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NINETEENTH VOLUME.

FROM JANUARY TO DECEMBER, 1888, INCLUSIVE.

NATIONAL CAR AND LOCOMOTIVE BUILDER

DEVOTED TO THE INTERESTS OF RAILWAY ROLLING STOCK.

R. M. VAN ARSDALE, Proprietor.

ANGUS SINCLAIR, Editor.

PUBLICATION OFFICE:

MORSE BUILDING, NEW YORK.

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Old and New Methods of Fighting Snow.

Ever since the opening of railroads on the American continent, the lines lying within the snow belt have been paralyzed at frequent intervals by the obstructions presented by heavy falls of snow drifted by the fierce winds into every sheltered nook, the cuttings of railroads offering attractive resting places for the gale-driven snow flakes. The greater portion of the earnings of many railroad companies has often been swallowed up in the enormous expense of clearing away successive snow blockades and in the destruction to track and machinery incident to the old methods of fighting snow.

THE OLD BRUTE FORCE AND STUPIDITY METHODS.

The usual plan of dealing with snow blockades was with large sheet iron plows, fashioned after a land plow, with double boards. Plows of this kind were kept at division stations, and when a storm arose a plow was secured to the front of a powerful locomotive. If the snow drifts were deep several more engines were coupled to that having the plow, and the whole cavalcade was rushed into the snow banks, the aim being to force the plow through by momentum. While the speed was high the plow threw the snow upwards and sidewards, projecting part of it a few yards from the track; but when the speed diminished, as it soon did in deep snow, the snow was built up in walls at the sides of the opening. A common feature of this kind of snow bucking was to run in till plow and engines were buried, then have men shovel them out. Rushing into deep snow at high speed caused many fatal and destructive accidents, and every man who was out on a snow fighting expedition knew that the work endangered his life every moment. Where the snow was drifted at a sharp angle to the track the plow was very liable to be crowded to the side so strongly that the truck wheels would leave the track, and away plow and locomotives would rush into the

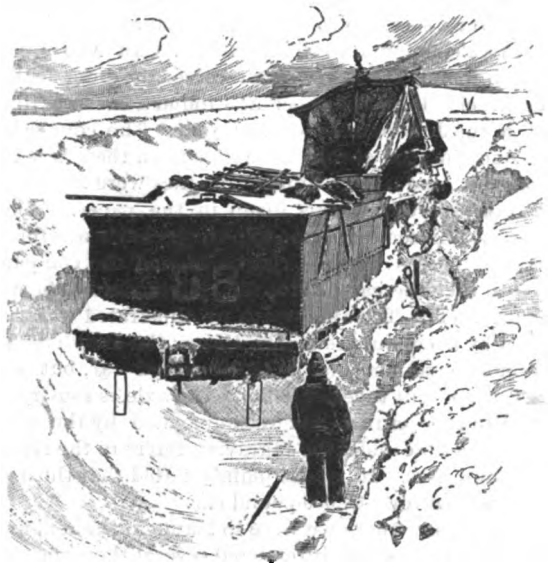

Fig. 1.

ditch, and it was fortunate if the engines were not wrecked and the men's lives lost.

A COMMON INCIDENT OF THE OLD METHOD.

When the snow was frozen or drifted extremely hard, the wedge-plow was apt to leave the track and climb up on the snow. An accident of this kind is illustrated in Fig. 1. A letter describing this accident says:

"Engine 568, Chicago & Northwestern, was equipped with one of our best iron plows, strongly braced; when wrecked she was running into snow about 9 ft. deep, between Canby and Gary; this snow was somewhat harder than the Rotary took out on four-mile hill west of Gary. When hitting this snow at 50 miles an hour, engine 568 would go about twice her own length into it. When wrecked it was found that her plow nose had doubled under her, and she rode up on snow, and when found was 5 ft. high above the rail. Her engine and tank trucks were all on the track at the face of the drift."

TERRACE SHOVELING AND BLOCKING.

It frequently happened in the Northwest that the snow got packed so hard that the wedge-plow could not break through it, and then the slow, tedious and expensive method of shoveling by hand had to be resorted to. Fig. 2 shows a gang of men engaged in this tiresome operation. In this case the hard lumps of snow are thrown from the bottom on to a terrace and from thence to the top. We have seen the snow so deep where it had to be handled on this way, that three terraces had to be employed to get the cutting cleared. After a cutting is cleared in this way it is very liable to lead to a new blockade, for the cutting is so narrow that the snow from a light storm is sufficient to fill it up again. When the snow in a cutting is particularly hard, the obstruction is cut into large blocks and drawn off by a locomotive, as shown in Figs. 3 and 4.

On first-class roads these dangerous, crude and expensive methods of handling snow are things of the past. The work is done safely, cheaply and expeditiously by the Leslie Rotary Steam Snow Shovel, which is familiar to our readers.

DESIGN OF THE ROTARY STEAM SNOW SHOVEL.

The construction of the first Rotary steam snow shovel built was illustrated in our issue of October, 1884, and the performances of machines subsequently put to work have been frequently described in the pages of the NATIONAL CAR AND LOCOMOTIVE BUILDER. In the first machine built the cutting blades that operate upon the snow bank and the revolving fan used to throw the snow away from the track were mounted upon separate shafts, one of them being a strong tube and the other working inside of it. Experience in working heavy snow with this machine

Fig. 2.

suggested many improvements, and various details in the construction of the machine were changed till now it is built in the shape shown in Fig. 5.

A wheel 9 feet in diameter is set in a round casing, with a flaring square front 10 feet wide and the same height, which feed the snow into the wheel. The wheel contains an inner and outer series of knives. These knives are pivoted on radial pins, and the surfaces of the knives being inclined to one another, as will be seen by reference to the diagrams, Figs. 6 and 7, the knives are canted when they encounter any snow, and are set so as to slice it off and feed it into the machine. Behind these knives and on the same shaft is a fan wheel composed of a number of radial blades. As the whole wheel is revolved at considerable velocity the centrifugal force causes the snow to fly to the outside of the fan wheel, and as the latter is surrounded by a casing the snow can only escape where an opening is provided for it. This opening is at the top of the wheel immediately behind the headlight. The opening is provided with a movable hood, so that the stream of snow can be regulated and made to fly either to the right or left of the track.

In the diagrams 6 and 7 *A A* represents the casing, *B* is the shaft, *C C* are the knives, and *D D* the fan blades. The manner in which the knives slice off the face of the snow drift and feed it into the fan blades by which it is whirled out of the top of the casing can be readily understood from the diagram. The knives and fan are shown revolving in the direction of the arrows shown in solid lines. The snow is then ejected to the right as shown. If it is desired to throw the snow to the left, the engines driving the knives and fan are reserved. The position then assumed by the knives is shown in dotted lines, and the course of the snow is shown by the dotted arrows. The

Fig. 3.

reversing is very readily accomplished, and is not often needed, but the use of this adjustment is evident. Should a wind be blowing across the track it would obviously be of little use to throw the snow to windward, and in side-long cuttings any snow thrown against a hill would simply roll down again and refill the cut.

The fan wheel and knives are carried on a stout steel shaft and are connected by means of bevel gearing to a cross shaft which is actuated by a pair of 17 × 22 horizontal cylinders. These cylinders are fitted with link motion and are got up much in the style of locomotive cylinders. They are supplied with steam from a locomotive type boiler, which has, however, more heating surface and a larger fire-box than is usual on locomotives. The wheel, the engines for driving it and the boiler for supplying steam are all mounted on an eight-wheeled car. The trucks, axles and framing of this car are of extra strength, the framing being composed of heavy I beams and channel irons. The boiler and engines are protected from the weather by a strong house built over them.

METHOD OF OPERATING THE ROTARY.

The rotary is under the charge of a pilot, who stands on a platform immediately above the bevel wheels and in front of the smoke-box of the boiler. By a system of signals he controls the engineers on the rotary and pusher, and by a hand-wheel can alter the position of the hood that directs the stream of snow to either side. He has also charge of the ice breaker and flanger for cleaning the rails after the main body of the snow has been removed by the rotary.

THE ICE BREAKER.

The ice breaker is a stout blade of steel, hanging in front of the front wheel of the front truck, and so attached to the journal box and frame of the truck that it rises and falls with the movement of the front truck wheels, and consequently maintains a fixed position—about ¼ in.—above the top of the rail. When nearing switches or frogs the ice breaker and the flanger which follows it can be raised several inches above the track by means of a steam cylinder, specially arranged for this purpose. The pilot has merely, by pushing a lever, to admit steam to this cylinder and the ice breaker and flanger are instantly raised clear of the track. Should, however, the pilot forget his proximity to switches, the gear holding the ice breaker in position is so arranged that should it strike an obstacle it is freed by shearing a bolt and allowed to pass over the obstacle without further damage. This bolt can easily be replaced.

THE FLANGER.

The flanger, which clears out snow from both sides of the rail for a distance of about 12 inches, is attached in a somewhat similar manner in front of the rear wheel of

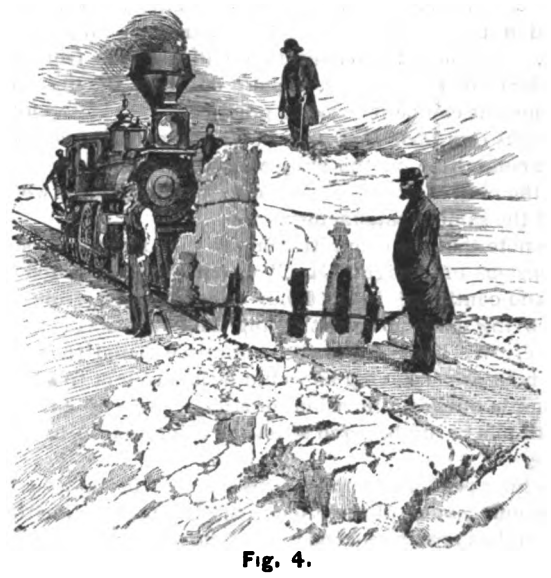

Fig. 4.

the front truck. It is stated that these devices work very successfully, and that the rail is left as clean as it could possibly be made by hand labor, using picks, shovels and brushes. Even when the rails can be clearly seen, the presence of ice or packed snow flush with the top of the rail will greatly impede travel and cause the locomotive to slip, and therefore the value of efficient means of cleaning the rails is hardly inferior to that of the wheel itself, which clears away the great bulk of the snow, but, of course, leaves it an inch or more deep on the rail.

The eight-wheeled car as above described is followed by a tender carrying water for the supply of the boiler. These two vehicles are propelled into a snow bank by one or more engines as may be required according to circumstances.

All the Rotary steam snow shovels used in the United States have been constructed for the Rotary Steam Snow Shovel Company by the Cooke Locomotive Works, of Paterson, N. J. The Canadian Pacific has bought the right to use the Rotary steam snow shovel for their whole system, and will build it in the railroad company's shops. The machine has now been adopted by all the Trans-Continental lines in the United States and Canada.

THE NEW METHOD AT WORK.

The Rotary steam snow shovel applies in an intelligent and rational fashion steam power to operations formerly performed slowly and laboriously by hand shovels wielded by an army of laborers. It is applying to the handling of snow the power that has been long used in nearly all laborious operations. The railroad companies displayed a warm interest in the Rotary from the first day that it was brought to their notice, but few of them consented to purchase the machine till its performance in deep snow-drifts during the winter of 1886-7, demonstrated its efficiency and durability. Orders for that kind of machine were then given out freely, and the beginning of the last winter found several of the largest railroads prepared to fight snow by real mechanical methods. The winter proved unusually severe, but the roads which had the Rotaries were kept open with the greatest ease and without any destruction of life or property; while other railroads that depended upon the old methods had divisions blocked for months, although great expense was incurred

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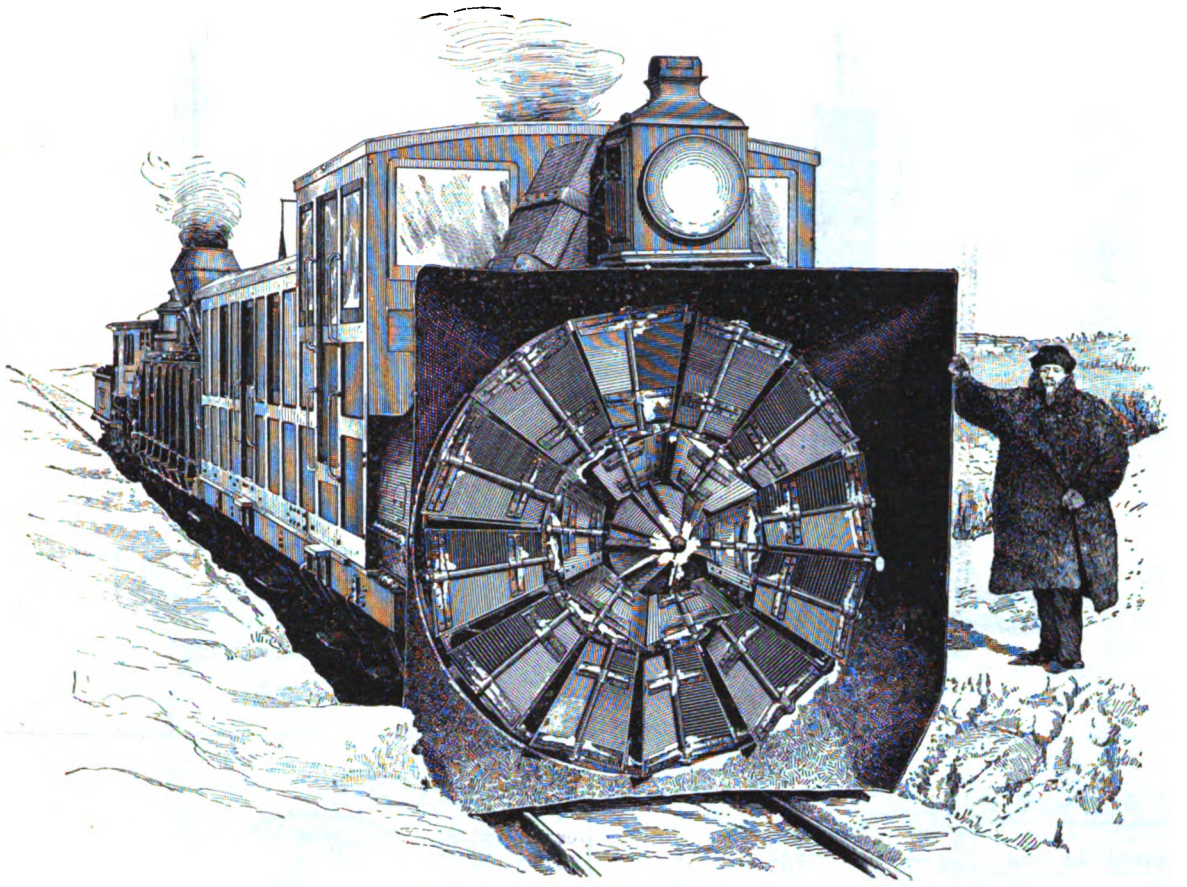

Fig. 5.

and a great deal of machinery damaged trying to force the wedge-plows through the snow drifts. All the Rotaries were employed to the west and northwest of Chicago. In the great blizzard that visited New York and vicinity in March, all the railroads were blocked for days, and the obstructions had to be cleared away by the slow process of hand shoveling, after many lives were lost and much property destroyed in attempts to open the track by

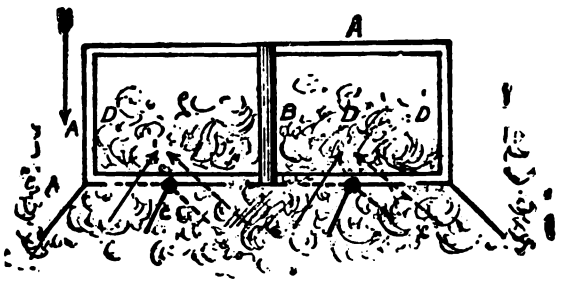

Fig. 6.

the ancient bucking. With a sufficient force of Rotary shovels the blockade would have been raised in a day.

Fig. 8 is engraved from a photograph taken while a rotary was at work on the Northern Pacific, and illustrates the ordinary working of the machine. There is no racket, noise, excitement or confusion associated with the work as in the old bucking methods. All is order and quiet effectiveness. The locomotives push the machine steadily into the snow banks, the cutting wheel slices off the snow and the fan throws it far into the prairie, leaving no built up bank to protect deep receptacles for the snow of the next storm. We have received the following account of the performance of the rotaries at work last winter:

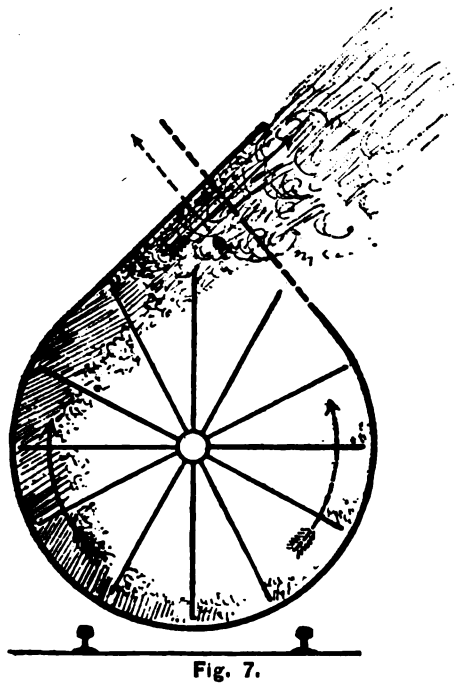

Fig. 7.

KEEPING MOUNTAIN ROADS OPEN.

One has been at work on the Southern Pacific, chiefly in the Sierra Nevada, and east to Ogden, Utah, three Rotaries have been employed on the Union Pacific from Omaha west, including both the main line, the Oregon short line, the Utah & Northern, Wood River and Park City branches. On the latter lines very heavy service has been performed by the Rotaries for the past two winters. The Oregon Railway & Navigation Co. has used the Rotary to clear the line and it proved of especial service in a storm that lasted for ten days without cessation, the snow being blown down from the mountain sides in such quantities that for 35 miles the cut was filled within half an hour of being cleared. The trains were literally "convoyed" through, the passenger train following within about 50 yards of the shovel, and the freight trains following the passenger at a similar interval. In this manner traffic was run without delay or inconvenience, while in the winter of 1884–'5 the line was blocked for three weeks, two passenger trains being snowed in while endeavoring to force their way through drifts on the Cascade Mountain division. The passengers were supplied with provisions sledded for many miles over the snow. The difficulty and danger of sledding in such a wild and broken country over drifts, in some cases 40 feet high, may be imagined but can not be described. Even then the passengers were not rescued until the Northern Pacific sent a large body of men with engines and snow plows to dig the trains out. These men were part of the construction force of the Northern Pacific at that time. It is said that in raising this blockade over 20 locomotives were seriously disabled, being wrecked or thrown off the track in bucking the snow, while the rails on 60 miles of the track were "burnt" where the engines had slipped in pushing the old-fashioned wedge plow.

WHAT WAS DONE ON THE NORTHERN PACIFIC.

Four Rotaries were used on the Northern Pacific this winter. The first that arrived from the manufacturers was rushed to the front, and was sent to open the switchback line over the Cascade Summit, which had been blocked for nine days when the Rotary arrived. Mr. J. M. Buckley, the Assistant General Manager, and other officials of the Northern Pacific, were present when the switchback was cleared. The feat was accomplished in less than nine hours, being begun at 10:30 A. M., and finished at 7:20 P. M., though, owing to the switchbacks, the Rotary had to be taken back to the foot of the mountain, several miles from the foot of the switchback, to be turned for the next switch. Just after the switchback was opened by the first Rotary (No. 1), the second arrived, after which one was put at each end of the train of locomotives, so that the switchback could be cleared without having to go back to the turn-table. The trains are worked in a similar manner, one engine being at each end of a train, so that whichever way the train is running, the front engine is always pilot first.

The switchback was successfully operated during the rest of the winter from Jan. 2, the Rotaries keeping it open without any delay to the traffic. The difficulties of clearing this line were enhanced by the steepness of the grades, 296 feet to the mile. An ordinary light passenger train requires two Consolidations, one at each end, while a heavy train is divided into two sections, two Decapods taking the heavy and two Consolidations the light section. Our readers, therefore, will not be surprised to hear that three Consolidations and one Decapod were required to propel the Rotary. This probably formed the heaviest train for its length that has ever been regularly worked, and must have subjected the numerous high trestles on the switchback to a strain fully equal to that allowed by the designers of the best and latest steel bridges.

The fall of snow is so excessive in this region that the men and contractors who had been engaged in building the road laughed at the idea of keeping the road open with a Rotary or any other form of snow-plow. While the cold is never very intense, seldom falling below zero, it is said that two feet of snow will often fall in one hour, and that such a storm will often last for several hours.

WRESTLING WITH DAKOTA BLIZZARDS.

The third Rotary for the Northern Pacific was intended for the Rocky Mountain division, but never reached there, owing to the terrible storms which prevailed in Dakota when the Rotary arrived at St. Paul from the manufactory. The Dakota lines were completely blocked with snow and black soil blown in and frozen hard into a mass resembling sandstone rather than snow.

The following account of the performance of the Rotary is abstracted from an article in the *Minneapolis Tribune*, in which we understand the facts are accurately given, and were contributed by officers of the railroad who were present:

"One of the Rotaries started out in Dakota in the middle of January, after the terrible storm, and while the thermometer was still 30 degrees below zero. Sidings covered with from 1 to 3 feet of snow were first cleared, the Rotary being pushed by one American type engine. The next operation was to open the Northern Division from Jamestown to Minneawaukon. The first obstacle encountered was a cut filled with 12 feet of solid snow, packed and frozen hard for a distance of about 25 feet, while for 100 feet more the drift varied in depth from 1 to 5 feet. The Rotary was pushed by two 18 by 24 engines, but stalled after penetrating 5 feet into the deep cut. On backing out it was found that the face of the drift on which the Rotary cutters had been working resembled polished granite in shine and consistency. The sides of the face were then shoveled down, and the Rotary, after repeated attacks, worked through the obstruction. An officer of the company who witnessed the two first trials returned to Jamestown and reported that they will not get to Minneawaukon in six weeks. As many as nine snow plows belonging to the road had been smashed in trying to open the same cut in the previous spring, it did not seem unlikely that the new machine would also fail. But within three hours the cut was opened, and another cut 500 feet long and varying from 2 to 8 feet deep had also been cleared and an abandoned and buried train had been disinterred. This train was taken back to Jamestown, and the Rotary started again next morning, making an advance of 46 miles during the day. Two cuts, 600 and 800 feet long respectively, blocked with snow from 2 to 8 feet deep, were cleared out. In the deepest parts the snow was packed solid and frozen hard. But, notwithstanding this, the worst cut was opened in 50 minutes. On a previous occasion, when this cut was opened by an ordinary snow plow, 35 shovelers were employed, and 11 hours were consumed in opening this cut. It is found that where the snow is not hard packed—of the consistency where an ox can walk on it without sinking in more than 2 inches—the Rotary will clear out snow 10 to 12 feet deep while moving two or three miles an hour."

Fig. 8.

The fourth Northern Pacific Rotary, which was the last to arrive from the factory, was intended for the Dakota division, but owing to the lines in Minnesota having become completely blocked for weeks before its arrival it was retained on the Minnesota division, and was employed in clearing the various branches in Minnesota, which was successfully done, and during the cessation of storms in February the Rotary opened and cleared as much as 650 miles in four days, Mr. Root, Assistant Superintendent Minnesota division, and other officers accompanying it on this trip. During another cessation of storms in March, equally good work was done in clearing roads that had been blocked by previous storms. During all these operations in Dakota and Minnesota, in which many thousands of miles were cleared, no engine was disabled and no person was injured, while it is stated that during the preceding winter some 32 locomotives were disabled and wrecked on these divisions in simply opening the lines after they had been blocked all winter. The Brown's Valley branch of the St. Paul, Minneapolis & Manitoba was completely

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blockaded all the winter, only one train having been able to force a way through by the aid of shovelers, progressing a few miles a day, and that only when the weather was favorable. This train carried provisions for the inhabitants and Indians, who were in great distress. This is one of the many instances of lines being completely closed for traffic during the whole winter.

DEMAND FOR THE ROTARY EXTENDING.

The Colorado Midland also used a Rotary, which proved more economical in operation than the old method of clearing snow. This road was, we understand, kept clear solely by its use, the ordinary plows not being used after the Rotary had made its first trip. This line has been operated this winter without the omission of a train, a feat which, considering the height of the summit, 11,000 ft., was previously deemed impossible.

The Chicago, Milwaukee & St. Paul secured the last Rotary built. This was placed at Chicago on trial, in order to give the officials of Chicago roads an opportunity of seeing it work without going to the Northern Pacific. Its trial trips were made on the lines of the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul, and it was bought by the latter company. It raised several blockades. One portion of the Winona & St. Peter Division of the Chicago & Northwestern, which had been blocked for three weeks, was opened in one day, a feat that had never been previously accomplished.

On the 16th of March the Rotary which had been built at the Polson Iron Works in Toronto, made a trial trip on the Northern & Northwestern of Canada, and cleared a blockade which had stopped traffic on the Beeton branch. Three freight engines were used as pushers, and a drift from 10 to 12 feet deep, which an ordinary plow had failed to go through, was cleared. It is stated that the snow was thrown as much as 200 feet into the adjoining fields, clearing the fences and flying over the telegraph wires. The blockade extended over a distance of 20 miles, the snow lying from 2 to 12 feet deep, but this distance was cleared in 2¼ hours actual working time.

MR. W. P. SEGUINE, the representative of Frost & Peterson, 161 West Eighteenth street, New York, manufacturers of perforated veneer seats for cars, has recently returned from a trip to the West and South, during which he booked two of the largest orders he ever received for veneers for car sides, ceilings, etc. This firm are the largest manufacturers of products in this line in the United States.

Fig. 1.

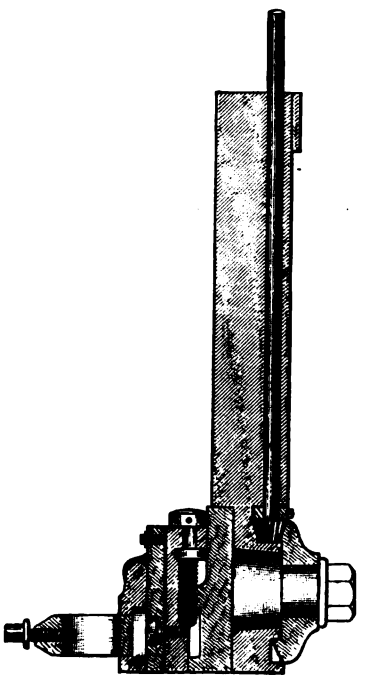


Fig. 2.

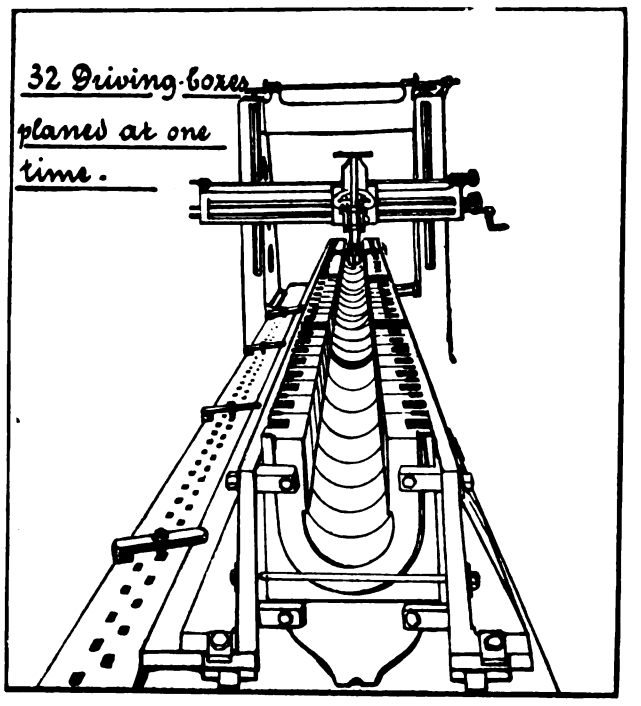


Fig. 3.

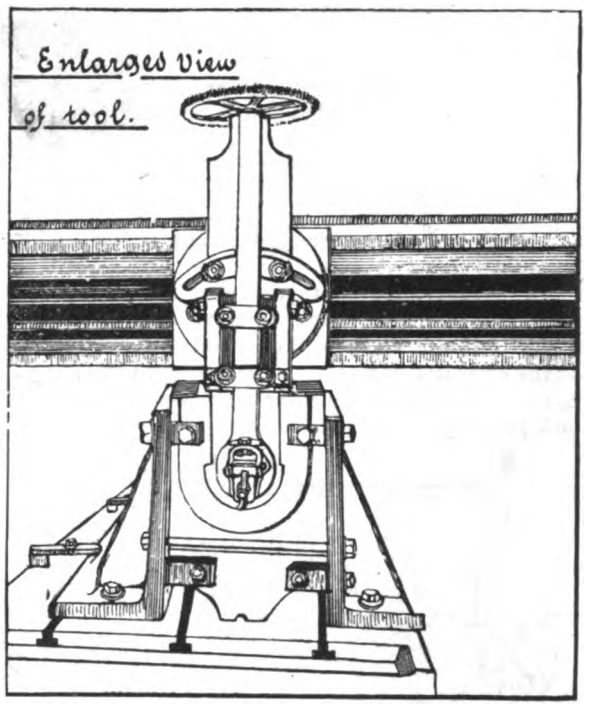


Fig. 4.

Planer Tool for Locomotive Driving Boxes and Curved Surfaces.

This invention is applied to an ordinary planing machine, having a longitudinally moving bed and a vertical adjustable cross head; the tool is made of a forged bar, heavy and strong, to withstand the strain to which it is subjected. At the lower end of the bar is a circular enlargement, and at the rear of the bar is a groove and a shaft, or spindle, upon which is mounted a gear; at the front of the bar is a face plate or head, with a vertical guide for tool carrier. The carrier is made with a vertical adjustment, by means of a screw and nut. The gear fastened to face plate, or head, is driven by the gear pinion upon the end of rear shaft, which rests within the groove at rear of the bar, which gives the rotation of face plate and tool holder, and can be driven by hand or feed gear wheels.

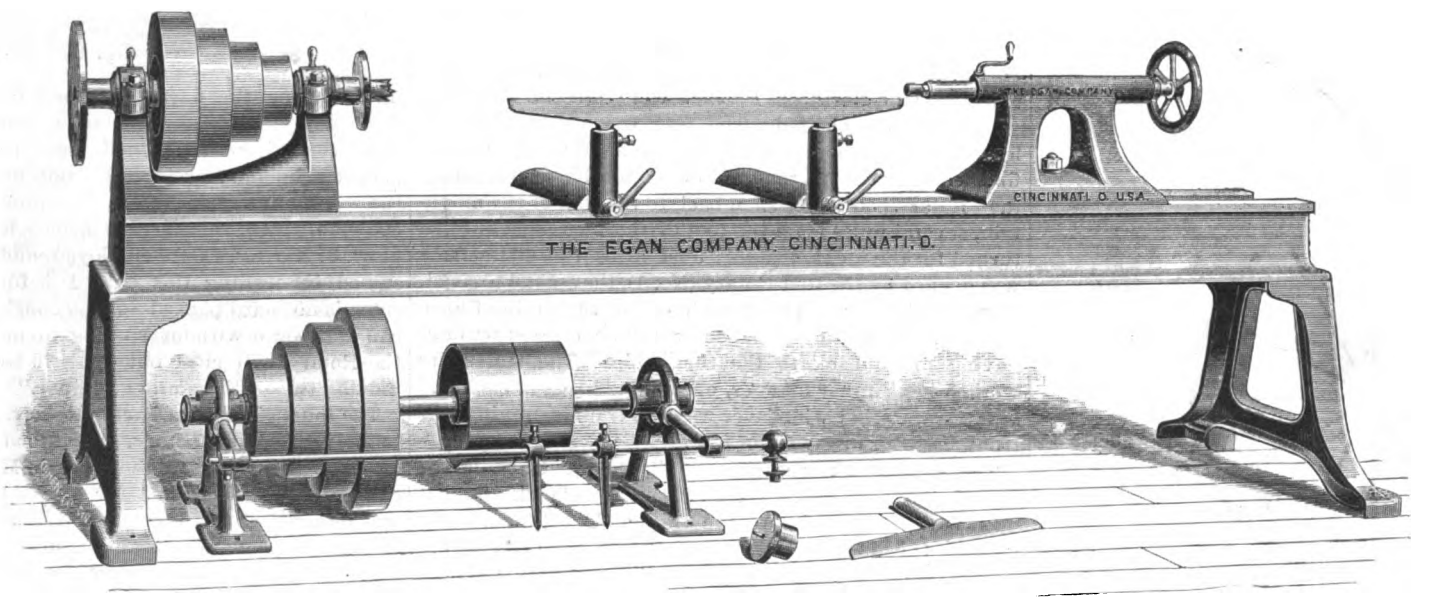
Supposing it is desired to plane out a number of driving boxes, they should be suitably placed in line and fastened between angle irons to planer bed. The bar, or tool, is then placed in planer tool post and properly secured and adjusted. The planer is then set in motion, and, at every stroke of the planer, a suitable partial revolution to the shaft may be given and a corresponding movement will be given to the tool, which moves around the center formed by the spindle, and the entire circular part of the driving boxes by repeated movements of the planer bed, or table, will be planed out. Should the operator prefer, both shoulders of the driving boxes may be squared up before the circular part is begun.

An important advantage arising from the use of this tool is that a number of boxes may be operated upon at one time, the number being only limited by the length of the planer table, and the work will be found with greater accuracy, which will make the boxes interchangeable. This tool is not confined solely to the planing of driving boxes, but can be, and is used for performing any work requiring accuracy and the movement in circular form.

It has been found to be much superior to slotting, and a saving of 100 per cent.

This tool is in use on the Chicago, Burlington & Quincy Railroad Company, and is giving most excellent results. At their Aurora shops they have a 25-foot planer, upon which is placed thirty-two driving boxes at one time; the planing for the cellars and shell bearing is finished complete in thirty-six hours, at the rate of 24 cents per hour, making the cost of all planing 27 cents per box. Fig. 1 shows the tool as made. Fig. 2 shows section of tool. Fig. 3 shows tool on 25-foot planer, planing thirty-two driving-boxes. Fig. 4 shows enlarged view of tool on planer.

Further particulars will be furnished upon application to Pedrick & Ayer, 1,025 Hamilton street, Philadelphia, Pa.



Iron Frame Wood Lathe.

The cut represents an improved wood lathe with iron bed specially suitable for large pattern shops, car and railroad shops, and other establishments requiring a reliable and substantial tool for long turning and for turning large diameters. The head stock spindle is made of the best crucible cast steel and furnished with double face plates; the back plate is for turning large circles: a suitable floor-stand with an adjustable rest being provided for this purpose. This face plate can be taken off and the back step placed in position to sustain the thrust on the spindle when turning between the centers. The head stock has a cherry cone, with four steps of large diameter and face, giving ample belt power for all kinds of turning. The tail stock also has a crucible steel spindle and center, and is provided with a hand wheel and screw to work the same in and out. An improved clamping device is arranged in connection with the spindle to fasten the same when placed in position. The bed is planed perfectly true and is provided with two sockets which are automatically tightened by an ingenious clamping device. The sockets can be clamped in any desired position across the bed. Any length of bed can be made, and different sizes of heads for various diameters of stock can be furnished to suit the purchaser. Each lathe is furnished with two centers, two improved sockets, three rests (two single "T" rests and one double rest), two face plates, screw-chuck, floor-stand with adjustable rest and countershaft with shifter and belt holders. The cut represents a lathe with 10′ bed with 24″ heads. The T. & L. pulleys on the countershaft are 12″x4½″ and should make 500 revolutions per minute.

Manufactured by The Egan Co., 235 to 255 West Front street, Cincinnati, O.

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