(No Model.)

J. M. WESTERLIN & A. CAMPBELL.

DASH POT.

No. 345,939. Patented July 20, 1886.

FIG. 1.

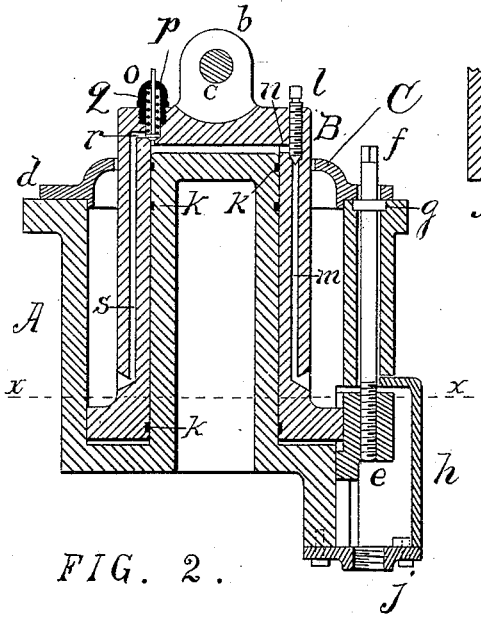


FIG. 4.

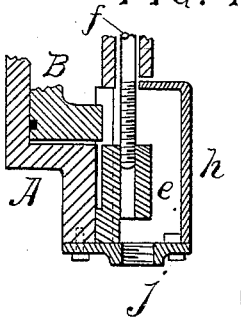


FIG. 5.

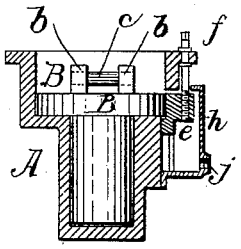


FIG. 2.

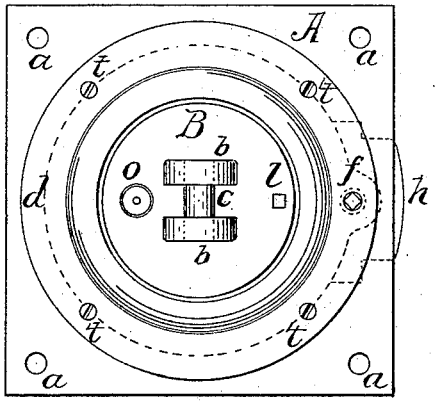
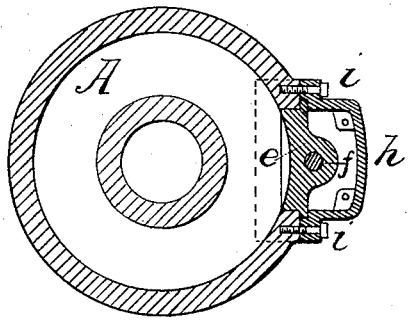


FIG. 3.



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UNITED STATES PATENT OFFICE.

JOHN M. WESTERLIN, OF LAKE VIEW, AND ALLAN CAMPBELL, OF CHICAGO, ILLINOIS.

DASH-POT.

SPECIFICATION forming part of Letters Patent No. 345,939, dated July 20, 1886.

Application filed May 1, 1886. Serial No. 200,857. (No model.)

To all whom it may concern:

Be it known that we, JOHN M. WESTERLIN, residing at Lake View, county of Cook, State of Illinois, and ALLAN CAMPBELL, residing at Chicago, in the county of Cook and State of Illinois, and citizens of the United States, have invented a new and useful Improvement in Dash-Pots, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section through the center of the dash pot; Fig. 2, a top or plan view; Fig. 3, a cross-section on line *x x* of Fig. 1; Fig. 4, a detail in section showing the controlling-valve at its lowest point of adjustment; Fig. 5, a detail in section showing a modification.

This invention is primarily designed for use with engines having the Corliss or analogous styles of valves, and in which the valves are closed by the pressure of the atmosphere on top of the plunger when the governor releases the pick-up finger or crab claw from the lever by which the valve is opened; but it can be used in connection with other valves and devices, and has for its objects to insure a rapid descent of the plunger for nearly the entire length, and for the completion of its stroke a gradual stoppage without producing any noise; to regulate the amount of cushion under the plunger in the cushion-chamber without interfering with the rapid descent of the plunger until the resistance is reached; to dispose of any excess of oil that may accumulate in the dash-pot by drawing off the same, and to improve, generally, the construction and operation of the dash-pot as a whole; and its nature consists in providing a vacuum dash-pot having a cushion regulated by an adjustable valve for gradually stopping the descent of the plunger and preventing noise; in providing relief-passages for the escape of the air, and through which any excess of oil can be drawn off, and in the several parts and combinations of parts hereinafter described, and pointed out in the claims as new.

In the drawings, A represents the shell or cylinder of the dash-pot, formed, as shown, of an inner and outer annular shell or wall, so as to leave between them an annular chamber in which the plunger works, and, as shown, the dash-pot at one end is provided with a square flange having holes *a* for the passage of bolts or screws by means of which the dash-pot can be secured to a support, and, as shown, the inner cylindrical wall of the dash-pot extends some distance above the outer wall of such dash-pot, and the inner wall surface forms a guide for the plunger.

B is the plunger, having a central cylindrical bore to receive the annular inner wall of the dash-pot, and having at its bottom end a flange the periphery of which fits the inner face of the outer wall of the dash-pot, as shown in Fig. 1, the bore of the plunger being concentric with the inner wall of the dash-pot, and the periphery of the flange concentric with the outer wall, so that when the plunger is in place in the chamber between the inner and outer wall a close fit will be produced.

C is a cap or cover for closing the open end of the dash-pot, such cover having an annular flange, which rests on the edge face of the outer wall, with a depending lip, also annular, which fits within the annular wall, as shown in Fig. 1, so as to make an air-tight connection, and the cover is provided with an annular opening for the play of the plunger, the opening being a trifle larger than the diameter of the plunger, so as to leave a passage between the plunger and cover for the admission of air, and, as shown, the outer end of the plunger is provided with two lugs, *b*, between which is a pin, *c*, for the attachment of a pitman or rod, (not shown,) which rod is connected to the valve-gear by which the plunger is moved.

The cover C is attached to the edge face of the outer wall by means of screws *t*, and when the parts are together the bore or chamber in the plunger B makes a nearly air-tight fit on the inner wall of the cylinder A, and the flange at the inner end of the plunger B makes a corresponding fit on the inner face of the outer wall of the dash-pot A.

The outer wall of the dash-pot A at one side,

near the bottom of the chamber of the dash-pot, has an opening or hole cut through it, in which opening is located a valve, *e*, the inner face of which, for a portion of its length, is formed on the same circle as the inner face of the outer wall, so that the face of the valve and the face of the wall lie in the same plane, and the inner face of the valve, for the balance of its length, is made to fit closely into a flat space or opening made in the outer wall of A, so that the abutting faces form a guide for the valve in raising and lowering it, and, as shown, the valve is raised and lowered by means of a stem or rod, *f*, which screw-threads into the body of the valve *e*, and is squared or otherwise formed at its outer end to receive a wrench or other device, by which the stem or rod can be turned to raise or lower the valve on the screw-thread, and this stem is held in position in the construction shown by a collar, *g*, near its outer end, which enters a recess in the edge face of the outer wall of the dash-pot, the rod or stem passing through a suitable hole in such outer wall, as shown in Fig. 1. The valve and the opening therefor in the dash-pot are inclosed by a cover, *h*, which is secured in place by screws *i*, which enter the outer wall of the dash-pot, as shown in Fig. 3, and, as shown, this cover *h* is provided with grooves to receive flanges on the side edges of the valve, by which the valve is maintained in its line of movement up and down. If desired, the guides for the valve *e* may be formed independent of the cover.

The hole in the outer wall of the dash-pot A is, in fact, a port controlled by the valve *e*, so that such port can be made variable in its dimensions up and down, and this control of the dimensions of the port through the valve *e* is had by the screw-threaded stem *f*, by which the valve can be raised or lowered to make an oblong slot or port of any required dimensions.

The covering *h* of the slide-valve *e* may be left open at the discharge and receiving end, and where the air is received in a pure state such open covering will operate properly; but in case the air is full of dust and dirt a flange, *j*, with a threaded hole which receives a pipe, (not shown,) can be attached to the open end of the cover *h*, and the air for the dash-pot can be drawn through such pipe from any source of pure supply.

As shown, the outer face of the inner wall of the dash-pot and the inner face of the plunger are provided with slots or grooves *k*, in which oil enters, to secure a thorough lubrication of the coacting faces of the dash-pot and plunger, and by which a seal is formed between the dash-pot and the plunger, which prevents air from passing into the vacuum-chamber, except as hereinafter described.

The cover *j* may be applied by screws, which enter a flange extending down from the dash-pot and suitable lugs or bosses on the cover *h*, or in any other suitable manner.

A plug-valve, *l*, is screw-threaded into the closed end of the plunger B, the end of which valve is pointed to properly engage a seat in a passage, *m*, which passage is located in the wall of the plunger B, and communicates with the air-chamber between the plunger and the dash-pot body, as shown in Fig. 1, and the mouth of such passage *m* is made funnel-shaped, and lies above the flange on the end of the plunger, so that in the movements of the plunger such opening will be above the bottom of the air-chamber and below the cover C, by which means the air which is forced out through the passage *m* will escape into the annular chamber in which the plunger operates, and such escape will not produce a hissing sound by the peculiar shape of the mouth, which allows the escaping air to expand and pass out with a decrease in its pressure, thus preventing noise and assisting in making the dash-pot noiseless; and in order to relieve the air between the plunger and the inner wall of the dash-pot at the end a passage, *n*, is formed in the wall of the plunger to communicate with the passage *m*, such communication being had through the plug-valve *l*, and by means of these passages *m n*, the vacuum-chamber in which the plunger moves has communication with the chamber between the plunger and its guide. The excess of air, in case more air is admitted than will be discharged through the passages *m n* while the plunger is descending, is allowed to escape, without impairing the prompt action of the dash-pot, by a relief-valve, *o*, the stem of which is located in a stuffing box or chamber, *p*, screw-threaded into the end of the plunger, around which stem in the chamber *p* is a coiled spring, *q*, by which the valve is held to its seat formed in a passage, *r*, leading from the chamber between the plunger and the inner wall of A to a passage, *s*, which leads into the vacuum-chamber in a manner similar to the passage *m*, the passage *s* also having a funnel shaped mouth to prevent the air from escaping with a hissing sound when driven from the vacuum-chamber by the descent of the plunger. The relief-valve *o* also furnishes a means for the discharge of any surplus oil that may collect in the upper chamber, or the chamber formed in the plunger, and the proper lubrication between the plunger and the inner wall of the dash-pot is accomplished by a suitable oil-cup located on the end of the plunger, with a passage leading from such oil-cup to the chamber of the plunger for the lubricant to pass to the faces of the plunger and the inner wall of the dash-pot.

In operation, at the starting of the apparatus the valve *e* is placed at its lowest position, so as to leave the passage which it closes fully open, as shown in Fig. 4. The plunger B re-

ceives an upward motion from the valve-gear by the rod attached to the pin *c*, and rises above the top of the port controlled by the valve *e* in the vacuum-chamber, terminating its course before the flange at the lower end of the plunger B in the vacuum-chamber comes in contact with the cover C, and as the chamber in the plunger fits closely on the inner cylindrical wall of A, such fit, in connection with the seal formed by the oil in the grooves *k*, prevents the passage of any air between the plunger-chamber and the inner wall of A, producing a vacuum in the chamber formed by the lifting of the plunger B between the inner and outer wall of A. The air in such upward movement of the plunger has free access to both sides of the flange on the inner end of the plunger from below through the port of the valve *e*, and from above by the air which passes through the small annular space between the plunger and the cover C, and during the upward movement of the plunger the valve *e* is drawn up to partly close its port by the screw-threaded stem *f*, so that when the valve with which the dash-pot is used is ready to close, through the action of its governor, the atmospheric pressure on the top of the plunger causes it to be forced down, as shown in Fig. 1, and the air in the annular chamber in which the plunger operates and beneath the plunger is driven ahead of the descending plunger through the port in the vacuum-chamber, controlled by the valve *e*, until the end of the plunger comes to the edge of the valve *e*, from which point, during the further descent of the plunger, the air is confined and compressed, and forms a cushion which acts to bring the plunger to a gradual stop, and by adjusting the valve *e* by a few trials the exact point at which it should act to cut off will be found, and it is there held by the screw-threaded stem *f*, producing a cut-off below which the air will be confined and compressed with each descent of the plunger, bringing the plunger at each descent to a gradual stop under the action of an air-cushion. The downward movement of the plunger will be very rapid for the greater part of its course, the area of the port controlled by the valve *e* being of ample extent, so as to allow the air to pass out freely without offering any impediment to the descent of the plunger; and it will be seen that the instant the end of the plunger passes the edge of the valve the air between the plunger and the bottom of the vacuum-chamber will be rapidly compressed, as the air is confined in the annular chamber formed by the bottom of the vacuum-chamber, the bottom of the plunger, and the wall of the vacuum-chamber, the outer wall being completed by the valve *e*, the result being that the speed of the plunger is gradually diminished until the point is reached at which the resistance of the confined air below the plunger equals the pressure of the air above, at which time the plunger comes to a stop. The port of the valve *e* being of considerable extent, allows the free passage of the air in the descent of the plunger without producing a sufficient pressure to cause a whistling or hissing sound, and, as before stated, no sound is produced in the movements of the plunger from the air passing through the passages *m n*, by reason of the enlarged mouth or discharge of the passages, so that a perfectly-noiseless dash-pot is produced, and at the same time one which is reliable and effectual in its operation.

The valve *e* serves several important objects, as by placing it in the position shown in Fig. 4 it allows any excess of oil that may accumulate in the annular chamber below the plunger to be readily and quickly drawn off. It enables a proper depth of air-cushion to be formed to produce a gradual stoppage of the plunger in its descent, as through the screw-threaded stem *f*, or other regulating device, it can be so set as to form the exact depth of chamber required for the cushion to produce a gradual stoppage of the plunger, and the port which it produces is one which permits a rapid descent of the plunger and a free escape of the air without producing the hissing sound given to other constructions of dash-pots. The air which escapes through the port formed by the valve *e* may be allowed to pass into the engine-room, and the air for the supply beneath the plunger may be drawn from such room; or by using a cover, *j*, with a pipe leading therefrom, the escaping air and the air supply can be delivered or drawn from some other source.

The construction shown in Fig. 5 has a dash-pot with its chamber formed by a single outer wall, and this dash-pot has an extension with a chamber to receive the stem of the plunger B, the head of which fits the annular chamber in the dash-pot. The operation of the controlling-valve *e* is the same as that already described, and in this figure, 5, the cover *h*, which incloses the valve *e*, and its port has a closed bottom, and the opening *j*, for the attachment of a pipe, is formed in the front face or wall of the cover.

What we claim as new, and desire to secure by Letters Patent, is—

1. The combination, with the body or shell A, having an annular chamber formed by an inner and outer wall, of a plunger, B, working in the annular chamber, and a port closed by a regulating slide-valve, *e*, for cushioning the plunger, substantially as and for the purpose specified.

2. The combination, with a vacuum-chamber, of a controlling-valve, *l*, and passages *m n*, the passage *m* having an enlarged mouth, substantially as and for the purpose specified.

3. The combination, in a dash-pot, of a re-

lief-valve, *o*, with the passages *r s*, the passage *s* having an enlarged mouth, substantially as and for the purpose specified.

4. The body or shell A, having an annular chamber, and plunger B working in the annular chamber, in combination with a port controlled by a sliding valve, *e*, and a cover, *h*, inclosing the valve and port, substantially as and for the purpose specified.

5. A dash-pot consisting of a body or shell, A, plunger B, port controlled by a sliding valve, *e*, and passages *m n* and *r s*, controlled by valves *l o*, the passages *m* and *s* having enlarged mouths for cushioning the plunger and producing a noiseless dash-pot, substantially as specified.

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