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THE MANUFACTURE OF PULSOMETER PUMPS.

In 1872 an important addition was made to the previously existing varieties of pumps in the market, in the introduction of an entirely new style, made under patents then obtained by C. Henry Hall, in which the direct pressure of steam was used to force the liquid raised by a vacuum produced by the condensation of the steam. This idea at once struck engineers and mechanics as an important innovation, and, as the pump was constructed without pistons or connecting rods, and had neither cams, eccentrics, nor stuffing boxes, it had no exhaust and required no lubrication. In consequence of these desirable features it immediately became popular. There were, however, some defects in the mechanical construction of some of the earlier pumps made under these patents, on account of which many failed to work satisfactorily, while others were eminently successful, and have been in use to this day, showing that the principle on which they were designed to operate was all that the inventor claimed for it.

The illustrations we present on the first page of this paper show some of the processes of manufacture, and give different views of the "new" pulsometer pump, so styled because, while embodying no new elementary principles, the pump has been so improved as to obviate the difficulties of detail and imperfect workmanship which characterized many of the earlier pumps made under the Hall patents. These pumps are now believed to combine great strength, durability, and efficiency with a simplicity of construction that makes it almost impossible for them to get out of order, and an economy in working that places them in the front rank in a field where the competition is very searching and severe. The name "pulsometer" is a registered trade mark of the company, and is very suggestive of the operation of the pump.

An explanation of the working of the pump will be best understood by a reference to the illustrations. In Fig. 1, A A are two bottle shaped chambers formed in one casting, side by side. Their tapering necks are bent toward each other and terminate in a single upright passage, in which there is a ball valve, C, which is fitted to a seat in each neck, and capable of oscillating so as to close either neck. The upper portion of the pulsometer containing the ball valve is made separately, so that it may be renewed when worn out without having to replace the entire pump. The chambers, A, have openings connecting with the vertical induction passage, D, provided with valves, E E, of vulcanized rubber, which, together with their seats, F F, may be easily removed and replaced by new ones should they become worn. The delivery passage, H, is common to both chambers, and its valve seats, G G, have the same style of valves as the induction passage. The discharge chamber and its valves is shown in Fig. 2. J is the vacuum chamber, cast with and between the necks of chambers, A A, and connecting with the induction passage only below the valves, E E. K K are covers closing openings to the respective chambers to admit of getting at the valves and valve seats when necessary. A small air check valve, shown in the front view, Fig. 3, is screwed into the neck of each of the chambers, A A, and one in the vacuum chamber, J, the first to admit a small quantity of air above the water to prevent the steam from coming into actual contact with the water, thus forming an air piston, which prevents condensation. The valve in the vacuum chamber, J, serves to cushion the water column and to prevent the hammering which would otherwise occur upon filling the chambers alternately.

This pump when in operation is connected at the top with a steam supply pipe and at the bottom with the suction pipe, and the discharge pipe is connected with the discharge chamber. All the air check valves being closed, the steam is admitted, displacing the air from one of the chambers. The steam supply is then cut off, and the steam contained by the chamber condenses, forming a vacuum, when the chamber will immediately fill with water through the induction pipe. In starting the pump the hand is kept on the steam valve, turning the steam on and off four or five times until the regular operation is established. The vacuum formed in the chamber to which the steam is first admitted causes the ball valve, C, to close the opening in the neck of the chamber, and at the same time to admit steam into the opposite chamber, where, after shutting off the steam, a vacuum is made and the chamber fills with water. In this way, after the steam has been thus admitted four or five times, the alternate action of the chambers is established, and each of the air check valves is opened enough to cause a regular and continuous action, which will be recognized by the steady pulsation and smooth working of the ball valve, C, as the steam enters first one chamber and then another. The steam, entering the chamber directly above the water, presses upon and forces it out through the discharge valve with a force proportionate to the pressure of steam applied. When the water has been displaced by the steam, which follows it to the opening of the discharge chamber, the steam suddenly condenses.

It will be seen that in this way the steam pressure acting directly on the water, and the vacuum resulting from the condensation of the steam, act in alternation in drawing and forcing the water.

The economy of these pumps, working, as they do, without mechanical devices to absorb power, and with no appreciable friction, has been abundantly attested. It is estimated that 750 gallons per minute can be raised by a No. 8 pulsometer pump, supplied with steam through a one inch pipe; the pressure of steam necessary, depending on the height to which the water is raised. Good results on a lift of 40 feet have been obtained with steam at 30 lb. pressure, and on lifts of 70 feet with a steam pressure of 40 lb., although much must necessarily depend upon the situation of the pump, length of suction and delivery pipes, etc., while in other fluids than water these figures would of course be different.

The No. 8 pulsometer has suction and discharge pipes 5 inches in diameter, and occupies a floor space of only 20 x 31½ inches, its height being 54 inches, and weight 1,300 pounds. The company claim that the expenditure of power to operate their pumps is less than one-half of that ordinarily required to do the same work by other means, and have a large number of testimonials from both home and foreign users to support this statement. For use in mines the pulsometer has the special advantage of condensing all of the steam used. The temperature of the fluid being raised is increased one or two degrees, but there is no escape of steam. For tanneries, breweries, paper manufacturers, and as a ship's pump, or for filling water tanks of railways, it has some special advantages, as the arrangement of its valves is such that it is difficult for it to become clogged, and should this happen the parts can be readily removed and the trouble remedied. In a new sewage steamer lately built for the city of Liverpool, England, a large-sized pulsometer has given especial satisfaction.

It may be made of brass or other metal for pumping liquids destructive to iron, lead being used for acids, bronze for sugar works, and special compositions for other purposes; and one user of the pulsometer has it fitted with lignumvitæ ball valves, instead of the usual vulcanized rubber valves, to adapt it to pumping liquids which have a large proportion of grease. The company also fit up the pulsometer with rubber ball valves, instead of the ordinary flat ones, for extra dirty sewer work, and for paper mills, tanneries, etc.

It is believed that the improvements which are embodied in the "new" pulsometer are such as will obviate all objections heretofore urged by those who have had imperfect pumps, and justify the claims long since made for this pump as being among the first for cheapness, simplicity, and strength, as well as for efficiency and economy in its operation. It is manufactured and sold only by the Pulsometer Steam Pump Company, 83 John street, New York, Wm. F. Kidder being president of the company, G. F. Badger, secretary, and Geo. W. Laird, treasurer.

AGRICULTURAL INVENTIONS.

Mr. Alfred C. Dodge, of Charlotte, Mich., has patented a simple and convenient device which may be attached to the leg of the milker for holding a milk pail. It will hold the pail in a well protected position, preventing its being upset by the cow, and preventing dirt from being thrown into it. It will admit of both hands being used by the milker.

An improved corn sheller, patented by Mr. Berthold A. Kamp, of Evansville, Ind., is so constructed that it will not become clogged, will not break the cobs, will carry the cobs out of the way, and will deliver the shelled corn into a spout, whence it can be drawn off into sacks or other receivers.

Mr. John J. Knapp, of Lewisburg, W. V., has invented an improved mower which is simple in construction and effective in operation, easily adjusted and controlled, and which will work with less wear and tear than mowers constructed in the usual way.

Prizes for Potters' Machinery.

Not long ago the attention of the readers of this paper was directed to the fact that in no other manufacturing industry had there been so little advance made as in the fabrication of pottery.

We are pleased to learn from the *Pottery and Glassware Reporter* that at the last annual convention of the United States Potters' Association this subject was considered and discussed at some length, and the following resolution was adopted:

"*Resolved*, That a reward of five hundred dollars be and is hereby offered to any person who may invent and offer to us any new and useful machinery of importance to us, applicable to our art and business.

"And that a reward of two hundred and fifty dollars be and is hereby offered by us to any person who may invent any essential and useful improvement to or upon any machinery now in use by us. Provided, that these inventions or improvements are free from all patents obtained or to be obtained from the inventor or any other person.

"And that a committee of three be appointed to investigate and test these inventions and improvements, and when, in their opinion, these rewards or either of them be fairly and fully earned, or if in their opinion a portion only of the above rewards be earned by the parties presenting them, the committee shall have power to draw upon the treasurer through the Executive Committee for such sum or sums as the committee may have agreed to, not exceeding the above named amounts."

These prizes are certainly worth competing for, and should enlist the earnest efforts of many inventors in the competition. All communications relating to machinery and rewards should be made to the members of the committee called for in the closing clause of the above resolution, Messrs. Thomas C. Smith, Greenpoint, N. Y.; John Moses, Trenton, N. J.; M. Tempest, Cincinnati, O.

In alluding to the premiums offered, the editor of the above journal adds: "Whatever causes may be to blame for it, it is an established fact that potting is behind the age in the matter of labor-saving machinery, the same hand processes being now employed as were in vogue thousands of years ago. While every other industry has benefited largely by the inventive genius of modern times, the potter plods on in much the same way as did his forefathers in the art. This state of affairs is largely due, probably, to the conservatism of the potters themselves, who seem very generally to go on the principle that 'what was good enough for their fathers is good enough for them,' and partly to the fact that the attention of inventors has never been publicly called to the needs of the industry in this regard. Once let it become known among inventors that the machinery of improved form is needed, and from all the devices likely to be offered something can certainly be selected to suit the different purposes."

Raisin Wine.

The conservative minds of old-fashioned French wine merchants are just now greatly agitated with regard to the subject of making wines from dried grapes. These merchants affirm that the great entrepots at Paris were constructed for the purpose of holding wine, and not a liquid made by pouring water upon Turkish raisins and then fermenting the remarkable product. This "new departure" is not, they assert, wine at all, and its existence is a fraud upon the legitimate trade. They have consequently been petitioning the Municipal Council of Paris to repress this new and not particularly creditable industry. But the Council, after listening with much patience to the *pros* and *cons* of the case as put before them, have decided that the new kind of wine is lawful, because in the first place it is made from grapes, and is produced by processes similar to those used in the making of ordinary wine, namely, pressing, fermentation, racking, etc. The new description of wine contains alcohol, and yields its fair proportion to the direct taxation of the country and to the *octroi* of the different towns whither it may be conveyed. It is further asserted that this wine from dried raisins is not injurious to health, and that when blended in certain proportions with ordinary wine its presence cannot be detected. It is, moreover, comparatively cheap; and thus it affords for the lower classes a useful drink; therefore the Municipal Council of Paris considers that its production should be encouraged rather than repressed at a time when the natural wine products of France are so much below the average. With regard to English consumers, they will doubtless never have an opportunity of tasting the dried grape wine unless they find themselves in some low class cabaret in Paris, or some other large town in France. It is not probable that, in the ordinary way of trade, wines of this character will be sent over here. The blending of wines from various departments surrounding the Gironde has, we are well aware, been carried on for some time, and perhaps never was the demand for these adjuncts to claret greater than at present. The wines of Narbonne, of Roussillon, etc., have been largely purchased at Bordeaux for this purpose; in fact, claret at £5 per hogshead cannot now be produced without this aid. But raisin wine is not likely to be used just at present in the Gironde. If ever it should be employed by shippers there, owing to the destruction of French vineyards, then we can import raisins from the Levant almost as cheaply as our Gallic neighbors, and make the cheerful and exhilarating beverage at home. —*London Grocer.*

The Epidemic at Adams, Mass.

The epidemic at Adams, Mass., has finally been traced to the water supply. Engineer Locke has made a map of the town, indicating by red dots every house where there was a case of sickness, and by small circles every house which escaped, covering both the village proper and all the roads leading out of it. Afterward he drew the line of the water pipe on his map, and everywhere the red dots stop with the pipe and follow its course. He cites numerous instances to prove that the water was the sole cause of the trouble, and shows that nearly everybody who was pointed out as not using the town water, although sick, had been in the district and drank the water. He locates the impurity in an old mill-dam through which the water passes, and says he found it full of decaying vegetable matter which gave forth an offensive odor perceived at some distance from the pond. That, he thinks, was sufficient to cause the outbreak, in connection with the peculiar weather which had prepared the people for the epidemic.

Value of Swamp Muck.

Some time ago we remarked that an acre of swamp muck of good quality, three feet deep, was actually worth $25,000. No doubt such a statement is surprising. So was the statement of Dr. Lawes, of England, that a ton of bran fed to cows returned more than its cost in manure. Swamp muck, free from sand, contains two per cent or forty pounds of nitrogen in a ton. Nitrogen is worth in the market twenty-five cents per pound, so that a ton of swamp muck is actually worth $10 for the nitrogen in it. All that is needed is to work up the muck, so as to make the nitrogen available. An acre of swamp muck three feet deep contains 2,500 tons, and would require eight months to draw out, at ten loads a day. Few persons realize the value of the fertilizing elements of common waste matters which lie under their feet, and the innumerable tons of matter that may be available for fertilizing purposes, and that much of the idle and neglected materials represent a vast amount of wealth.—*American Agriculturist.*

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