(No Model.)

F. M. DEAN.

PNEUMATIC TRACK SANDER.

No. 563,751. Patented July 14, 1896.

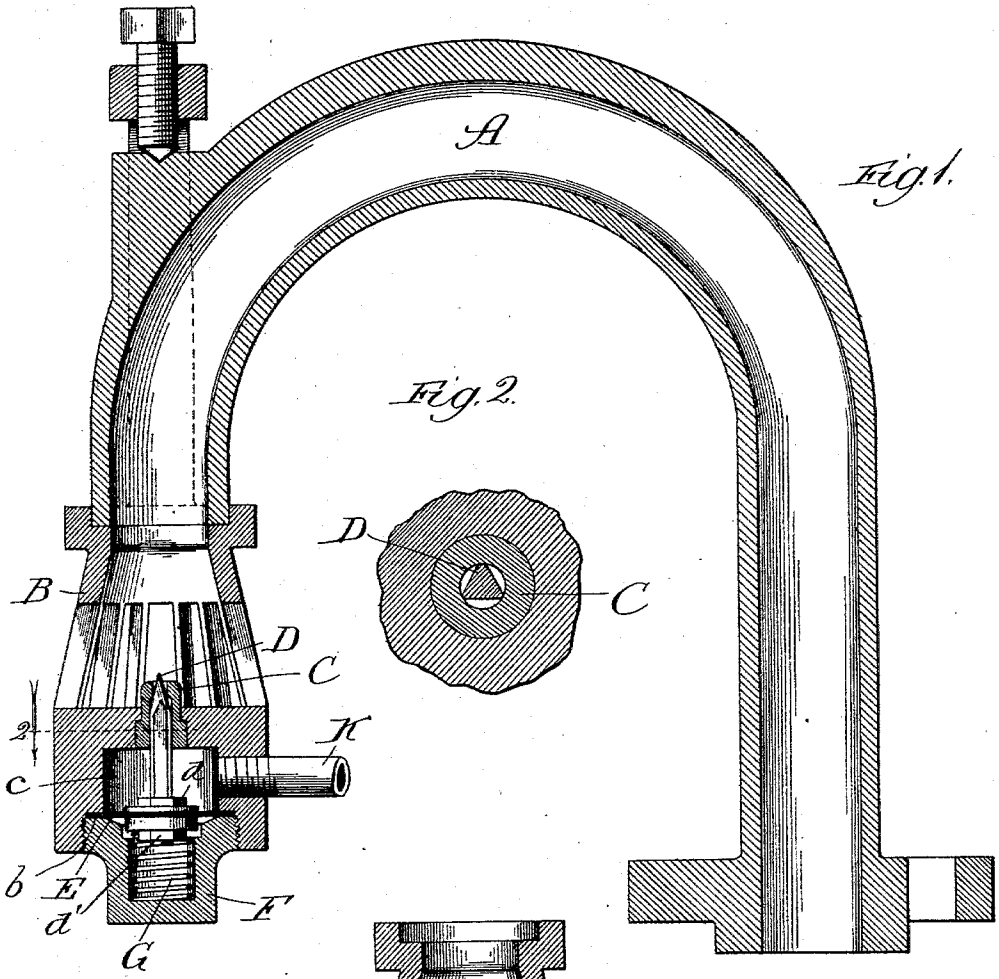
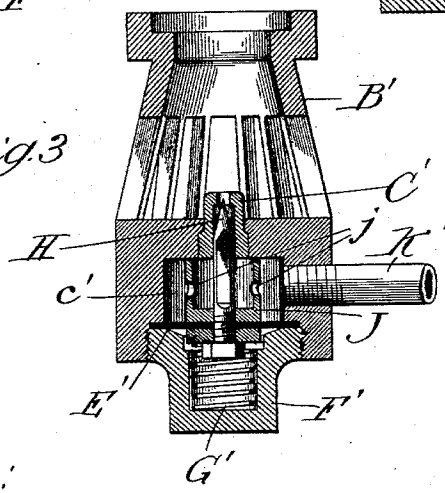


Fig. 1.

Fig. 2.

Fig. 3



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UNITED STATES PATENT OFFICE.

FRANCIS M. DEAN, OF HURON, SOUTH DAKOTA.

PNEUMATIC TRACK-SANDER.

SPECIFICATION forming part of Letters Patent No. 563,751, dated July 14, 1896.

Application filed April 13, 1896. Serial No. 587,293. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS M. DEAN, residing at Huron, in the county of Beadle and State of South Dakota, have invented a Pneumatic Track-Sander, of which the following is a specification.

My invention, which is an improvement upon that patented to me February 4, 1896, No. 554,056, relates to track-sanding devices which are operated by means of fluid-pressure under the control of the locomotive engineer or other operator, and its particular object is to prevent any liability whatever of the blast-nozzle and passages becoming filled and clogged with sand by reason of the movement and jolting of the locomotive, so as to render the device inoperative.

In the drawings, Figure 1 is a section taken through the cage and nozzle and the siphon-shaped pipe connecting with the usual discharge-pipe; Fig. 2, a section on line 2 of Fig. 1, showing the shape of the needle or stem; and Fig. 3, a sectional view of a modified form.

As shown in my former patent there is within the usual sand-box a pair of siphon-shaped pipes and a pair of cages at the end thereof into which sand is drawn and ejected finally through discharge-pipes by the action of the air from the blast-nozzles. In the present case I have shown only one cage and one of such siphon-shaped pipes, but it will be understood that a pair of each is preferably employed.

The siphon-shaped pipe A connects at one end with a sand-discharge pipe and at the other with the cage B, within which is arranged a blast-nozzle C. This nozzle communicates with an interior chamber *c*, into which enters an air-pressure-supply pipe K, connected to a supply of air or other fluid pressure under control of the engineer.

In order to normally close the orifice and passage in the nozzle to prevent the entrance of sand into the chamber and supply-pipes which would eventually clog and obstruct the passage of air, I employ a spring-pressed needle or stem D, which carries at its lower end a diaphragm E, of flexible or other suitable material, having the required spring or flexibility. This diaphragm may be removably or otherwise mounted on the needle or valve-stem. As shown, it is arranged between two washers on either side thereof and held against a set-nut *d* by screwing up a nut *d'* upon the end of the valve-stem.

The edge of the diaphragm is held against an annular flange or shoulder *b* by means of a plug F, which screws into the hollow bottom or base portion of the cage. This plug is provided with a pocket adapted to receive a suitable spring G, which bears, respectively, upon the bottom of the pocket and against the washer on the diaphragm whereby the needle is forced upward and its end seated in the nozzle-passage to close the same. The top surface of the plug is beveled inward from the edges in order to accommodate the movement of the diaphragm, as hereinafter explained.

It is understood that the spring is of the proper predetermined tension in order that the diaphragm and needle may be operated by the fluid-pressure in the manner desired.

As clearly illustrated in Fig. 2, the needle is preferably triangular in cross-section except at the end or point, so as to allow the fluid-pressure to pass freely thereby through the passage in the nozzle. It is sufficient if the needle is flattened on one side only, or if other ways are adopted for providing a suitable passage for the pressure through the nozzle-passage and past the needle.

My sanding device being constructed as hereinbefore set forth operates as follows: The parts being in the normal position shown in Fig. 1, fluid-pressure is admitted by the engineer or operator through supply-pipe K into chamber *c*, whereupon the diaphragm is forced downward against the tension of the spring. The needle or stem is consequently withdrawn and a free passage made through the nozzle. The sand is sucked into the cages and ejected through the discharge-pipes in a manner similar to that described in my former patent. When the pressure supply is cut off, the spring restores the diaphragm to normal position and closes the orifice.

In Fig. 3 I have shown another form of construction in which the similar parts are designated by the same reference-letters but primed. In this form I employ what I term a "cleaning-needle" H and secure it to a diaphragm E'. A cup or cup-nut J screws upon

the needle and is provided with a suitable number of openings *j j*. The cup is of such a height that it strikes against the top of the interior chamber *c'* and prevents the needle from seating and from entirely closing the nozzle-orifice. This cup may be adjusted up or down upon the needle for regulating the degree of opening made thereby in the nozzle-passage. When fluid-pressure is admitted, it will pass through the holes *j* and out through the nozzle-orifice without disturbing or moving the diaphragm, but if sand should accumulate or become clogged and wedged in the orifice and around the cleaning-needle by reason of the jarring of the locomotive or otherwise, so as to obstruct the passage of fluid, the increased pressure will operate upon the diaphragm to cause it to withdraw the needle and leave the clogged sand free to be blown out by the blast and the passage to be thereby cleaned. As soon as the sand is thus free from the orifice and needle, the diaphragm and also the needle and cup will be restored automatically to normal position and sufficient pressure will be allowed to pass by the needle for ordinary sanding. Any sand which may have accumulated in the cup J is carried out by the blast at the same time. If a large amount of sand should be required for extra sanding, the increased pressure employed would move the diaphragm and withdraw the cleaning-needle and move the cup downward to allow free and ample passage of the fluid-pressure without requiring it to pass through the holes *j*. The nozzle-passage is always open in this form of construction to a sufficient extent to allow of ordinary sanding and the needle is operated whenever the orifice becomes clogged or heavy pressure is admitted. I thus provide a positive and efficient sander which is economical in the use of sand and under the full control of the engineer. Moreover, by the employment of the improvements, the device is rendered absolutely reliable in operation under all conditions, as all liability of the clogging and obstruction of the passages is removed.

Although I have described more or less precise forms and details of construction, I do not intend to be understood as limiting myself thereto, as I contemplate changes in form, the proportion of parts and the substitution of equivalents as circumstances may suggest or render expedient and without departing from the spirit of my invention.

I claim—

1. In a track-sander, the combination, with a sand-box and its discharge-pipe, of a blast-nozzle, the pressure from which is adapted to eject sand from the box through the discharge-pipe and a needle located in the nozzle-passage and controlled by the air-pressure.

2. In a track-sander, the combination, with a sand-box and its discharge-pipe, of a nozzle, a source of fluid-pressure in communication therewith, a needle or stem within the nozzle-passage and a flexible diaphragm secured to one end of the stem and influenced by the fluid-pressure.

3. In a track-sander, the combination of a fluid-pressure blast-nozzle, a connection therefor with a suitable source of fluid-pressure, a needle operating in the nozzle-passage and means connected to the needle for operating the same by the pressure of the blast.

4. In a track-sander, the combination, with a sand-box, of a blast-nozzle within the box, a connection therefor with a suitable source of fluid-pressure, a needle operating in the nozzle-passage, a flexible diaphragm connected to the needle and influenced by the fluid-pressure and means for holding the needle and diaphragm in normal position.

5. In a track-sander, the combination, with a sand-box and its discharge-pipe, of a cage arranged in the sand-box and having an interior chamber, a connecting-passage between the cage and discharge-pipe, an air-blast nozzle in the cage communicating through the interior chamber with a source of air-pressure, a flexible diaphragm arranged in the chamber and a needle carried by the diaphragm and operating in the blast-nozzle passage.

6. In a track-sander, the combination, with a sand-box and its discharge-pipe, of a cage communicating with the discharge-pipe within the box and provided with an interior chamber *c*, a blast-nozzle in the cage communicating with the interior chamber, a connection between a source of fluid-pressure and the interior chamber, a needle or stem governing the nozzle-passage, a diaphragm connected to the end of the needle and influenced by the fluid-pressure and a spring arranged on the opposite side of the diaphragm from that exposed to the fluid-pressure and adapted to keep the diaphragm in normal position.

7. In a track-sander, the combination, with a sand-box and its discharge-pipe, of an air-blast nozzle, the air-pressure from which is adapted to eject sand from the box through the discharge-pipe, a needle operating in the nozzle-passage, the body of such needle being flattened on one or more of its sides to permit the passage of air, and means connected to the needle for operating the same and under the control of the air-pressure.

8. In a track-sander, the combination with a sand-box and its discharge-pipe of an air-nozzle, a suitable source of pressure, a connection therefrom to the nozzle, the air-pressure from the nozzle being adapted to eject sand from the box through the discharge-pipe, a needle or stem working in the nozzle-passage and adapted to normally close the same and a diaphragm connected to the stem and controlled by the air-pressure to operate the stem.

9. In a track-sander, the combination with a sand-box and its discharge-pipe of a cage arranged in the sand-box and having an upper chamber with openings in the side thereof and having a hollow base, a cup-shaped plug

adapted to fit in the hollow base to form an interior chamber *c* communicating with a source of fluid-pressure, a passage between the interior chamber and upper chamber, a needle or stem adapted to normally close said passage, a flexible diaphragm clamped by the plug against the base portion and secured to the end of the stem and a spring arranged in the hollow portion of the plug and pressing against the diaphragm to seat the stem and close the passage whereby when pressure is admitted the diaphragm will be caused to be moved against the tension of the spring to open the passage.

10. In a track-sander, the combination with a sand-box and its discharge-pipe of a cage B arranged in the box and having a hollow base portion, a cup-shaped plug F adapted to screw part way in the base portion to form an interior chamber *c*, a connection between a suitable source of fluid-pressure and the interior chamber, a blast-nozzle C communicating with the interior chamber, a needle or stem D working in the nozzle-passage, a flexible diaphragm E connected to the stem and a spring G arranged in the plug and forcing the diaphragm upward to seat the stem and close the nozzle-passage.

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