

Oct. 10, 1939.

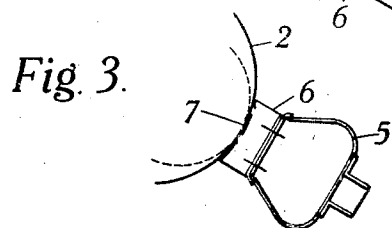
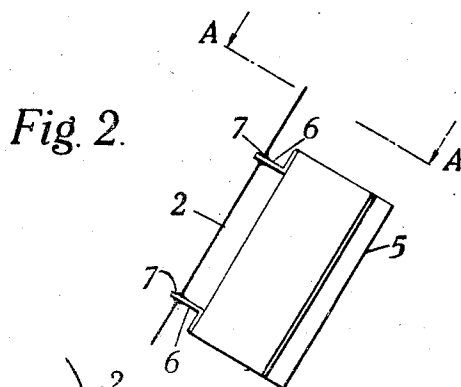
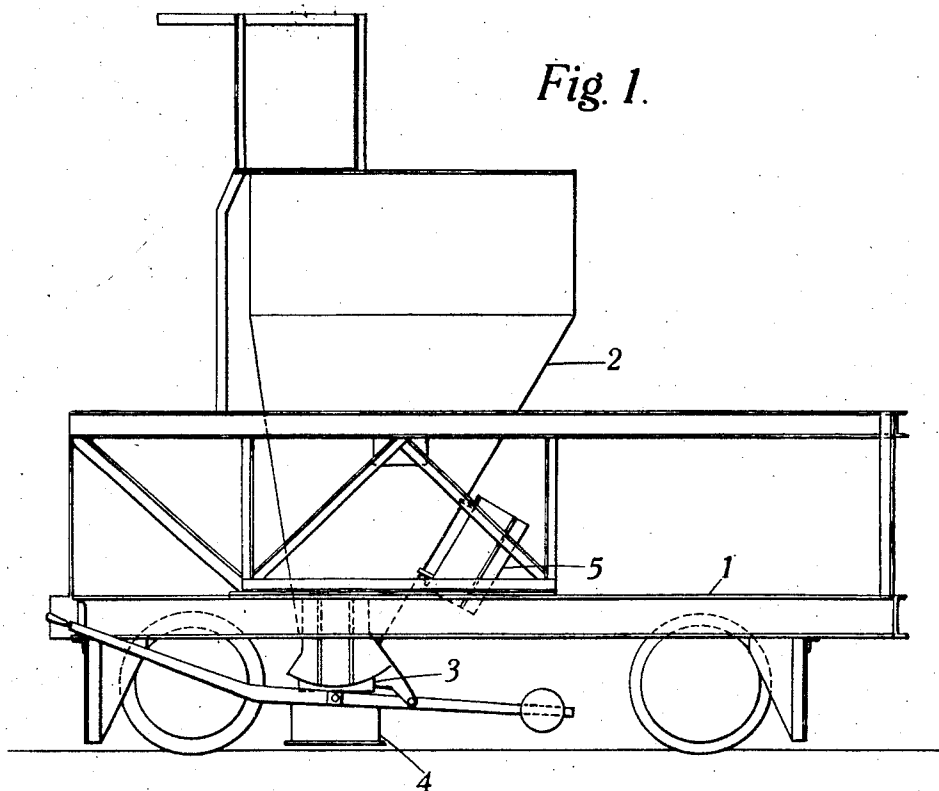
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2,175,541

MATERIAL DISCHARGE DEVICE

Filed Sept. 16, 1937

2 Sheets-Sheet 1



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Fig. 4.

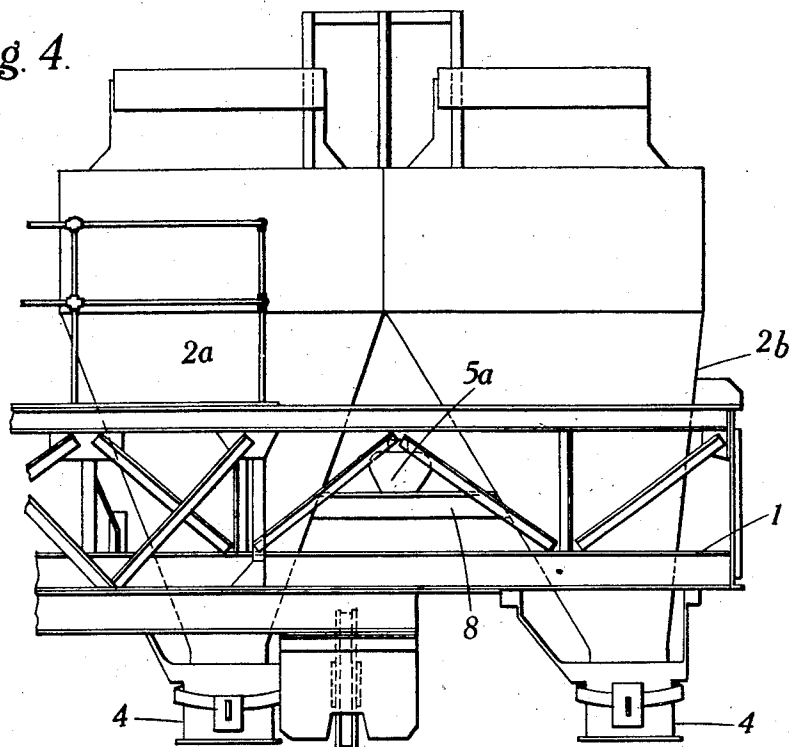
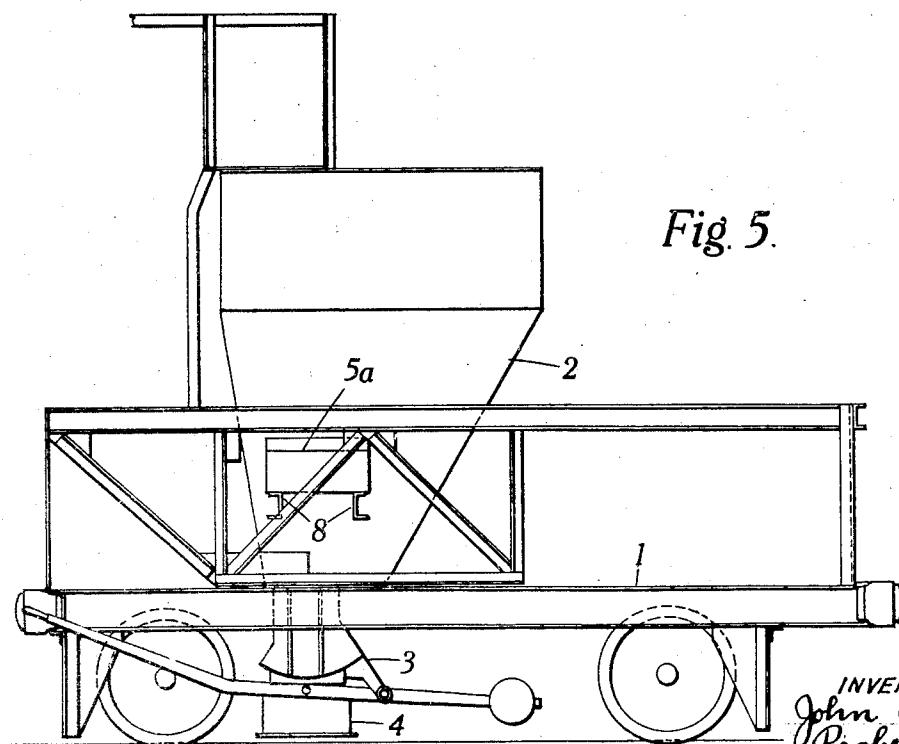


Fig. 5.



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UNITED STATES PATENT OFFICE

2,175,541

MATERIAL DISCHARGE DEVICE

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Application September 16, 1937, Serial No. 164,249
In Great Britain September 29, 1936

2 Claims. (Cl. 214—18)

The present invention relates to improvements in discharging small-sized granular or finely-divided coal or coke, particularly when these materials are in a damp or wet condition, from
5 hoppers or chutes. Such materials have a marked tendency to stick when discharging and the purpose of the present invention is to facilitate their discharge from hoppers or chutes.

According to the present invention, the discharge of small-sized, granular or finely-divided coal or coke from hoppers or chutes is facilitated by imparting to the hopper or chute vibrations of relatively high frequency and small amplitude.

The invention also includes hoppers or chutes
15 from, or through which small-sized, granular or finely-divided coal or coke is discharged, in which a vibration generating device is connected to the hopper or chute and imparts vibrations of relatively high frequency and small amplitude thereto.

The present invention can be applied with especial advantage to the charging cars of coke-ovens or like carbonizing retorts, and, according to a further feature of the invention, a coke-oven
25 charging car, including a hopper or hoppers from which small-sized, granular or finely-divided coal is discharged into a coke-oven, is characterized by the feature that a vibration generating device is connected to the hopper or hoppers, and imparts vibrations of relatively high frequency and small amplitude thereto.

A coke-oven charging car of the ordinary known construction comprises one or more hoppers (for example, four), mounted on a carriage
35 movable along the top of the coke-oven battery. The hoppers are filled with coal at a charging station and the car is then moved along the top of the battery until it is above an oven which is to be charged, when the coal in the hoppers is released and flows through the lower outlet of each hopper through the oven charging hole, into the oven.

It is the practice to charge coal into coke-ovens in a wet condition, i. e., the coal may contain from 8 to 15% of moisture. When discharging, the wet coal tends to stick in the lower part of the hopper, so impeding the charging of the oven, and for this reason mechanically operated stirrers are often provided in the interior of the hopper, to agitate the coal and prevent it sticking and hanging up. Such arrangements are not free from objection, and when the moisture content of the coal becomes high, they often fail in the purpose for which they are intended.
55 The present invention provides a more satisfac-

tory method of ensuring that the coal flows freely from the hopper, and that it does not hang up during the charging of an oven.

As an example of how the invention may be carried out in practice, its application to coke-oven charging cars will be described with reference to the accompanying drawings, in which—

Figure 1 is a diagrammatic side elevation of a coke-oven charging car;

Figure 2 is an enlarged view showing the manner in which the vibration generating device is attached to the hopper;

Figure 3 is a cross-section on the line A—A of Figure 2;

Figure 4 shows a front elevation of a coke-oven charging car including an alternative arrangement of the invention;

Figure 5 is a side elevation of the arrangement of Figure 4.

Referring to Figures 1, 2 and 3, the coke-oven charging car comprises a framework 1 carrying coal hoppers 2, the lower outlet of each hopper having the customary discharge valve 3 and drop sleeve 4 through which the coal is discharged into the oven. Attached to the side of the hopper
25 2 is an electro-magnetically operated vibration generating device 5 of known construction, adapted to generate pulsations having a frequency of about 3000 per minute and of relatively small amplitude. The moving portion of each vibrator
30 is attached to the side of the hopper by metal plates 6 which are shaped to fit the curved side of the hopper and are welded thereto at the regions 7. As shown, the vibration generating device 5 is attached to the hopper near to the
35 outlet thereof.

No special cushioning or other like arrangements are provided for localizing the vibrations to the hoppers, as it is found that the vibrations, due to their small amplitude and high frequency,
40 are not transmitted to any appreciable extent to the charging car as a whole or to the rails on which the car runs.

If desired, however, the hoppers 2 can be mounted on springs on the main frame of the
45 car or, alternatively, the hoppers 2 can be carried on the subsidiary framework and springs can be interposed between this subsidiary framework and the main frame 1 of the car.

Figures 4 and 5 show an arrangement in which
50 one vibration generating device serves two hoppers. In this arrangement the vibration generating device 5a acts on beams 8 attached to the hoppers 2a and 2b, so that the vibrations are transmitted equally to the two hoppers.

The manner in which it has been found convenient to use the present invention, when applied to a coke-oven charging car, is as follows: When the charging car is in position, and charging of the oven is about to begin, the discharge valves 3 on the hoppers are opened, and the vibrators 5 are momentarily set in operation to start the coal flowing out of the hoppers. The coal then continues to flow of its own accord, until the coal in the oven reaches the charging holes in the oven. The leveller bar is then inserted in the oven in known manner to level the charge, and after levelling, the vibrators are again set in operation to cause the remainder of the coal to flow out of the hopper, and may be kept vibrating until all the coal is discharged. Preferably, the vibrators are not operated while the coal is unable to flow into the oven, or the vibration may cause the coal to pack in the hopper, and there may then be difficulty in starting the coal flowing again.

The present invention has the important advantage that the power consumed in operating the vibration generating devices is small, and further, as applied to the hoppers of coke-oven

charging cars, that the interior of the hopper is left entirely free from stirring elements and the like which occupy space or which tend to obstruct the free flow of coal out of the hopper.

What I claim is:

1. Coke-oven charging car, including at least two hoppers from which small-sized damp carbonaceous material is discharged into a coke-oven, a rigid connection between the bodies of said hoppers, and a vibration-generating device capable of generating vibrations of relatively high frequency and small amplitude, attached to said rigid connection.

2. A coke-oven charging car including a plurality of hoppers from which small sized, granular or finely divided damp coal is discharged into a coke-oven, the interiors of said hoppers being entirely free from obstructions, with vibration-generating means capable of generating vibrations of high frequency and small amplitude supported by and operatively connected to the bodies of all of said hoppers whereby the vibrations from said means may be transmitted to the bodies of all of said hoppers.

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