the action of the regulating apparatus, but serves to prevent the escape of steam through the pipe 10 whenever there is no occasion for reducing the maximum rate of the boiler-supply.

When the water-line 12 falls below the pipe 10, water is no longer drained through said pipe into the regulator, and, the vent-pipe 16 being continuously open, what accumulation then exists in the regulator is soon discharged, thereby allowing the float to descend and through the connections described to open the regulating-valve 6, thereby admitting steam to the steam-pump S and increasing the rate of the boiler-supply to its maximum quantity. If now said rate of supply is sufficient to normally oversupply the boiler, the water-line 12 gradually rises until it reaches the level of the aforesaid drainage-pipe 10, and the surplus is drained through said pipe into the regulator R more rapidly than the accumulated drainage-water in said regulator is discharged through the vent-pipe 16. Consequently the accumulation in the regulator goes on so long as the water-line continues above its normal level. As the drainage-water accumulates in the regulator it gradually raises the float and through the connections described gradually closes the regulating-valve 6, thus reducing (more or less) the speed of the feed-pump S, thus reducing the boiler-supply and finally lowering the water-line 12. When the water-line is sufficiently lowered, as set forth, the discharge of drainage-water to the regulator is reduced, while the discharge of the accumulated drainage-water continues through the pipe 16 from the regulator, thus gradually lowering the float and again causing, as above set forth, the acceleration of the feed-pump.

By the term "boiler-supply" as used herein I mean the whole quantity of water delivered into the boiler from the pump, thus including the water which is converted into steam for use, together with the oversupply of water that is drained from the boiler for operating the regulator to control the operation of the feed-pump.

By this method of boiler-feeding an accurately-regulated supply is reliably obtained with the minimum pumping. The drainage-water discharged from the regulator being returned to the supply-pipe 3, the use of said drainage for the purpose of regulation does not entail any waste, since both the drainage-water and the heat therein contained are immediately returned to the boiler through the supply-pump.

Having thus described my invention, I claim—

1. The herein-described method of maintaining the water-level in boilers by regulated pumping, consisting in pumping to normally oversupply the boiler, draining the oversupply from the boiler at the water-line into a regulator having a continuously-open discharge-outlet of less capacity than the inlet thereto, and operating the regulator-float of the pump by the variable accumulation of said drainage-water.

2. The herein-described method of feeding boilers by regulated pumping, consisting in pumping to normally oversupply the boiler, draining the overflow from the boiler at the water-line into a regulator having a continuously-open discharge-outlet of less capacity than the inlet thereto, operating the regulator-float of the pump by the variable accumulation of the drainage-water, and returning said drainage-water to the pump-supply, whereby the water-level is maintained and the drainage-water returned to the boiler with a minimum pumping.

3. The herein-described method of regulating the water-supply of boilers fed by steam-actuated pumps, consisting in draining the oversupply from the boiler at the water-line into a float-provided regulator having a continuously-open discharge-outlet of less capacity than the inlet thereto and controlling the pump-actuating supply from the regulator-float.

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