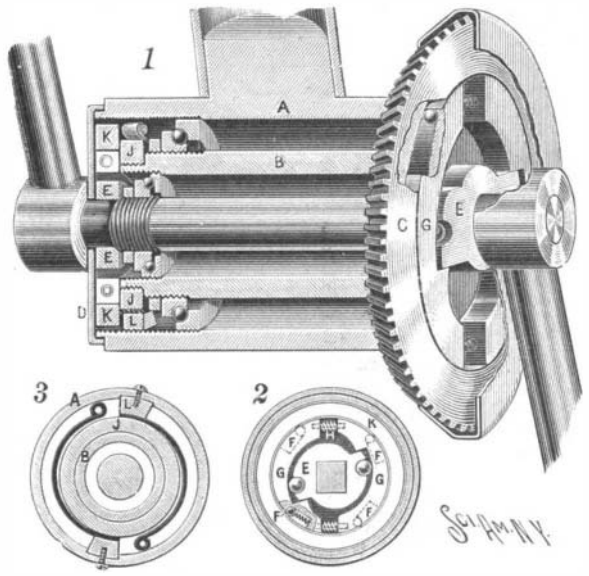
A BACK-PEDALING BRAKE FOR CHAIN AND CHAINLESS BICYCLES.

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.



A BACK-PEDALING BRAKE FOR CHAIN AND CHAINLESS BICYCLES.

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*.

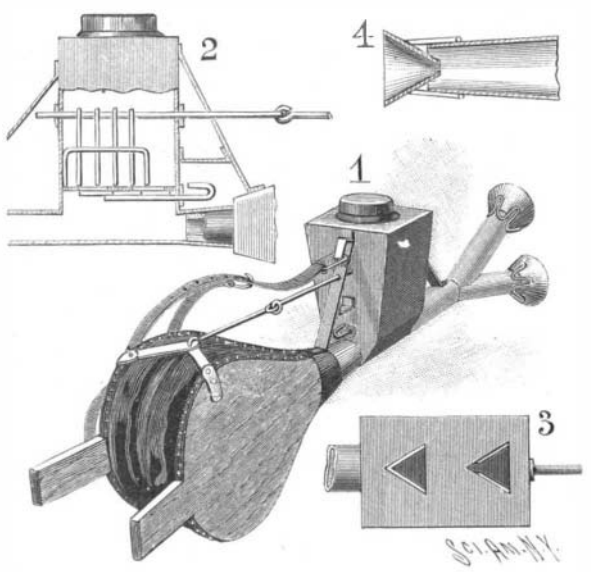
AN INSECT-POWDER DUSTER FOR PLANTS.

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.



AN INSECT-POWDER DUSTER FOR PLANTS.

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.

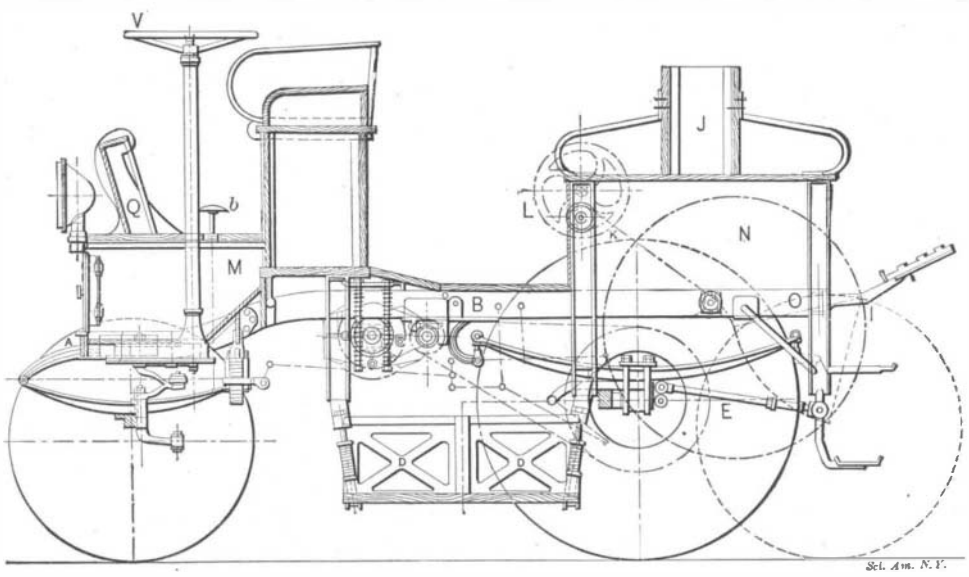


Fig. 2.—SECTION OF THE ELECTRIC HOSE WAGON.

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

the frame, of which it is independent. It consists of a drum mounted upon two wheels. Each of its extremities is provided with a journal upon which is placed a ring that on the one hand is connected with the frame by a chain, and, on the other, with a windlass through another chain. Upon actuating the windlass by means of a lateral hand wheel, *L*, the reel is raised above or lowered to the ground. In the latter case, it is separated from the wagon for the unwinding of the hose.

The box of accumulators, *D*, is suspended from the frame by four rods provided with rollers and springs. The heads of these rods move upon knife edges, so that the suspension may be very elastic and assure a perfect verticality of the box under all circumstances. The box is of metal and contains forty-four elements of C. G. S. accumulators, weighing about 1,140 pounds and having a capacity of 150 ampere-hours at a discharge of 35 amperes. The accumulator plates are of the oxide of lead type. The technical service of the department submitted to experiment various elements furnished by different French manufacturers, but the only ones that gave satisfaction were those supplied by the Société des Voitures et Accumulateurs Electriques, of Neuilly-sur-Seine. It seems that the good results given by these accumulators are due to an improved method of making the paste with which the plates are covered. The dimensions of the plates are 10½ by 5½ by ½ inches. The motor is of the T_3 type of 4,500 volts. It is provided with two armatures and two collectors upon the same shaft, but there is but one inductor winding. The two armature windings are in the proportion of five to three, and may be coupled in several different manners by the controller in order to obtain different rates of speed without changing the coupling of the elements of the battery assembled in series, or without varying the excitation. The result of this arrangement is that the motor is always excited normally and that the brushes give rise only to a minimum quantity of sparks. The flat form of the battery allows of its being installed under the box. The controller lever permits of seven speeds being obtained, the greatest of which does not exceed 13 miles an hour.

In front of the box, under the eyes of the driver, are placed the following measuring and controlling apparatus:

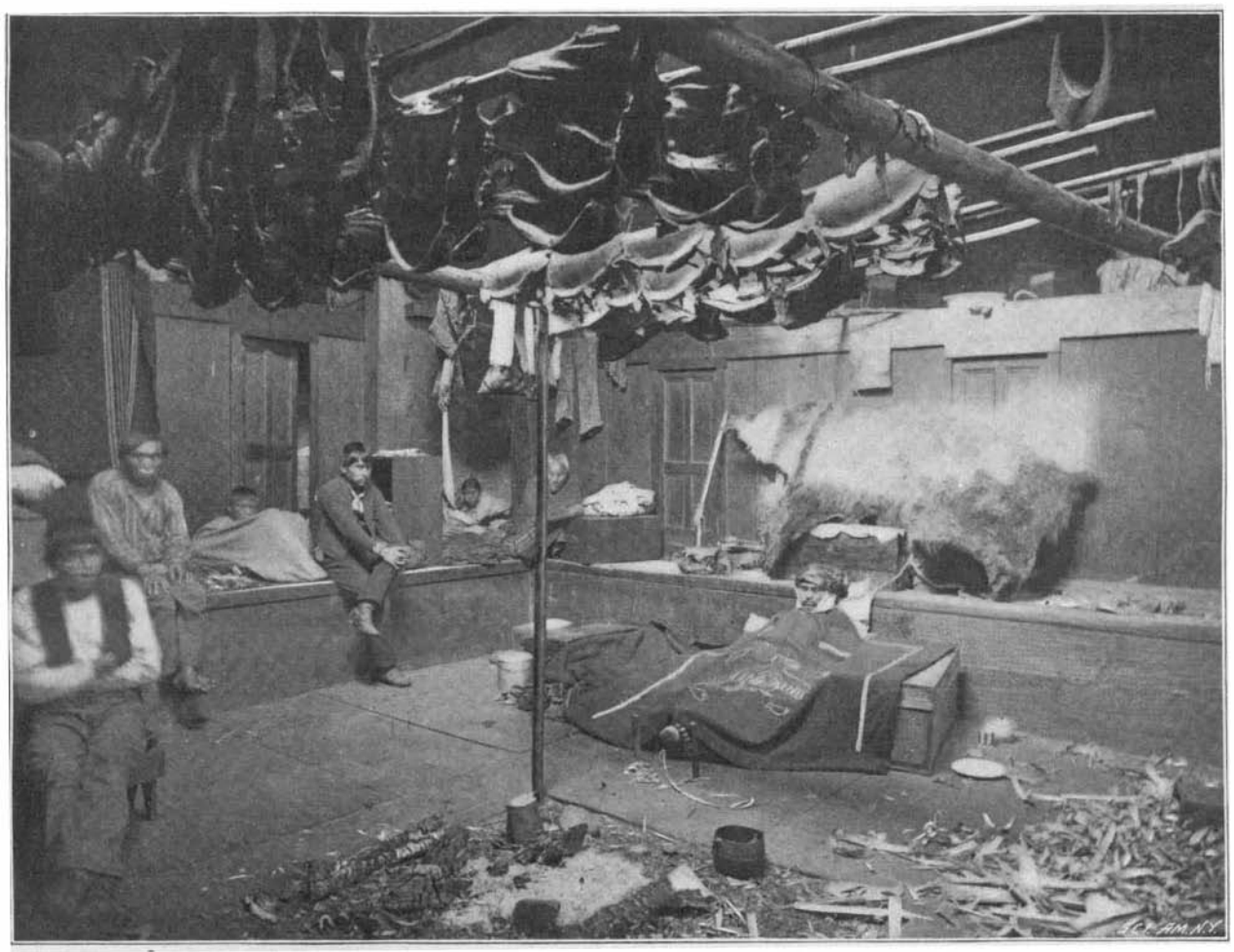
(1) An aperiodic voltmeter, (2) an aperiodic amperemeter, (3) a fusible lead circuit breaker, (4) a distributing box into which may be inserted a spring-jack connected with the charging cables, or a plug, of which the presence is necessary for the passage of the current from the battery into the motor, and which when withdrawn renders the vehicle immovable; (5) a series of interrupters controlling the incandescent lamps, lanterns, and a lamp for lighting the measuring apparatus; (6) an interrupter controlling a collector for supplying two arc lamps of 10 amperes, designed for lighting the field of operations.

The accumulators permit of making a run of 60 miles, without recharging, at a speed of from 7 to 9 miles an hour. Such speed can be easily increased to 13 miles an hour at night, when the way is clear. The consumption is, at a speed of 9 miles an hour, from 35 to 40 amperes at 90 volts. By consuming 50 amperes, 13 miles may be made upon a level. As the radius of the fire centers is 5,000 feet, on an average, from 3½ to 4½ miles would be run, provided the vehicle were called out two or three times a day. This assures of a return in good condition.

The reel at the back carries 525 feet of 2¾-inch hose, while 260 feet of a smaller diameter, along with three nozzles, are arranged in a box. The equipment is completed by a short ladder suspended at one of the sides of the wagon.

The hose carriage has received a very practical test and is now working in admirable fashion. At several fires it arrived before the engines and hose carts drawn by horses. The Fire Department of Paris has ordered six other electrically-propelled fire-extinguishing machines of different models, including a hook and ladder and steam fire engines; they will be in use at the Exposition.

For the above particulars and the engravings, we are indebted to Le Magasin Pittoresque.

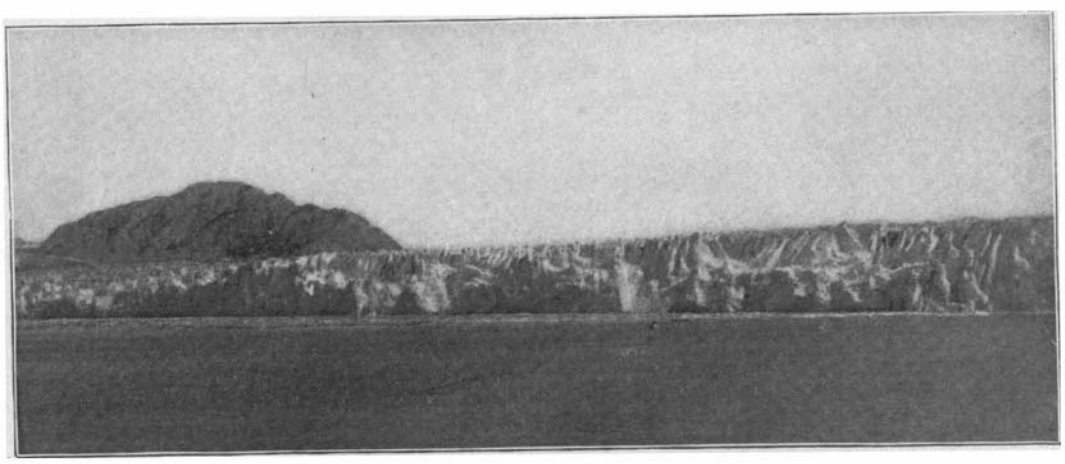


INTERIOR OF AN INDIAN HOUSE, YAKUTAT BAY, ALASKA.

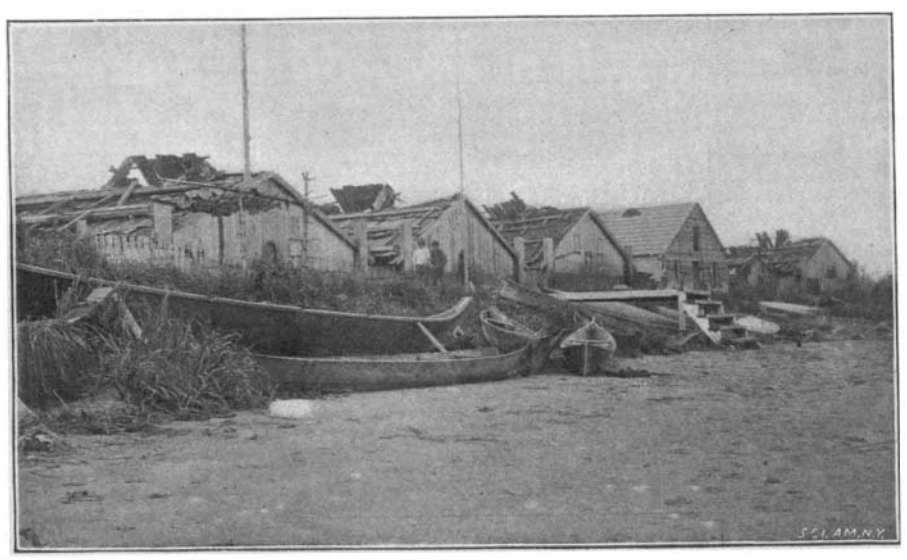
THE LATE ALASKA EARTHQUAKE.

For weeks preceding the violent volcanic eruption in the island of Hawaii, severe admonitory earthquakes were felt all along the western shores of the North American continent from the Isthmus of Panama to Puget Sound. Along the coast of California numerous shocks of uncommon severity occurred and continued until the outbreak of Mauna Loa on the morning of July 4 last, when they appeared to subside. The quietness was only temporary, however, though the scene of disturbance was transferred from equatorial to Arctic latitudes. Alaska was the theater for a display of seismic power such as the world has seldom witnessed, which, had it happened in regions less remote or had been populated by others than a few scattered bands of aborigines, would have been a catastrophe at which the world would have grown pale at the bare recital. Fortunately the dreadful upheaval had witnesses among white men, and what would have been an incident of horror to be preserved among the traditions of a few terror-stricken Indians was carefully observed by men whose probity places their recital beyond the suspicion of a doubt. The effects of the shocks were noticed far at sea by navigators, from which the enormous extent of the disturbances can be easily calculated.

The Puget Sound country was coincidently shaken, and from all accounts it would appear that with Mount St. Elias as a center the region affected by the shocks was fully four thousand miles in diameter.



THE FRONT OF THE GREAT MUIR GLACIER, ALASKA.



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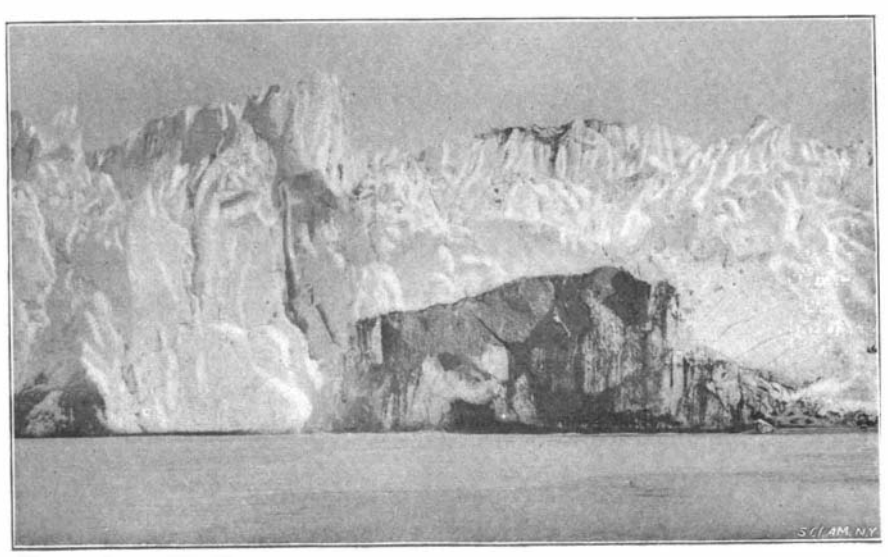
CHIEF YAN-A-TCHOO'S VILLAGE, YAKUTAT, ALASKA, SHOWING WAR CANOES.



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MOUTH OF THE SUB-GLACIAL STREAM, MUIR GLACIER, ALASKA.