HOW TO PACK A MULE.—THE DIAMOND HITCH.

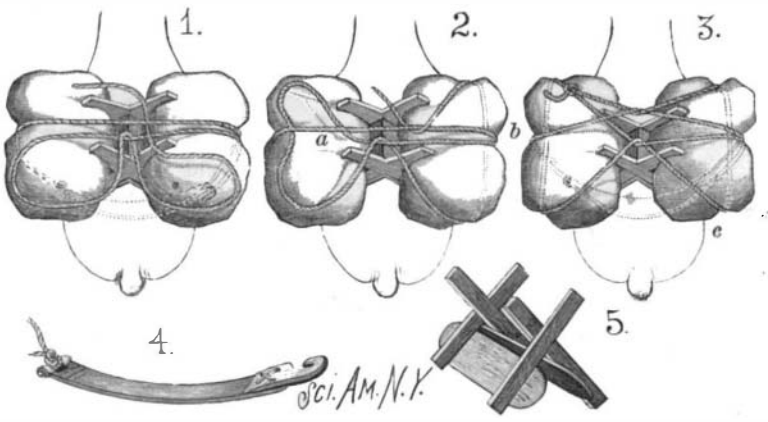
It fell to the writer's lot, some years ago, to travel through the Yellowstone region with a train of pack animals, horses and mules. This was in the early days, before the Northern Pacific Railroad had opened up that region to civilization. All the more bulky *impedimenta* of the party were carried by pack animals, any approach to a wagon being considered inadmissible. The pack saddles used by us were of the simplest description. In construction they resembled a small, light sawbuck, with side boards fastened under the crossed pieces, to come upon the animal's back. In saddling, a piece of blanket was first put on, then the saddle was girthed, or, in Western phrase, "cinched," on very tightly. In the southern regions, Mexican pack saddles are much in vogue. These are not so simple, resembling, to some extent, an ordinary riding saddle, but with immense square skirts.

The operation of packing involves the use of the peculiar knot, very famous in its way, termed the "diamond hitch." By its agency the packs are fastened rigidly in position on the back and sides of the animal carrying them. After the animal has been saddled, the packs, divided into two even portions, are slung up, half on each side, by two packers. To the parts of the saddle corresponding to pommel and cantle, short lines are fastened. The packers hold the packs up against each side of the pack animal, and passing the ropes around the articles from underneath, and up, over, and across the back, tie the ends together so as to hold all in position. Any small articles are piled on top, and all is ready for the diamond hitch.

To make this, a piece of 2 or 3 inch rope is used, about 30 feet long. One end is fastened to a short girth or cinch. To the other end of the cinch is secured a large flat hook, generally made of wood. In the army a long leather strap, about an inch wide, is used instead of the rope. Throughout the whole operation the packers work in pairs. One stands on the near or left side of the animal, whom we shall designate as A; the other stands on the off or right side, and will be called B. The packing rope and cinch are taken by A on the near side. He swings the hook end of the cinch across under the animal's belly to B, who catches it. Then A makes a bight in the part of the rope near the cinch, and throws it over across the top of the pack to B, who inserts it in the hook. Thus two leads of the rope run over the top of the pack transversely. A then turns a half hitch with large loop in the next succeeding part of the rope, and passes the free end to B. This end B passes over the second and under the first lead of the rope lying across the packs, and as near the center as may be. The state of things at this point is shown in Fig. 1.

The left hand part of the half hitch is passed under the cross rope by A, while the free end of the rope is passed as described by B. Fig. 2 shows this phase of the operation. In this way two loops are formed, one for each side. A's loop lies under the cross line, while B's loop comes outside of everything. All these operations are executed in a few seconds, no exact order being followed. The tightening process comes next. B begins to pull the rope backward and upward, grasping it at *b*, Fig. 2, putting his knee, or even foot, against the hook for a purchase, while A takes in the slack as fast as given him from B's successive pulls, grasping and pulling the rope at *a*, Fig. 2. When no more can be gained, and the poor brute is compressed as much as possible, A passes the loop on his side tightly around and partly underneath his half of the pack. Then B, grasping the rope at *c*, Fig. 3, pulls diagonally backward and outward. This begins to "spread the diamond." He next puts his loop in position, when A, taking hold of the free end of the rope, pulls it diagonally forward and outward, over the withers of the horse. This completes the spreading of the diamond, and it will be at once seen that this separation of the two leads of the rope tightens it with enormous power. After A has given the final pull, he ties the free end of the rope wherever convenient, thus completing all. The final result is shown in Fig. 3. The last two pulls consolidating the pack nearly double up the poor animal. The cinch, often cruelly narrow, is drawn up into his belly until the profile forms a double curve, his body being violently squeezed upward. After packing, the poor beast will sometimes go off, as it were, on tiptoes, trying to relieve himself by motion. To untie the hitch, the end of the line is untied and cast loose, and withdrawn from under the cross lead of the rope. Then the whole being slackened, the bight is withdrawn from the hook, and the rope comes off without a knot. If a knot is formed, it is a sign that a mistake has been made in the tying.

The tightness of the "lacing" to which the animals are subjected has an element of mercy in it, because, if the saddle shifts about, a sore back inevitably results. With the spread of railroads and wagon roads the tying of the diamond hitch may take its place among the lost arts. The writer has used it in roping large, irregular bundles, and its power in such cases is surprising. A simple loop tied on the end of the rope was made to serve instead of the cinch loop.



HOW TO PACK A MULE.—THE DIAMOND HITCH.

Natural Gas Pyrotechnics.

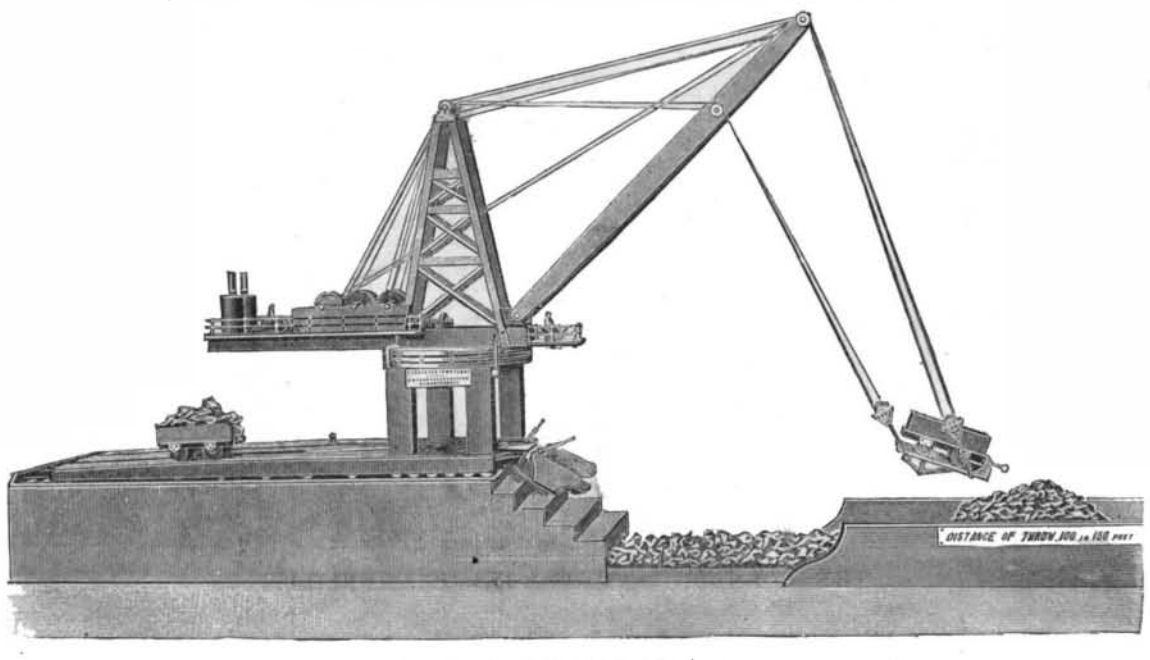
The four escape pipes of the Philadelphia Natural Gas Company, at Thirty-sixth Street, Pittsburg, were lighted up again last week, but with a lower pressure than that of the previous occasion. A story gained currency that Mr. Westinghouse proposed to have the gas lighted with a full pressure of gas. Some of the people who live near the escape pipes heard of it and entered a protest, claiming that the heat of the fire under such a pressure would be so great that it would melt the tar on the gravel roofs of their houses. The protest was entirely unnecessary, as the company at no time had any idea of putting on the full pressure, which would be nearly 200 pounds. Such a pressure is deemed too dangerous to allow it to come into the city. A large crowd of people was gathered on Thirty-sixth Street last night to see the illumination, which was extensive enough to enable a person to read a paper with great facility two miles away. On Wednesday night when the gas was lighted, the pressure was ten pounds. Last night the pressure was only nine pounds.

The pipes where the gas was lighted last night are Station A of the company. The escape pipes are four in number, built like an oil well derrick, and extend to a greater height than the highest derrick. The escaping gas first goes into safety valves, ten inches in diameter. From these they pass into a 24 inch pipe, which extends ten feet into the ground. From this pipe at the depth of ten feet it passes into the four 8-inch escape pipes. The object in having the 24 inch pipe extend so far underground is to get rid of the roaring noise which would accompany the escape under any other circumstances. Every six miles stations similar to that of Station A are established, and two men are constantly on watch to see that the pressure does not go above ten pounds. One of these regulating stations is at Murraysville. If the pressure ever gets above ten pounds, each station is telephoned to at once, and the valves regulated until the pressure is brought down.

THE PENDULUM TITAN SHOWN AT THE INVENTIONS EXHIBITION, LONDON.

We illustrate the "pendulum titan" manufactured by Messrs. Ransomes and Rapier, Ipswich. The apparatus consists primarily of a specially constructed jib crane, mounted on a traveling carriage, to allow of its being moved from place to place. The machine has been designed to perform expeditiously all the mechanical work of constructing walls and breakwaters. For the laying of large quantities of concrete or masses of stone under water in such undertakings, it is of the first importance that the machinery employed shall be capable of dealing efficiently with the large quantities of materials necessarily required. The crane is constructed with a cradle suspended by two pairs of ropes or chains from the jib in such a manner that the cradle, when held up to the foot of the crane, shall be in a horizontal position, so as to allow the trucks being run on to it, and in such a manner that, when released from the foot of the crane, it shall swing forward, and, toward the end of its forward swing, tip endwise to discharge the contents of the truck. The pillar forming the center pivot of the moving body of the crane is fixed in the center of upper girders, forming a pathway for the rollers of the live ring of the crane, and fixed on cross girders supported by machine legs from the floor of the apparatus, the rollers working between the upper girders and similar girders fixed to the under side of the crane body. The moving body is fitted with a jib. The boilers and engines, it will be seen, are mounted on the tail piece, so as to form part of the tail weight. The crane is provided with four winding barrels, each constructed in two parts. The front barrel winds the two front chains, the next barrel winds the two back chains, the other two barrels are for varying the radius of the jib. The barrels are all controlled by worm gearing, the worms being loose on the engine shaft and fixed thereto by means of clutches. The engine shaft is also continued so as to operate the central crane post for working the traveling gear. In the floor of the crane is a small turntable toward which a number of lines of rail converge, there being two lines next the water. The cradle is suspended from the jib by four ropes, the two in front of the cradle being attached to the front of the jib, and the two behind being attached lower down the jib, as shown. The cradle is retained in position on the crane by a strong frame provided with guides. When the cradle has swung out and deposited its load, it swings back again, and a detent on its under side drops into a rack on the frame. The rack is mounted on parallel links, and lowered by means of a handle to release the cradle.

The dimensions of the apparatus are of course determined by the load to be lifted and the distance which it is desired to be thrown, and is so arranged as to admit of considerable variations as regards radius of jib. The chains for effecting this purpose are passed over a high mast, and are so adjusted that the radius of the jib can be varied without altering the height of the suspended load. In this way, when a block has been lowered nearly to its intended place, it can be finally adjusted with great facility. The height of the mast reduces to a minimum the strain on the adjusting jib, and the "fusee" barrel employed so equalizes their travel and the movements of the load chains that the load is neither lifted nor lowered when the radius and height of the jib are altered. The details of the machine have been carefully worked out, and all the structural parts are made of wrought iron.



THE PENDULUM TITAN.

As illustrating its extraordinary capacity for depositing materials, we are informed that the machine can discharge 20 trucks, each containing 10 tons, in half an hour, throwing the contents to a distance of 100 to 150 feet, being equivalent to the removal of 400 tons per hour.

To facilitate the discharge of large pieces, the floors of the trucks can be faced with plate iron, or furnished with rollers permanently mounted, so as to allow the large stones to slide off easily.

The machine is useful for all kinds of work in the construction of breakwaters, and is particularly applicable to the formation of structures consisting of "pele mele" concrete or other blocks.—*Mech. World.*