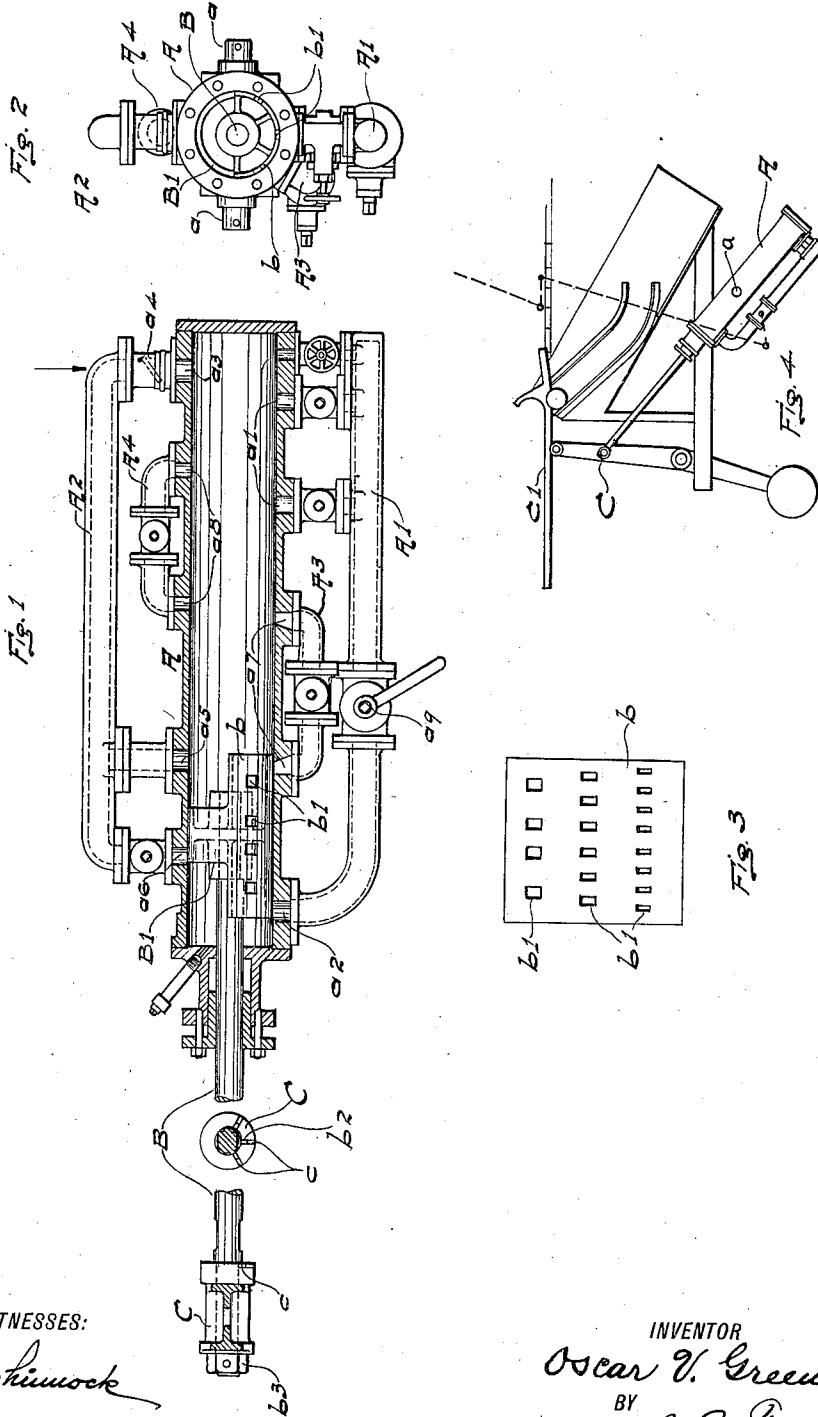


O. V. GREENE.
RETARDING DEVICE.

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Patented May 14, 1912.



WITNESSES:

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RETARDING DEVICE.

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To all whom it may concern:

Be it known that I, OSCAR V. GREENE, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Retarding Devices, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

As is well understood, it is necessary in the construction of car dumping mechanism, such as is used for the dumping of cars in connection with coal mine tipples, that some form of check or equivalent retarding device be provided to control the movement of the tilting track-section; for such movement, save in power actuated types of dumping apparatus, is usually derived from the weight of the loaded car which it is desired to dump, the entrance of the latter onto the track section initiating and effecting the movement of the latter. It is also recognized as desirable, in this type of mechanism, that a jerky or spasmodic movement be imparted to the car, whenever, for any reason, the coal in such car is not readily dislodged by the simple tilting movement of the track-section. It accordingly becomes necessary to interrupt more or less sharply, the movement of the car one or more times before it reaches its final lower position; in this way the coal may be caused to pass therefrom in an even stream, and not in one mass, as might be the case were reliance wholly placed on the final stopping of the track-section at the end of its tilting movement. It has been found that a liquid-containing cylinder provided with a by-pass and having a reciprocable piston connected with the tilting track-section, affords a very satisfactory form of retarding device for regulating the movement of the track-section, the rate of movement being regulated by a valve in the by-pass permitting the flow of liquid from one end of the cylinder to the other to take place at varying rates, or to be stopped altogether. While it is possible to secure the jolting effect just described, with this type of retarding device by alternately opening and closing the by-

pass valve, such operation requires the attention of the operator, and for other reasons is inconvenient.

The object of the present invention, then, is the provision of means in connection with retarding mechanism of the kind just referred to, wherein the desired jolting may be automatically secured and wherein adjustment may be had for securing such jolting in varying degree, depending upon the exigencies of the particular service in which the dumping mechanism is employed.

To the accomplishment of these and related ends, said invention consists of the means hereinafter fully described, and particularly pointed out in claims.

The annexed drawing and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting, however, but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawing:—Figure 1 is a longitudinal central section of a retarding cylinder and the piston operating therein, both constructed in accordance with my present invention; Fig. 2 is an end elevation of said cylinder and its appurtenant parts viewed from the right in Fig. 1, the corresponding head being removed; Fig. 3 is a development of the piston, forming a feature of the device; and Fig. 4 is a side elevation, more or less diagrammatic in character, of a typical dumping mechanism showing the mode of including therein the retarding device.

In the particular installation of the device represented in Fig. 4, it is necessary to mount the retarding cylinder A so as to permit oscillation thereof. To this end it is provided with trunnions *a* adapted to rest in suitable bearings therefor provided, while the piston rod B is connected directly to a cross-head C constituting part of the supporting means for the tilting track-section C'. For present purposes, it is merely necessary to note that the movement of the track section involves reciprocation of said piston rod and thereby of the piston B' within the cylinder. The latter is designed to be filled with a suitable liquid, such as dead oil, so that movement of the piston and piston rod

is possible only upon condition that such liquid be allowed to flow from the one end of the cylinder to the other, as it is displaced by the onward movement of the piston, whatever the direction of such movement. To permit such flow of the liquid, I provide four several by-passes A' , A^2 , A^3 and A^4 , the disposition and connection of which with the cylinder will now be particularly explained, first noting, however, the construction of the piston itself. Such piston is provided with a longitudinal extension b projecting both forwardly and to the rear, wherein are formed one or more series b' of apertures, as illustrated in the development of said piston portion shown in Fig. 3. Where more than one such series is utilized, both the number and the size of the apertures is varied in successive series. Such apertures are alined with the axis of the cylinder, and are disposed preferably in equal numbers on opposite sides of the piston head proper, which provides in effect, as has been explained, a moving wall separating the cylinder into two parts between which communication is had only by means of the by-passes aforesaid. The piston rod B (to which the piston is rotatably secured), is mounted in the cross head C so as to be angularly adjustable in order to bring any one of such series of apertures into a predetermined angular position about the axis of the cylinder. In order to accurately locate and secure the piston rod and piston in any such position as may be desired, the cross-head is provided with a series of radial recesses c , into which a pin b^2 projecting laterally from the adjacent portion of the rod is adapted to register. To release such pin, it is necessary to first loosen the nut b^3 on the end of the piston rod, so as to permit a slight longitudinal movement of the latter, whereupon it can be rotated and then drawn up and locked in its new position.

Of the by-passes, two, A' and A^2 , extend substantially from one end to the other of the cylinder, the one A' shown as being located on the under side having a plurality of valve controlled connections a' (shown as three in number) with the lower end of the cylinder, such connections being spaced longitudinally of the cylinder, and a single opening a^2 near the upper end of the cylinder. A valve a^5 in by-pass A' is connected with means permitting its operation from any suitable station, the effect of this valve, when closed, being to retain the parts of the device in the position shown in Fig. 1. The by-pass A^2 shown as being located on the upper side of the cylinder, has a single connection a^3 with the lower end of the latter, such connection being controlled by a check valve a^4 permitting flow to the cylinder only, while two spaced connections a^5 a^6 are provided for the other end of such by-pass, the

connection a^6 being controlled by a valve. Of these latter connections, one a^6 lies just a trifle beyond the uppermost position of the piston so as never to be entirely cut off by the same, while the other a^5 lies a short distance below such piston when thus at the end of its upward stroke, as it appears in Fig. 1. The two remaining by-passes A^3 and A^4 are of relatively short extent, their combined range being less than that of either of the others just described. Of such smaller by-passes then, the one A^3 is disposed a trifle to one side of the line of the connections a' of larger by-pass A' located on the under side of the cylinder, and it is with its openings a^7 that the apertures b' in the piston extension b are designed to be alined, the disposition of said by-pass A^3 longitudinally of the cylinder being such that the main piston wall is carried entirely by the upper opening a^7 in the position illustrated in Fig. 1. The other smaller by-pass A^4 has connection with the cylinder at two points a^8 both lying below the lower connection a^7 of the by-pass A^3 thus seen to cooperate with apertures b' in the piston. Each of said smaller by-passes has a valve controlling the rate of flow of liquid there-through.

The operation of the device, as has been indicated, will vary, depending upon the angular adjustment of the piston. Assuming as shown in Fig. 1, that the intermediate series of apertures (see Fig. 3) is alined with the connections a' of by-pass A^3 , and that the piston is just beginning its downward movement, the rate of such movement will be limited by the rate of flow of liquid through the large by-pass on the under side of the cylinder, so that a slow, easy, tilting movement is permitted the track section or other part, connected with the piston rod, until the piston B', proper, has passed beyond the upper connection a^7 of by-pass A^3 . Immediately thereupon, the alined apertures b' in the portion of piston extension b projecting upwardly from the piston come successively into register with such opening thereby affording a relatively free connection between the portion of the cylinder lying on opposite sides of the piston. As a result, a brief period of acceleration is permitted the latter, only to be sharply checked the moment the particular aperture b' in question passes beyond the by-pass opening. This effect is repeated as successive apertures on the same upper side of the piston extension come into register with said by-pass opening, and similarly as those on the other side of the piston come into register with the other opening a^7 of said by-pass, as will be readily apparent. In this way a series of jolts, or shocks, is automatically given the piston rod and the tilting track-section connected

therewith, with the beneficial results previously noted as being desirable. Since the number and size of the apertures b' determine the frequency and severity of this jolting action, a practically inexhaustible range of adjustment is available, and where several series of the apertures are provided in the same piston structure to be optionally brought into operative position, as herein shown, a single retarding device provides all necessary possibilities of adjustment in this respect.

After the last aperture b' has passed beyond the lower opening a' , the by-pass A^4 comes into play, its effect being to permit a more rapid movement of the piston during the latter portion of its stroke, such movement serving, in the particular dumping apparatus illustrated in Fig. 4, to permit a reverse tilting movement to the track-section C' , whereby the car, now dumped of its contents, may be discharged onto a track suitably disposed for its reception. Before the end of the stroke is reached, however, the uppermost of openings a' are cut off by the piston together with connection through this by-pass A^4 , so that the limited flow of liquid through by-pass A' permitted by the lower connection a' determines the rate of movement of the track-section just prior to its coming to rest. This is accordingly accomplished with a minimum of jar and shock. The return movement is then free to begin at once, so far as the retarding device is concerned, such return being expedited by the relatively free flow of liquid in by-pass A^2 that is now permitted by check-valve a^4 , by-pass A' , permitting, of course, a reverse flow as well. However, by restricting the upper connection a^6 of by-pass A^2 , it will be seen that this rapid return movement may be checked as the piston nears the end of its stroke, just as in the case of the down stroke. A further checking effect also results from the partial closure of this connection a^6 , and that a^2 of the other by-pass A' , by the passage of the piston thereover, only small portions of the full openings remaining uncovered in the final position of the piston. A very wide range of adjustment, it will be obvious, can hence be secured not only in the matter of the jolting effect but also in the timing and rate of the various other movements of the device. I should also note that the jolting can be entirely omitted by simply closing the valve in by-pass A^3 .

By way of conclusion it may be remarked that I have herein referred to an "upper" and "lower" end of the cylinder A merely for reasons of convenience and without implying that any particular disposition, least of all a vertical one, is significant in the operation of the device; also, the term "piston," as herein employed designates

simply the solid piston head that forms the moving wall whereby the cylinder is divided into two chambers. The part termed an "extension" of such piston might equally well be regarded as a part of a hollow piston since it can obviously assume any form such as that of a complete annulus, if desired; it has been thought best, however, in the interest of clearness to distinguish between these two parts in referring to them both in the preceding description and the claims which follow.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:—

1. In mechanism of the class described, the combination of a cylinder, a piston in said cylinder, and means operated by said piston adapted to alternately cut off and permit flow from one side to the other of said piston pending movement thereof in said cylinder, said means being adjustable to vary the frequency of such cutting-off operations.

2. In mechanism of the class described, the combination of a cylinder, a piston in said cylinder, and means operated by said piston adapted to alternately cut off and permit flow from one side to the other of said piston pending movement thereof in said cylinder, said means being adjustable to vary the duration of such cutting-off operations.

3. In mechanism of the class described, the combination of a cylinder, a piston in said cylinder, and means operated by said piston adapted to alternately cut off and permit flow from one side to the other of said piston pending movement thereof in said cylinder, said means being adjustable to vary both the frequency and the duration of such cutting-off operations.

4. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston in said cylinder, and means operated by said piston adapted to alternately cut off and permit flow through said by-pass, said means being adjustable to vary the frequency of such cutting-off operations.

5. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston in said cylinder, and means operated by said piston adapted to alternately cut off and permit flow through said by-pass, said means being adjustable to vary the duration of such cutting-off operations.

6. In mechanism of the class described,

the combination of a cylinder provided with a by-pass, a piston in said cylinder, and means operated by said piston adapted to alternately cut off and permit flow through said by-pass, said means being adjustable to vary both the frequency and the duration of such cutting-off operations.

7. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder, and an extension borne by said piston and provided with a series of apertures adapted to register with the openings of said by-pass.

8. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder, said piston being angularly adjustable about its axis, and an extension borne by said piston and provided with a plurality of series of apertures alined with the axis of said piston, said series of apertures being respectively adapted to register with the openings of said by-pass in different angular positions of said piston about its axis.

9. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder, said piston being angularly adjustable about its axis, and an extension borne by said piston and provided with a plurality of series of apertures alined with the axis of said piston, said series of apertures differing in number and being respectively adapted to register with the openings of said by-pass in different angular positions of said piston about its axis.

10. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder, said piston being angularly adjustable about its axis, and an extension borne by said piston and provided with a plurality of series of apertures alined with the axis of said piston, said series of apertures differing in size and being respectively adapted to register with the openings of said by-pass in different angular positions of said piston about its axis.

11. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder, said piston being angularly adjustable about its axis, and an extension borne by said piston and provided with a plurality of series of apertures alined with the axis of said piston, said series of apertures differing both in number and size and being respectively adapted to register with the openings of said by-pass in different angular positions of said piston about its axis.

12. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder and an extension borne by said piston

and projecting in both directions therefrom, said extension being provided with a series of apertures lying partly on one side and partly on the other side of said piston and adapted to register with the openings of said by-pass.

13. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder, and means operated by said piston to alternately cut off and permit flow through said by-pass, the frequency of said alternations being different in different angular positions of said piston about its axis.

14. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder, means operated by said piston to alternately cut off and permit flow through said by-pass, the frequency of said alternations being different in different angular positions of said piston about its axis, and means adapted to secure said piston for reciprocation in desired angular position about its axis.

15. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder, means operated by said piston to alternately cut off and permit flow through said by-pass, the frequency of said alternations being different in different angular positions of said piston about its axis, a cross-head, the outer end of the piston-rod being secured to said cross-head so as to be rotatable with respect thereto, and means adapted to lock said piston-rod in desired angular position about its axis.

16. In mechanism of the class described, the combination of a cylinder provided with a by-pass, a piston reciprocable in said cylinder, means operated by said piston to alternately cut off and permit flow through said by-pass, the frequency of said alternations being different in different angular positions of said piston about its axis, a cross-head, the outer end of the piston-rod being secured to said cross-head so as to be both longitudinally and rotatably movable with respect thereto, a plurality of radial recesses in said cross-head, and a pin projecting laterally from said piston-rod and adapted to be held in a selected recess to lock said piston-rod in desired angular position about its axis.

17. In mechanism of the class described, the combination of a cylinder provided with two by-passes extending substantially from one end to the other thereof and with a shorter by-pass connecting points near one such end, a piston reciprocable in said cylinder, and a check-valve in one of said longer by-passes permitting flow therethrough in one direction only.

18. In mechanism of the class described, the combination of a cylinder provided with two by-passes extending substantially from one end to the other thereof and with a shorter by-pass connecting points near one such end, a piston reciprocable in said cylinder, a check-valve in one of said longer by-passes permitting flow therethrough in one direction only, and an exteriorly operable valve in the other larger by-pass. 10
Signed by me this 2nd day of April 1909.
OSCAR V. GREENE.

Attested by—

CHRISTINE E. ARNS,
JNO. F. OBERLIN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."