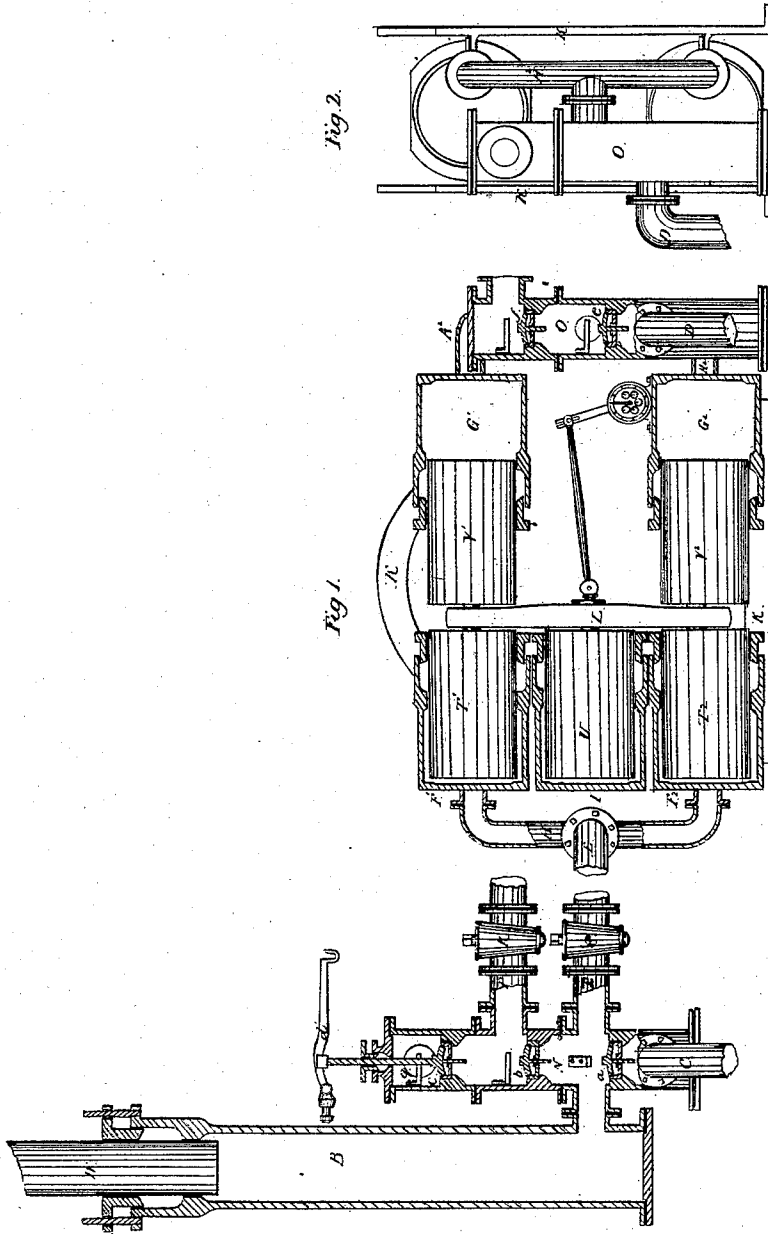


W. H. LINDSAY.

Piston Meter.

No. 8,741.

Patented Feb. 17, 1852.



UNITED STATES PATENT OFFICE.

WM. H. LINDSAY, OF NEW YORK, N. Y.

METER FOR STEAM-BOILERS.

Specification of Letters Patent No. 8,741, dated February 17, 1852.

To all whom it may concern:

Be it known that I, WILLIAM HENRY LINDSAY, of the city, county, and State of New York, have invented certain new and useful
5 Improvements in a Machine termed a "Fluid-Meter," for which a patent was granted me February 20, 1849; and to enable others skilled in the art to make and use my invention I do hereby declare that
10 the following is a full and exact description of the said invention, reference being made to the accompanying drawings, forming part of this specification.

Figure 1, a sectional elevation: Fig. 2,
15 an end elevation.

B, feed pump; C, supply pipe from the hot well or tank to the feed pump; D, supply pipe from the hot well or tank to the meter cylinders G' and G²; E, feed or connecting pipe from the feed pump B to the
20 forcing cylinders F' and F²; G' G², meter cylinders; H' H², side pipes connecting the cylinders G' G² and F' F², respectively; I, pneumatic cylinders; K K, side frames to which the cylinders are bolted;
25 L, cross head; M, counter; N, feed pump and overflow valve chest; O, meter valve chest; P, safety feed pipe to the boiler or other receptacle; R, stop cock on the safety
30 feed pipe; S, stop cock on the connecting pipe E; T' T², plungers working in the forcing cylinders; U, plunger working air tight in the pneumatic cylinder I; V' V², plungers working in the meter cylinders; W,
35 feed pump plunger; a, feed valve in the chest N; b, delivery valve rising and allowing the fluid displaced from the feed pump B to pass to the boiler or other receptacle through the safety feed pipe P if the stop
40 cock R is open and the stop cock S shut. This position of the stop cocks R and S is intended only when it may be necessary or desirable to shut off the communication between the feed pump B and the forcing cylinders
45 F' F² while the feed is maintained to the boiler or other receptacle through the safety feed pipe P, but when the cylinders F' F² are in communication with the feed pump B the cock R is closed and
50 S open, allowing of the free and uninterrupted passage of the fluid through the pipe E. When in this condition should the whole or any portion displaced from the feed pump B be unable to gain admission
55 to the forcing cylinders F' F² by reason of the regulating feed cock (situated any place

between the meter valve chest O and the boiler or other receptacle) being wholly or partially shut it will raise the valve c (which is loaded in excess of the pressure
60 which the plungers have to overcome in displacing the fluid from the cylinders G' G²) and pass off by the waste pipe g. d, waste valve lever; e, feed valve in the chest O, admitting the fluid from the hot well or tank,
65 to the meter cylinders by the side pipe H²; f, delivery valve in the chest O, allowing of the passage but preventing the return of the fluid displaced by the plungers V' V² from the meter cylinders.
70

Having given reference to the several parts shown in the drawings, I will now describe wherein the improvements consist, which is in the provision made as herein
75 set forth for bringing into action in case of accident to the meter or from other causes at any moment an independent or safety feed, a provision in an instrument for this purpose of the utmost importance when the meter is employed in connection with a
80 steam boiler, likewise combined with the most perfect control of the meter or that portion of it performing the office of measurement as herein described, constituting an important practical improvement in its
85 construction and operation.

Having described wherein the improvement consists, I will now describe its operation:

By reference to Fig. 1 in the drawings annexed it will be seen that the feed pump plunger W is represented at that point from whence it commences its force stroke on its
90 descent, the fluid displaced by it from the pump barrel B is forced through the pipe E into the cylinders F' F², carrying forward the rams T' T², U and V' V². The ram or plunger U is attached to the cross
95 head L by a bolt passing through an arm across the end of the plunger and through the center of the cross head, secured by a nut. The plungers T' V' and T² V² are connected to each other and the cross head by a bolt with head passing from the back
100 or inner side of the arm on one plunger, through the cross head and arm of the other plunger, the whole being brought home and secured by a key. Whatever distance the plungers V' V² are forced into the meter
105 cylinders G' G² they will displace a quantity of the fluid equal to their bulk which is forced through the delivery valve f in the
110

chest O, into the feed chest, boiler, or other receptacle.

To the cross head L is attached a link or light connecting rod, which gives motion to the lever or arm of the counter M and registers in proportion to the travel of the meter plungers during their forward or force stroke. Suppose the full stroke of the meter plungers to be set at 12 inches, and the diameter of each as 14 inches, the solid contents due to such is the index or known quantity of fluid displaced from the meter cylinders G' G² for every point registered by the counter. If the plungers only travel a portion of a full stroke during an entire stroke of the feed pump plunger the displacement from the meter cylinders and the indication or distance traveled by the hand of the counter will be in proportion.

On the exhaust stroke of the feed pump plunger the fluid received by the forcing cylinders F' F² during its previous force stroke will be returned to the pump barrel B by the return of the forcing plungers T' T², being assisted to do so by the atmospheric pressure on the plunger U, which on the plungers T' T² being forced carry the plunger U with them, leaving a vacuum in the cylinder I. When the forcing plungers are drawn back to their starting point as represented in Fig. 1, the space between the plunger U and the interior of the cylinder I is filled with oil, preventing the return of the plungers beyond their proper starting point.

Should the forcing cylinders F' F² not receive from the feed pump a sufficiency of fluid during any one stroke of the feed pump plunger to cause the plungers T' T² to make a full stroke, which will be the case if the feed chest is or becomes full during the same, or when the regulating feed cock between the meter cylinder valve chest O and the boiler is wholly or partially shut, an amount of fluid equal only to what was received can be returned to the feed pump barrel B from the cylinders F' F² by the return of the plungers T' T² on the exhaust stroke of the feed pump plunger W. The deficiency will be supplied from the hot well or tank by the rise of the valve *a*, the meter cylinders being supplied from the hot well or tank during the exhaust stroke by the

rise of the valve *a*. If a self acting feed is used in connection with and between the meter and the boiler, etc., a feed cock is not required as when the chest becomes full the forcing and meter plungers are incapable of moving, and the surplus from the feed pump escapes by raising the valves *b* and *c*, passing off by the waste pipe *g*. If a regulating feed cock is employed, it must not be placed on the pipe E, but between the meter and the boiler, etc., which allows of the free passage of the fluid to and fro between the feed pump and the forcing cylinders.

When the meter is connected with the feed pump, the stop cock S is to be full open and the stop cock R fully shut, but if it is necessary or desirable from any cause to disconnect the meter from both the feed pump and the boiler, etc., it can readily be done by opening the cock R and closing the cock S, which closes the communication to the meter from the feed pump and opens a communication from it to the boiler, etc.; and if a self acting feed is used, the usual check valve cuts off the communication between the meter and the boiler, etc. The feed to the boiler can be maintained and regulated in the usual manner by the cock R, which now becomes the regulating feed cock, and the valve *b* also comes into operation as the feed pump delivery valve.

I do not claim the special use of a plunger piston, or pistons, puppet valves, or well known cocks, the same being long known and used; but

What I do claim as my invention and desire to secure by Letters Patent, as constituting a new and useful improvement in the construction and operation of a fluid meter, is—

The means herein set forth for maintaining the feed to the boiler, etc., and the closing or cutting off the communication to and from the meter in case of accident or from other causes, arranged and operating for the purpose and with the intent substantially as described.

WILLIAM HENRY LINDSAY.

Witnesses:

J. EDGAR,

WILLIAM LINDSAY.