

(No Model.)

2 Sheets—Sheet 1.

C. BECKWITH.  
STREET CLEANING MACHINE.

No. 554,168.

Patented Feb. 4, 1896.

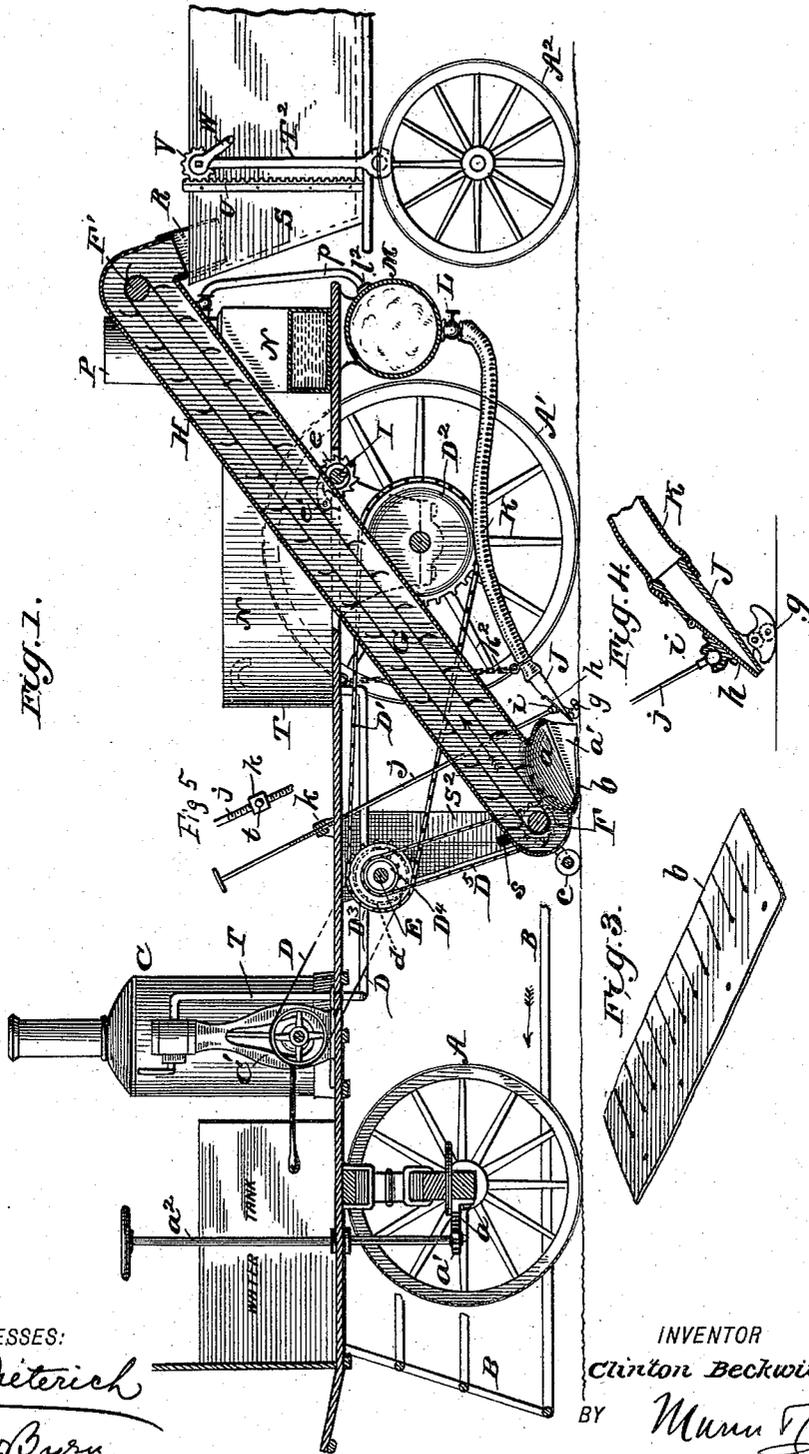


Fig. 1.

Fig. 3.

Fig. 4.

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# UNITED STATES PATENT OFFICE.

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## STREET-CLEANING MACHINE.

SPECIFICATION forming part of Letters Patent No. 554,168, dated February 4, 1896.

Application filed March 16, 1894. Serial No. 503,893. (No model.)

*To all whom it may concern:*

Be it known that I, CLINTON BECKWITH, of Herkimer, in the county of Herkimer and State of New York, have invented a new and useful Improvement in Street-Cleaning Machines, of which the following is a specification.

The object of my invention is to provide a street-cleaning machine arranged to be propelled and operated by steam or other power, and adapted to simultaneously sprinkle the street, to take up and carry along the trash and dirt removed from its surface, and also to disinfect the latter, and to dump or discharge the trash at intervals, all in a practical and expeditious way.

It consists in the peculiar construction and arrangement of parts for accomplishing the above objects, which I will now proceed to more fully describe with reference to the drawings, in which—

Figure 1 is a side view, partly in section, on line 1 1 of Fig. 2; Fig. 2, a plan view partly broken away; Fig. 3, a detail view in perspective of the flexible apron; Fig. 4, a detail view in cross-section of the spray and blast nozzle; and Fig. 5 is a detail of the trunnioned screw nut and shaft *j*.

The carriage is a four-wheeled one, similar to a herdic, and having wheels whose tires are preferably faced with wood, rubber, or other material to deaden the sound and secure traction. The front axle is provided with a fifth-wheel which has a segmental gear *a*, that is engaged by a pinion *a'* on the lower end of a vertical shaft *a<sup>2</sup>* bearing at the top a hand-wheel by which the fifth-wheel and the angle of the front axle are adjusted to guide the machine. Around the front end of the carriage, and extending down close to the ground, is a guard or fender *B*, and on the platform above are mounted a steam-engine and boiler *C*, with water-tank and fuel-box arranged in convenient proximity thereto. This engine is preferably of compact form, and is provided with reversing-gear. From its driving-pulley *C'* a belt *D* extends to and drives a pulley *d* on a transverse shaft *E* journaled in the timbers of the running-gear. On this shaft are rigidly keyed two pairs of sprocket-wheels. The outer ones, *D<sup>2</sup> D<sup>3</sup>*, connect with drive-chains *D' D'*, which engage

with sprocket-wheels *D<sup>2</sup> D<sup>3</sup>*, rigidly fixed on the axle of the main running-wheels *A' A'* and serve to propel the machine. The other pair of sprocket-wheels, *D<sup>4</sup> D<sup>4</sup>*, on shaft *E* serve to drive chains *D<sup>5</sup> D<sup>5</sup>*, which in turn operate upon the sprocket-wheels *F* fixed on the lower shaft of an elevator-belt *G*, which is housed in a casing or trunk *H* and extends up to and around a roller *F'* at the upper end thereof.

The lower end of the trunk *H* is flared or expanded, as seen in Fig. 2, and opens rearwardly through a flared mouth *a* (see Fig. 1) having curtains *a'* at its side. At the lower edge of this flared mouth is attached a flexible drag-apron *b*, which is designed to lie upon and conform as closely as possible to the contour of the street surface. This apron (see Fig. 3) is slitted transversely at one of its edges so as to cause it to lie closely to any irregular surface in the road-bed, and may be made of sheet metal, leather, or of sheet metal combined with leather, cloth, or other fabric.

The trunk or casing *H* is rigidly fixed to and supported upon a fulcrum-shaft *I*, and is arranged to be tilted therewith in bearings *x x*, so as to raise its lower end away from the road-bed while being transported without being in action, and also to allow it to yield to irregularities or obstructions in the road-bed when in action. To hold it in the raised position a ratchet-wheel and pawl *e* and *e'* serve to lock it to the framework of the carriage. To guide and control the lower end of the trunk, side pieces *S<sup>2</sup>* depend from the platform and extend nearly to the ground, where they have curved slots *s* that receive the projecting ends of the shaft of sprocket-wheels *F*.

Where the lower end of the trunk rests upon the road-bed it is sustained upon a series of circular disks *c* arranged upon a shaft, which disks protect and guide the lower end of the trunk as it moves along the surface. These disks have sharpened edges that enable them to split up or subdivide and loosen cakes of mud, clay, &c., so that they may be discharged into the trunk by the agencies hereinafter described.

*J* is a blast-nozzle which (see Fig. 2) is spread out or widened horizontally to correspond with the mouth *a* of the trunk, to which it closely approximates. This nozzle has a

wide slit or discharge-orifice directed to the front, whose size is adjusted by a hinged horizontal lip  $h$ , which may be raised to enlarge the opening or shut down to contract or entirely close it. This nozzle rides on jointed shoes or runners  $g$ , which are provided with two or more friction-wheels adapted to run upon the road-bed.

To regulate the adjustment of the hinged lip  $h$  of the nozzle, a screw-shaft  $j$  is connected to said lip by a ball-and-socket joint  $i$ , and has at its upper end, within convenient reach of the engineer, a hand-wheel for turning the same. This screw-shaft is tapped through a screw-nut  $k$  supported in trunnions upon the framework of the carriage, so that by turning the shaft the lip  $h$  may be adjusted. The trunnions  $tt$  of the nut allow the nozzle to ride over obstructions. This same screw-threaded adjustment serves also to lift the whole nozzle off of the road-bed to prevent useless wear upon the same when being simply transported from place to place. In accomplishing this the elevation of the screw-rod  $j$  first lifts the lip  $h$ , and finally raises the nozzle  $J$ , the turning of the ball-and-socket joint  $i$  permitting this movement of the parts.

The nozzle  $J$  connects with a flexible hose-pipe  $K$ , supported loosely by a chain  $h^2$ , which hose, through a throttle-valve  $L$ , communicates with a mixing-chamber  $M$ . This mixing-chamber  $M$  communicates with a water-pump  $O$ , an air-pump  $P$ , and a gas or disinfectant pump  $Q$ , these several pumps being connected to the mixing-chamber  $M$  at  $l^2$  through the branch pipes  $o p q$ , each of which is provided with a suitable valve.

The water-pump  $O$  (see Fig. 2) takes its supply from the subjacent tank  $N$  through inlet-pipe  $o'$  and delivers it through pipe  $o$ . The air-pump  $P$  takes its supply from the air, and after compression delivers it through pipe  $p$ , and the gas or disinfectant pump  $Q$  takes its supply from any suitable reservoir (not shown) and delivers it through pipe  $q$ . These pipes  $o p q$  all unite at a point  $l^2$  (Figs. 2 and 1) and deliver into the mixing-chamber  $M$ . I do not show or confine myself to any particular form of pumps  $O P Q$ , it being understood that any of the well-known pumps may be used.

$N$  is a large **U**-shaped water-tank, which is closed steam-tight and is adapted to carry a small steam-pressure.  $S$  is the end of a dump-car, which trails after and forms a tender to the main carriage. This dump-car is connected with the upper end of the trunk  $H$  by a flexible pipe or spout  $R$ , and said dump-car is provided at one end with means for raising and inclining the same to discharge its contents, consisting of standards  $T^2$ , pinion  $V$ , crank-handle  $W$ , and rack-bar  $U$  on the dump-car body which is engaged by said pinion.

The engine and gears should be of such form and arrangement as to give a propelling speed of eight miles an hour and a minimum

working speed of two miles an hour. The water-tank  $N$  should be of sufficient capacity to hold a supply of water for sprinkling purposes to sprinkle a surface of three thousand square yards, with a sufficient space partitioned off from the same to hold the necessary amount of disinfecting-fluid.

The exhaust from the engine is to be carried to the water-tank  $N$  through the exhaust-pipe  $T$ , as is also the exhaust from the pumps.

The operation of the machine is as follows: The parts are adjusted to the position shown in Fig. 1, with the lower end of the trunk and the nozzle resting upon the road-bed. As the machine moves forward from the power of its engine, the blast from the nozzle, striking the road-bed at an angle of about forty-five degrees, drives from pneumatic force all loose particles of dirt or trash, &c., forwardly into the open mouth  $a$  of the trunk, which trash is gathered or accumulated at the lower end of the trunk where the mouth converges into the same, and there it is scooped up by the buckets on the elevator-belt and is carried up to and delivered into the dump-car. This blast is compound in character, being composed of air from the air-pump or blower  $P$ , water from the water-pump  $O$ , and a disinfectant spray or gas from the pump  $Q$ . These are mixed together in the subjacent chamber  $M$  and, passing out of the same through the hose-pipe  $K$ , are made together to impinge contemporaneously upon the road-bed with a high degree of pressure. This serves to sprinkle the road-bed and lay the dust, and also loosens up the dirt, and the blast furnishes a powerful dynamic effect which loosens up and carries into the mouth  $a$  the dampened trash, the blast aiding in its propulsion through the trunk. The simultaneous admixture of the disinfectant liquid or gas also effectually kills all germs of disease that may lurk in the trash, and not only leaves the street in an antiseptic condition, but also disinfects the trash, so that it becomes practically innocuous at the dump.

The blast employed is so forceful, or of such high pressure, that the fluids as they mix in the chamber  $M$  do not condense or separate, but are maintained in a vaporous spray which gives a more powerful dynamic effect to the blast for cleaning purposes than air or dry steam alone could furnish, for the reason that the superior specific gravity of the liquids when energized by the air-blast gives a more powerful momentum or moving effect.

By discharging the exhaust-steam of the engine into the water-tank  $N$  through pipe  $T$  and making the tank steam-tight the tank acts as a condenser, making the engine more effective, escaping steam is avoided on the street, so that horses are not frightened thereby, and furthermore the water is warmed and made more effective for clearing the street.

I would have it understood that the air-forcing device may be used either with the water-spray and disinfectant, or it may be

used with either the water or disinfectant alone, or the air-blast may be used alone—as, for instance, with a light dry snow the air-blast alone would take up and carry it into the elevator and thence to the trailing dump-car.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The method herein described of cleaning streets, which consists in simultaneously sprinkling the street, and dynamically transferring the trash to a carrier by a forceful mixture of compressed air and aqueous spray, substantially as set forth.

2. The method herein described of cleaning streets which consists in transferring the trash from the surface of the street to a carrier by a forceful blast of air, and simultaneously and by the same blast blowing a disinfectant into said trash, substantially as shown and described.

3. In a street-cleaning machine, the combination of an inclined elevator or carrier having an inclosing trunk or casing opening at its lower end in the form of a rearwardly-diverging mouth, a wide-spreading or diverging nozzle arranged in the rear of the same to impinge against the road-bed and discharge into said mouth, and pneumatic devices for discharging a blast through the same substantially as shown and described.

4. In a street-cleaning machine, the combi-

nation of an inclined elevator having a trunk or casing with a wide-spreading mouth resting upon the road-bed, a wide-spreading nozzle discharging into the same, an air-forcing apparatus, a liquid pump, a mixing-chamber communicating with them both, and a flexible hose connecting the mixing-chamber with the nozzle, substantially as and for the purpose described.

5. The combination with the elevator-trunk; of the diverging or wide-spreading nozzle *J* having supporting runners or shoes *g*, hinged lip *h*, and means for opening or closing the same substantially as shown and described.

6. The combination with the blast-nozzle; of the elevator-trunk having rearwardly-flaring and laterally-diverging mouth *a* with flexible apron *b* attached at its forward edge, substantially as and for the purpose described.

7. The combination with an inclined elevator and its trunk or casing opening at the bottom in a rearwardly-flaring and laterally-diverging mouth; of the series of sharp-edged disks *c* fixed at the lower end of the trunk in front of the mouth to support the same and disintegrate cakes of mud, &c., substantially as shown and described.

CLINTON BECKWITH.

Witnesses:

EDWD. W. BYRN,  
 SOLON C. KEMON.