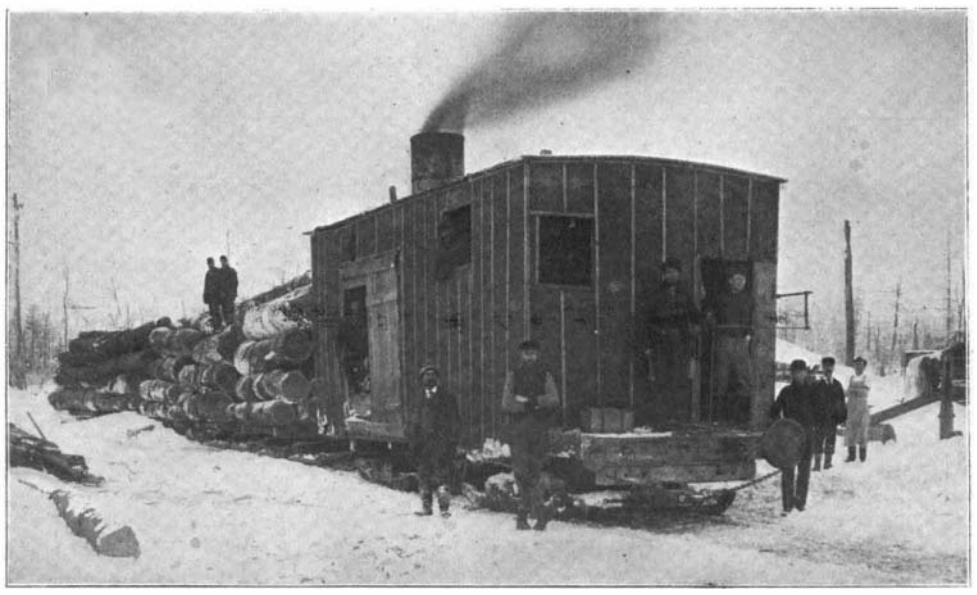
A NOVEL SNOW LOCOMOTIVE.

The accompanying illustrations show the general appearance and details of a 200 horse power snow locomotive invented by Mr. George Glover, of Chicago, Ill., and used with success by Gen. R. A. Alger for hauling logs in his Michigan pineries.

The mechanism is plainly to be seen in one illustration, the boiler being situated at the rear end of the frame and the engine at the forward end, while the driving drum, heated by the exhaust for melting the snow, and thus at the same time acting as a condenser, is located in the middle.

The engine has two horizontal cylinders, and is placed between two long steel beams forming the stringers of the frame. All that can be seen of it is the steam chests, rock bar, reverse lever, end of the crank shaft, etc. The two steam pipes, rising from the steam chests, unite below the throttle valve, and the single pipe formed, reaching to a sufficient height to pass over the water tank, runs back to the boiler, where it enters the top of the dome. The exhaust pipe runs to the driving axle of the traction wheel, or drum, to carry steam into the drum to keep it hot. It also rises, like the live steam pipe, sufficiently high to pass over the water tank and enter the smoke stack on top of the boiler.

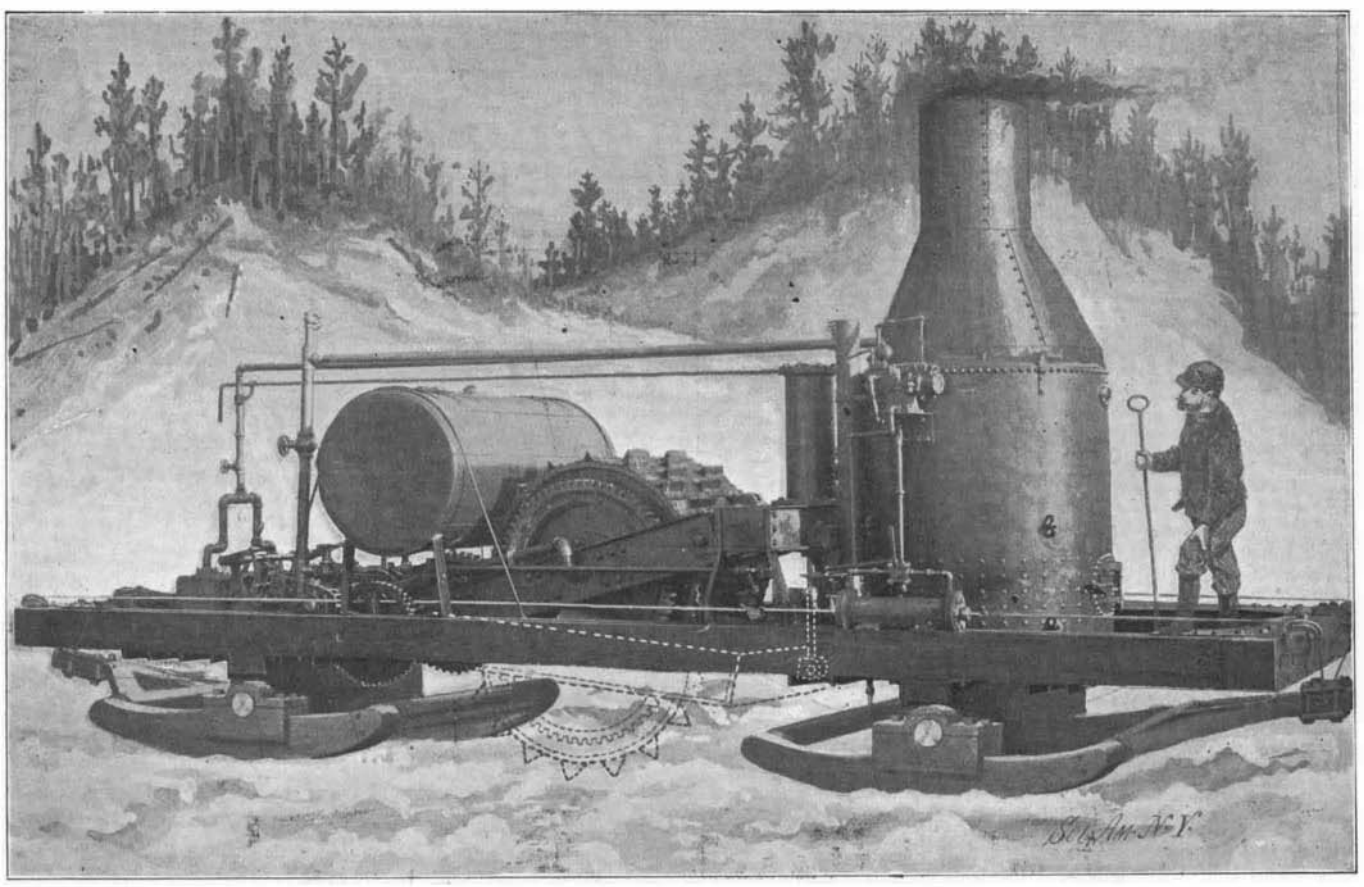


SNOW LOCOMOTIVE HAULING A LOGGING TRAIN IN GEN. ALGER'S PINERIES.

The exhaust pipe is equipped with valves, so that the entire steam may be exhausted into the driving drum, or all may be exhausted into the smoke stack, or a part into each, and a part into the atmosphere, through the pipe passing through the roof. This gives the engineer complete control of the exhaust and its distribution.

Next comes the water tank, supported on a steel frame at each end, and bound down by guy rods which pass over it. Its capacity is about 1,000 gallons. The water, however, is carried to a great extent in the driving drum and then forced back into the water tank, to be again fed to the boiler. A 6 x 4 x 6 duplex feed-water pump is used for this purpose. This is situated on the other side of the boiler from that seen in our illustration, and the horizontal pipe seen in front of the driving drum connects the water tank with it. The pump has a capacity of 100 gallons per minute, and is used for filling the tank with water drawn through a 2½-inch hose from a brook or other available source.

The driving drum is shown in the photograph in a false position for convenience in loading and unloading the locomotive for transportation by rail. The working position of the drum and its frame is shown in dotted lines. A 12-tooth steel pinion on the crank shaft drives the 48-tooth gear on the hinge-pin shaft, which is 5 inches in diameter and forms the hinge of the driving drum's frame, thus permitting the drum to follow the inequalities of the road. On this shaft a pair of 14-tooth pinions drive 44-tooth intermediate gears, which transmit the power to 68-tooth gears on each end of the traction wheel or drum.



SNOW LOCOMOTIVE WITH HOUSING REMOVED TO SHOW THE OPERATIVE MECHANISM.

The steam nigger (the cylinder seen at the left of the boiler), is used to throw the weight of nearly the entire machinery and frame on the traction drum when bad roads or snow drifts are encountered, and also, when going up hill with a heavy train. The handle of the rod controlling the three-way valve, which operates the nigger, is immediately above the head of the engineer, where he can reach it instantly, and, by depressing the piston which is directly connected to the drum frame, throw any amount of weight up to 12 tons additional onto the driving drum. As shown in the illustration, this handle is at the end of the rod extending from the three-way valve, which is at the top of the cylinder or nigger.

The steering apparatus is operated by hydraulic power.

The locomotive runs as readily one way as another, the pilot or steersman simply going to the other end, so that he is at the front end of the machine no matter in which direction it is going. He transmits signals to the engineer by means of a small steam whistle beside the latter. A third man—a fireman—is required to keep up steam.

The boiler, which is of the vertical type, 72 inches in diameter by 8 feet high, has a heating surface of 700 square feet. A specially constructed and attached dome is placed on top of the boiler, having five connections, and taking steam at five different points on top of it. This prevents drawing water, and also permits carrying the water very high, besides superheating the steam, as the dome is really in the hottest part of the fire, being encased in the smoke stack as shown. The dimensions of the dome are 20 inches by 30 inches. The bob sleds go under the oak bolster, which is under the boiler at the hind end and under the engine at the front end. A foot of snow is not much of an impediment to the machine, and it will travel through two and a half feet at about a walking gate. After having been over the road a few times, it has a road-bed of packed ice, and then a speed up to 12 miles an hour may be used with safety, as the runners are running in ice grooves and will almost keep the track themselves, without the steersman's attention.

There are two speeds operated by clutches, and obtained by a small pinion at one end of the engine shaft and a larger one at the other end.

The locomotive weighs 30 tons, yet it is capable of hauling the three sleds shown, with a total load on them of 100 tons. But 18 pounds of steam is required to operate the locomotive on a well-beaten track; and, as the working pressure is 160 pounds, there is great reserve power for emergencies and adverse conditions. Experiments have shown that, on a smooth ice track, the locomotive can haul a 150-ton train at 6 miles an hour.

The development of the automobile boiler has made it possible for these machines to be built at least 8 tons lighter than formerly, as a battery of three or four small boilers, which will be nearly six tons lighter, and yet will carry 300 pounds of steam or more, will make an engine of less than half the weight give sufficient power, while allowing of a lighter construction of the frame which carries this monstrous weight. The lighter weight will also enable a machine to work on ground that is no harder than necessary for a heavy team to travel over, as well as to haul loads across lakes on the ice, where it will be of great advantage. The development of the four-cylinder hydro-carbon engine will also reduce the weight question in this machine.

The driving wheel for automobiles for freighting or passenger purposes is a modification of the Glover snow traction drum. The face of the wheel is semi-toothed or semi-cupped for traveling through sand or soft roads, and has a solid rubber tire on each outer edge, which acts as a flange to hold the sand from squeezing out under the wheel. On pavement or good roads, these tires do the driving, and the semi-cup-shaped face of the wheel between the solid tires does not come within an inch or so of the ground or pavement. The Glover driving wheel, as applied to the automobile, is said to save a great waste of power, especially on bad roads and up hills, while it does away with the compensating gears on the hind axle, thus permitting of the use of a solid axle. The rear wheels run loose on their axles, the same as the front wheels, and the fifth, or traction wheel, is placed in the center of the machine directly under the body.

Manufacture of Quartz Glass in Germany.

Under the heading "A New German Industry," German papers state that the manufacture of quartz glass is rapidly developing.

Quartz glass consists essentially of melted quartz, which is made into tubes and other articles. It is perfectly translucent. The initial experiments in the manufacture of the new glass were made in England, but a firm at Hanau, a few miles from Frankfort, was the first to place quartz glass apparatus upon the market.

The manufacture of quartz glass is yet in its infancy, but has already shown symptoms of vigorous growth. While two years ago England led in its production, she has since been relegated to second place by Germany. Everybody who knows the properties of quartz glass admits that it will soon replace ordinary glass for many uses. It is only a comparatively short time since German manufacturers revolutionized the manufacture of optical glasses and obtained a monopoly of this important industry, and there is reason to believe that this will be repeated with quartz glass.

If quartz glass can be produced at a moderate price—and this seems to be quite possible where electric force can be cheaply obtained from water power—it will no doubt be largely employed.