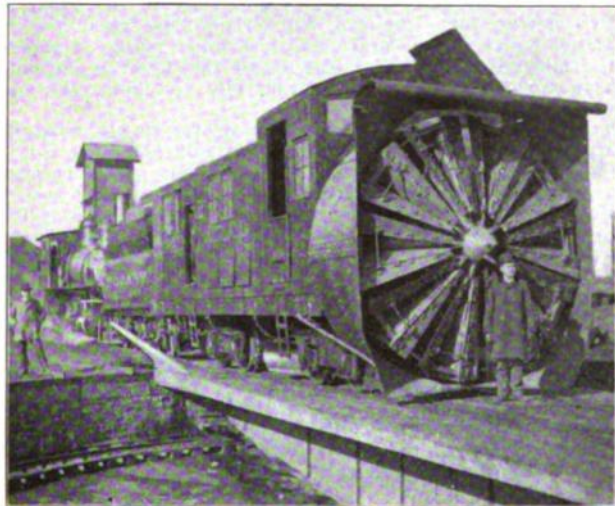


SNOW HANDLING IN COLORADO.

The experience on the Colorado Midland, after seventy-seven days of actual snow fighting during the winter of 1898-9, demonstrated the necessity of having a snow plow capable of handling snow at times as deep as thirty feet, and a plow capable not only of withstanding a severe strain, but one that would cut a channel wide enough to permit the longest Pullman cars to clear snow banks and cuts on 16-degree curves without scratching the sides of the cars. The fact that the officials of this line found it necessary last winter to transport on a toboggan, drawn



LARGE ROTARY—COLORADO MIDLAND.

by sixteen men on snow shoes, over the Continental Divide, at an elevation of over 11,000 feet, a piece of the rotary snow plow which weighed 1,400 pounds, in order to make certain repairs which would enable the plow to dig its way out and release a snowbound train and a number of workmen who were in a perilous situation, convinced the officials that no part of the new plow could be made too strong and substantial. It may be stated, also, that such precautions in other directions have been taken as to make it practically impossible that a serious snow blockade should occur. All passenger engines have been equipped with the Priest flanger, operated by the



FIGHTING SNOW ON THE COLORADO MIDLAND.

engineer. The company has purchased the Busk tunnel, which obviates the use of nine miles of line through the snow country, and at both ends of the tunnel durable snow sheds and covered turntables have been erected. The troublesome points between Leadville and Busk, where so much difficulty was experienced last winter, some features of which are shown in the accompanying illustrations, and where on account of the breaking down of the three plows then in service it required three weeks to go eight miles, have been fully covered with snow sheds. The preparations are now so perfect that the officials are anxious for snow rather than otherwise in order to see

what they can do. The most important provision for snow handling, however, is the new rotary.

The first consideration was to have a plow that would be almost indestructible, and it was decided to dispense entirely with the use of cast-iron. This was done with the exception of the cylinders and brake shoes, and steel and wrought iron were substituted. Plans were therefore prepared by Mr. A. L. Humphrey, superintendent of motive power, based on the experience of the past winter, and a contract let to the Rotary Snow Plow Company of Paterson, N. J., for a plow which was intended to surpass anything that has ever been built in the way of a snow handling device on the rotary principle, and constructed entirely with a view of adding strength where weakness had in the past developed. It was found that the plow and tender complete in working order would weigh 130 tons; the plow itself 170,000 pounds, the tender having a capacity of 4,000 gallons of water and 11 tons of coal.

The plow has been delivered. The machinery is as complete in every detail as that of a locomotive. The boiler is of the Belpaire type, with a 67-inch diameter shell, 278 two-inch tubes adapted to carry a working pressure of 190 pounds of steam to the square inch. The machinery which operates the plow is securely fastened to four 12-inch steel I-beams. The cylinders are made of the best charcoal cast-iron, 18 inches diameter and 26-inch stroke, with Richardson balanced slide valves and



FIGHTING SNOW ON THE COLORADO MIDLAND.

the Walschaert type of valve motion. The bed plates are especially designed for strength, being thoroughly ribbed and braced and made of the best cast-steel, manufactured expressly for this purpose by the Sargent Company of Chicago. All the pillow blocks and bearings in the bed plate are cast solid, so as to avoid the possibility of the bearings for the shafts getting out of alignment or becoming damaged by the bolts getting loose, thereby causing a break-down. All the bearings are fitted with a special anti-heating bronze. The connecting rods, crank pins, main shaft and the different parts of the valve motion of the machine are made of the best hammered iron and steel. The drum of the plow is made of 3/8-inch plate steel and riveted together with 8-inch rivets in a most substantial manner, with suitable openings on the top and side, and provided with hoods to carry the snow and ice in any direction desired.

The wheel of the rotary is constructed with 12 conical or funnel-shaped tubes, into which the snow passes, each tube being provided with a knife 4 feet 6 inches long that cuts the snow as the wheel is forced against the bank ahead of it. The snow is then thrown out through the openings in the hood by centrifugal force. At times, with the old rotary, it was found necessary to resort to the use of giant powder to loosen up the snow sufficiently to permit the plow with the old style blades to get hold of the snow so as to throw it out of the hood. The cone principle of wheel and blade overcomes this difficulty, as the blades are so constructed as to enable them

to cut practically solid ice. It also reduces the friction while the snow is passing through the wheel, and it is believed that it will be practically impossible for the snow to clog in this type of wheel. The surface is perfectly smooth, and as the wheel revolves at a high rate of speed it is apparently impossible for the snow to stick or clog, thereby completely overcoming the possibility of the snow choking or blocking the wheel. A severe test has indicated that this style of wheel works more freely and requires less locomotives to handle than the ordinary type. This fact has been demonstrated by two locomotives shoving the plow through seven feet of snow at the rate of



FIGHTING SNOW ON THE COLORADO MIDLAND.

ten miles per hour on a 3 per cent grade, while with the old style plow it required at least four locomotives to perform the same service.

One of the special features of this plow is the size of the wheel. Instead of having a bell-shaped hood for the snow to pass through in order to reach the wheel, the wheel is made 11 feet 6 inches in diameter, while the hood proper cuts 12 feet. The hood, therefore, only projects 3 inches on the side beyond the edges of the knives at the circumference of the wheel, while at the center of the wheel the knives are the first to encounter the



FIGHTING SNOW ON THE COLORADO MIDLAND.

snow. The wheel front of the rotary is therefore composed of sharp cutting edges without any dead surface whatever to be forced into hard snow.

The trucks are designed to enable the plow to be transported with safety at a very high rate of speed. The frames of the trucks are built and equalized on the same principle as a locomotive, the journal boxes working in a pedestal in a manner similar to those in a locomotive frame. The journals are 7½ inches in diameter by 10 inches long. The trucks are provided with frictionless side bearings and steel tired wheels.

A complete independent system of air brakes is provided, which enables the pilot on the plow to have complete control of the train while handling snow on a descending grade. The plow is specially arranged with ice cutters and flangers worked from the cab by compressed air, the pilot in charge having absolute command by the simple manipulation of well designed and convenient levers. The ice cutters are capable of cutting ice two to three inches thick on the rails, thus avoiding derailment, which in the past has been a very serious difficulty. The flanger removes snow and ice from the center of the track and deposits it entirely on the outside of the rail.

In providing for strength and durability, the comfort and safety of those operating the plow have not been neglected. Conveniences are provided for storage of provisions and bedding, etc., in case of blockade.

The snow district on the Colorado Midland is mainly on the mountains west of Leadville, a distance of about 40 miles, that portion of their line being practically 3 per cent grade. With the rebuilding of their old rotary and the addition of the new rotary, together with special flangers on their locomotives, operated by the engineer, and other snow fighting devices, the officials believe they are now prepared for any depth of



FIGHTING SNOW ON THE COLORADO MIDLAND.

snow. This account and the accompanying illustrations are furnished by the courtesy of Mr. George W. Ristine, president and manager of the Colorado Midland.

#### Kerosene Oil Engine and Direct Connected Generator.

The Mietz & Weiss engine consumes ordinary kerosene oil. These engines are made in eight sizes, ranging from 1 to 20 horsepower. One type is of 4 horsepower and is direct connected to a generator mounted on a common base and has a capacity of 40-16 candlepower incandescent lamps. The engine is of the two-cycle type, with an explosion at each revolution, and the makers claim that it is susceptible of a more perfect regulation than the four-cycle engine. The crank shaft is entirely inclosed, with a view to excluding dust and dirt. Particular attention is paid to lubrication, a special oil reservoir being provided at the right side of the engine frame, from which the oil is drawn by the partial vacuum formed during each revolution in both crank chamber and cylinder, and fed to the crankpin and cylinder, the main bearings being taken care of by automatic ring oilers.

The kerosene, which is carried in a closed copper tank firmly screwed to the cylinder, has a capacity of 10 hours' run. The consumption is about one pint per horsepower per hour. The oil is fed from the tank to the cylinder by a small oil pump, operated by an eccentric on the main shaft, an injection of oil taking place at each revolution. The place of a throttle in a gas engine is taken by a little hinged finger on the plunger of the oil pump. When it is desired to stop the engine the latch is thrown up clear of the follower and the pump is thereby thrown out of operation. The amount of oil fed to the cylinder is controlled by a simple and effective governor. These engines are built by August Mietz of 128-132 Mott street, New York City.

Mr. W. H. Hudson, formerly for over ten years connected with the Southern Railway as master mechanic at Atlanta, Ga., and Spencer, N. C., has become associated with Fairbanks Morse & Co. in their railway department headquarters at Atlanta.