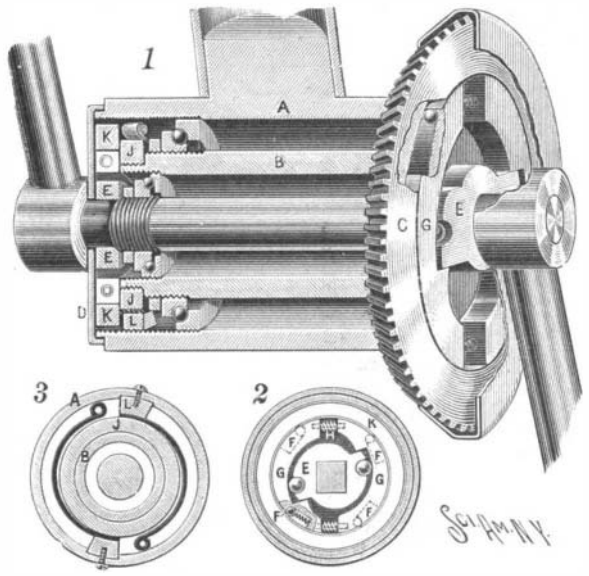
A BACK-PEDALING BRAKE FOR CHAIN AND CHAINLESS BICYCLES.

A back-pedaling brake which presents many novel features in its construction has been invented by Edgar S. Stem and Arthur O. Dunlap, of Alderson, Penn. Fig. 1 is a general view of the device. Figs. 2 and 3 are cross-sections.



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The braking mechanism is applicable both to chain and chainless wheels and is contained in the crank-hanger. On suitable bearings, a sleeve, *B*, is carried, forming the trunnion for the driving gear wheel, *C*. The pedal shaft turns on bearings within the sleeve, *B*. At one end the crank-hanger is provided with a case for the gear wheel; at the other end with a cap, *D*. Near the cap end of the pedal-shaft, a cross arm, *E* (Fig. 2), is fastened, forming a clutch member, having eccentric edges terminating in shoulders, adapted to engage corresponding shoulders on shoes, *G*, likewise provided with eccentric edges. Recesses in the cross arms, *E*, contain balls for rollers designed to engage the edges of the shoes, *G*. A ring, *K*, is loosely fitted within the crank-hanger and a cam encircles the clutch member, *E*, and is held in place by the cap, *D*. When the shaft forces the shoulders of the cross arm, *E*, into engagement with the shoulders of the shoes, *G*, the shoes are turned loosely within the ring, *K*, and around with the shaft and clutch member, *E*. But when the shaft turns in the opposite direction, the rollers or balls are forced against the eccentric inner edges of the shoes, thus locking the shoes and ring together. Rigidly secured to the left end of the sleeve, *B*, is a collar, *J* (Fig. 3), against which act two brake-straps, each fastened at one end of the crank hanger by a dovetailed connection, *L*. The other ends of the straps are connected with the ring, *K*, by pins. When the ring is idle the brake-straps are loose; but when the ring is locked with the shoes, *G*, and therefore turned with the shaft, the straps will be drawn tightly against the collar, *J*.

At the gear end of the crank-hanger a somewhat similar clutch mechanism is provided. Here we also have a shouldered cross-arm, *E*, the balls of which are caused to impinge against brake shoes, *G*, held movably together as in the first case. There is, however, no loose ring. When the shoulders of the clutch, *E*, and of the shoes, *G*, are in engagement with each other, the clutch member, *E*, the shoes, and the shaft turn together. When the clutch member, *E*, is turned in the opposite direction, the rollers on the clutch member bind against the eccentric edges of the shoes and lock the gear and shoes together, so that the gear is caused to turn with the shaft. When the shaft is driven forwardly by the pedals, the clutch member, *E*, on the gear end will be caused to turn with the shaft, in the manner just described. When it is desired to coast, the pedals are held stationary, and the parts are free to run. In order to stop the machine, back pressure is applied to the pedals, so that the clutch, *E*, on the left end will throw the shoes, *G*, out against the ring, *K*, thereby causing the ring to turn, contracting the brake-straps against the collar, *J*, and stopping the motion of the sleeve, *B*, and hence of the gear, *C*.

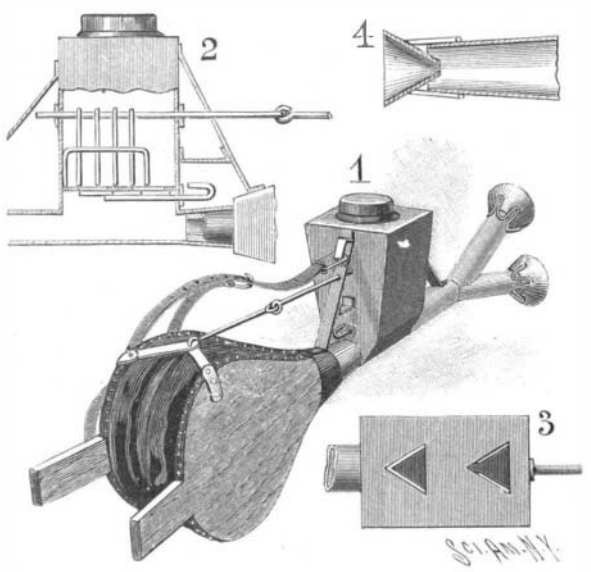
AN INSECT-POWDER DUSTER FOR PLANTS.

To provide a means for discharging insect-destroying powder upon vines and shrubs, a duster has been invented by Alfred and Thomas R. Hopper, of Highland, N. Y., which is of light construction, so that it can be easily carried about, and which is provided with a simple means for regulating the supply of powder to the discharge-tube.

Fig. 1 is a perspective view of the complete device; Fig. 2 is a longitudinal section; Fig. 3 is a cross section; and Fig. 4 shows an equalizing nozzle employed.

The insect-powder duster is composed of a bellows communicating with a powder-chamber situated below a hopper and forming part of a discharge-tube carrying two divergent nozzles at the outer end. The hopper-bottom (Fig. 3) has triangular openings leading to the powder-chamber and controlled by triangular valve-plates, which are connected with a rod extending outwardly through an opening in a wall of the powder-chamber. By operating these valves the size of the opening can be changed to permit more or less powder to pass to the chamber. In order to break up the lumps of powder in the hopper, triangular agitators are used, the upper ends of which, as shown in Fig. 2, are connected by means of a rod with two links pivoted to opposite sides of the bellows. Hence, when the bellows are operated, the links are simultaneously given a shear-like action and the rod is reciprocated to cause the agitators to break up the powder.

The discharge nozzles are funnel-shaped, and are so mounted that a space is left between their outer surfaces and the inner faces of the discharge-tubes, so that the powder is forced both through the interior of the nozzles and along the exterior, to obtain an equal distribution. A strap is provided by means of which the device can be hung from the shoulder.



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The construction described enables the powder to be discharged directly down or horizontally through the foliage. If insects have infested the under side of a leaf, the powder can be discharged upwardly against the contaminated surface. The shape of the nozzle tends to spread a small quantity of powder over a large surface.

AN ELECTRIC HOSE WAGON.

The fire department of the city of Paris has recently provided itself with a hose wagon propelled by electricity. This new automobile, which we illustrate herewith, and which was devised and constructed in the department's shops under the supervision of Adjutant Morvan, carries the crew and equipment necessary to fight incipient fires and save life. As the first experiments with it have been eminently successful, the city will, in a near future, be provided with similar vehicles, the use of which will have the advantage of saving time and also money, since the maintenance of the horses of the fire department costs at present at least $200 a day. The fire service of the coming Exposition will be performed by vehicles of the same nature.

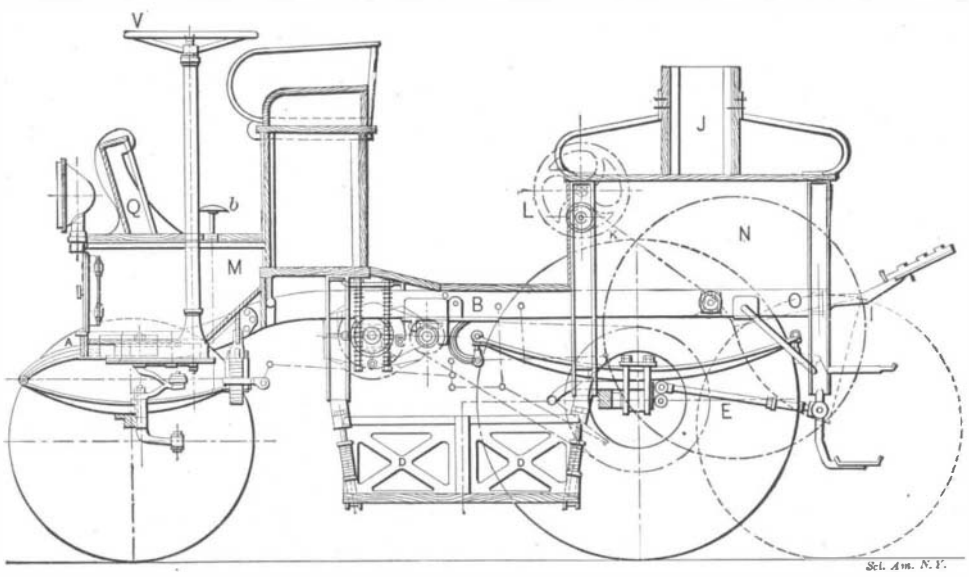

Fig. 2.—SECTION OF THE ELECTRIC HOSE WAGON.

Fig. 1.—ELECTRIC HOSE WAGON OF THE FIRE DEPARTMENT OF PARIS.

This wagon weighs, when empty, 3,830 pounds, that is to say, less than one of the electric hacks that have been running for some time past in the streets of Paris. The presence of the crew of from six to eight men and the equipment brings the weight up to about 5,275 pounds, each man being supposed to weigh 150 pounds. The box and all the motive parts are mounted upon a U-shaped steel frame, *B*, the curved front of which rests upon a compound axle through the intermedium of three springs, *A*, while the back is supported by an ordinary axle through the intermedium of a single spring. The tractive stress of the motor is exerted upon the frame through a rod. *E*, which serves at the same time as a chain stretcher.

The box is divided into two parts; upon the front seat sit two drivers, of whom the one to the right maneuvers the steering wheels through a large hand wheel, *V*, the controller by means of a small hand wheel at the side, and the pedal, *b*, of the mechanical brake by means of his foot.

The hose reel, *N*, is situated under the back part of