

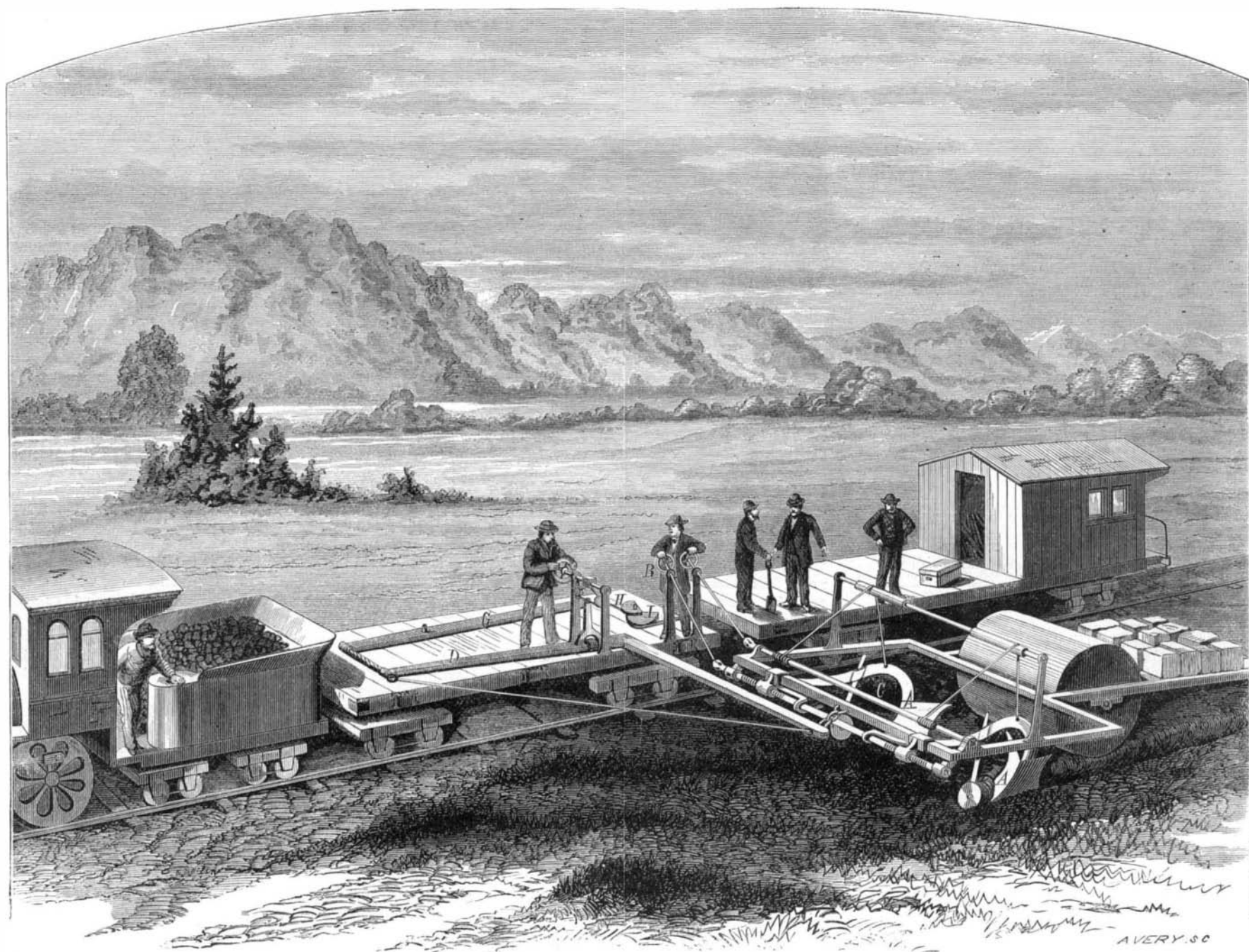
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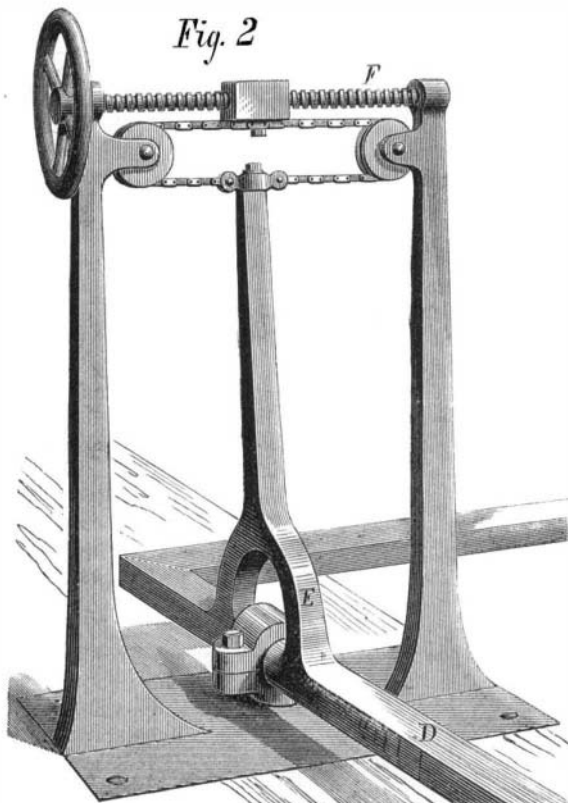


HARDEN'S RAILROAD GRADER.

IMPROVED RAILROAD GRADER.

The accompanying engravings represent a novel device for expeditiously grading railroads. It is mainly intended for use on Western prairies and watersheds, and will, it is claimed, promote the construction and extension of railways by rendering the same less costly, thus aiding in the development of regions now unopened to commerce.

In using the invention, it is first necessary to lay a temporary track over the designated line, to accommodate a locomotive, one platform car, and a caboose, the latter serving as quarters for the workmen and also playing a part in the operation of the device, as will be described further on. The appearance of the grader at work is represented in Fig. 1, and in Fig. 2 are given details of two important portions. Two plows, A, respectively right and left handed, are secured to curved beams which are attached to sleeves moving on the front bar of the heavy rectangular iron frame. Said sleeves are connected to nuts which travel on horizontal screws, placed in bearings on the same bar. By operating this screw (the threads of which are in reverse directions) through the wheel, B, on the platform car—the shaft of said wheel being attached to the screw by a universal joint—the plows can be moved nearer together or further apart. Arms connected to the plow beams pass around the middle portion of the screw shaft and serve to steady the plows. Above and near the front portion of the frame is another shaft, C, also rotated in similar manner by a wheel on the platform car. Chains or cords attached to this shaft lead over a roller and are fastened to the plows. By this means, by revolving the shaft, C, in either direction, the plows may be raised or lowered to cut shallower or deeper furrows as desired. To the rear of the rectangular frame is attached another and smaller frame,



in which works a large roller. In rear of the latter is a platform which is weighted heavily or lightly, as desired. This is all there is of the machine proper.

The plows, of course, turn furrows in opposite directions, throwing the earth inwards, and making a bed of the necessary width. The loose soil is then leveled by the weighted roller. The grader is drawn by the locomotive, and upon the platform car other devices are arranged, the uses of which we shall next explain. D is a heavy bar, one part of which lies lengthwise of the deck of the car, and the other part, extending out at right angles, forms the point of attachment of the machine. Between the ends of arms a strong brace is fastened. The apparatus, which is represented as being operated by the workman on the car, is shown in detail in Fig. 2, and its use is to lift the whole grader out of action while traveling, or so that obstructions may be avoided. Formed upon the arm of the bar, D, which lies parallel to the axis of the car, is a crotch, E, Fig. 2, between the arms of which the bar is rounded and the cylindrical portion is received in a bearing as shown. Said bearing is pivoted below so that it does not prevent lateral motion of the bar. Above the crotch a single arm extends upward, to each side of the summit of which are attached the ends of a chain, which passes over pulleys journaled in the two standards shown. Also attached to the chain is a nut, which travels on the screw shaft, F. It is evident that, when the latter is rotated by the hand wheel, the crotch arm serves as a lever to turn the bar in its bearing, and thus to raise and lower the forward portion of the machine. A device, H, Fig. 1, is used for equalizing the draft. As already stated, the direct arm of bar, D, is pivoted at the base of the bear-

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ing above mentioned. Its forward end is suitably connected to a second pivoted bar, G; so that, when the first bar has a lateral movement, that motion is, through the connection, transmitted to the second bar. To the rear extremity of the latter is attached a chain which passes around and is secured to the small cam, H, Fig. 1. I is a larger cam, rigidly attached to and hence working on the same pivot as cam, H. Around cam, I, and secured to it, is another chain, which passes over a guide pulley at the rear end of the platform and is fastened to the caboose car. The peripheries of each of these cams, or rather eccentrics, gradually increase from the point of connection of the cables, so that the caboose is thus made to serve as a counterweight to the resistance of the plows and drag, adapting itself readily to increased or decreased strain.

The present invention is one of a series designed for grading railroad beds in all situations, except through stone, and also to keep the same in repair. Two other machines have been devised, one to make a "cut" and a "fill," and the other for ditching purposes.

Parties who will interest themselves in the securing of contracts for use of the device above described are invited to address the inventor, Mr. J. J. Harden, 83 West Van Buren street, Chicago, Ill.

Communications.

Our Washington Correspondence.

To the Editor of the Scientific American:

Notwithstanding the general stagnation of business, the issue of patents still keeps on, the hard times appearing to have sharpened the wits of our inventors, thus proving, in more senses than one, that "necessity is the mother of invention," and causing the business of the Office to increase very much of late. The issue of March 6 was about four hundred, including patents, reissues, designs, trade marks, and labels.

An examination of the list of the acts of Congress of the last session that received the signature of the President shows but three relating to patents, namely, the acts for the relief of Henry Voelter, T. Bussell, and W. W. Hubbard. The first two of these is to authorize the Commissioner of Patents to extend the patents of the two gentlemen named, the first for a process for the manufacture of paper pulp from wood and the other for a car spring. The last act, according to the title, is "to make compensation for the past making, using, or vending of his patent explosive shell fuses and percussion exploders by the United States." There were other patent extension cases passed, but failed to meet the approval of the President, and hence have not become laws. No sewing machine patents have been extended, and it therefore appears that the monopoly of the sewing machine combination is about to end, and that about May next the prices of sewing machines will drop to a reasonable figure, or as soon thereafter as other manufacturers can supply the market.

Mr. Nathan Appleton has been in consultation with the late Centennial authorities at Philadelphia, and, as a result, has presented to Secretary Evarts a sketch of an organization for the proposed American exhibit at the next Paris Exposition, together with an estimate of the necessary expenses. He estimates that \$300,000 is the least amount with which a proper exhibition can be made, and this on the supposition that the goods will be received at New York in government warehouses and shipped to Havre in United States Government vessels. He believes, however, that \$500,000 should be appropriated to do the country credit at Paris. The gentlemen who are shaping the present movement entertain strong hopes that the President will be able in some way to accept the invitation of the French republic at an early date, as they find there is a general desire among Americans to take part in the Exposition.

I hear of no changes worth noting in the officials of the Patent Office, although rumors of the proposed removal of the Commissioner and his assistant have been flying around of late; but I have been unable to trace these rumors to any reliable source, and it is generally believed there is no foundation for them, as the new Secretary of the Interior is said to be a strong believer in civil service reform, and he would have to stultify his past record to make these removals. He is said to be now engaged in framing his views in relation to the civil service into the form of a code of rules to govern the department over which he presides, and which will, it is believed, form the basis of the government of the other departments in the matter of appointments, etc. It is reported that he has signified his intention of making no removals where the incumbent proves qualified, diligent, and efficient, and it is therefore hoped that all the trustworthy officials in the Patent Office will retain their positions.

The Post Office has invited tenders for the contract to manufacture postal cards for the next four years, from which it appears that, during the last fiscal year, 150,815,000 cards were issued; and it is expected that the issues for the current year will be about 180,000,000. It is thought that the number required during the next contract term will reach the enormous number of 1,000,000,000 at least.

Washington, D. C.

OCCASIONAL.

Friction of Slide Valves.

To the Editor of the Scientific American:

In your SUPPLEMENT, No. 62, there is an article by Mr. Hill on the friction of slide valves, which, while it contains

some truth, is yet enough in error to deserve notice. Allow me to say in the beginning that I am not one of those "semi-mechanics" who, to use Mr. Hill's expression, have been "peddling" balance slide valves. I am simply a mechanic who, in common with a great army of similarly situated men, contrive to gather up from year to year considerable information from the columns of the SCIENTIFIC AMERICAN, and it is because so many young mechanics make that paper their textbook that I venture to offer objections to Mr. Hill's conclusions. There are in the country mechanics who have invented, and no doubt to some extent "peddled," balance slide valves, and who, in point of ability, might not suffer in comparison even with Mr. Hill himself, and it certainly does not assist his argument to disparage these men at its commencement. Some of these inventors have, as is well known, supplemented fair scientific attainments by exhaustive practical experiments; and while they do not claim to save "25 to 50 per centum" they do claim to show a slight saving in fuel, a very material saving in eccentric and connection to valve, and undoubtedly considerably more than the highest figure named by Mr. Hill in the wear of valve and seat and consequent "blowing." Mr. Hill is certainly to be commiserated if, in all his varied experience, "there is not a single relieved valve in use" that does not leak to the extent he indicates; and he may be assured that he can find several of them in this section which have been running from two to five years without any repairs whatever. All the leak from the packing of these valves passes directly into the engine room without becoming a nuisance at that. So much for Mr. Hill's gratuitous attack upon the venders of balance valves.

In regard to that very useful and somewhat intelligent class, engine builders, whom he tells with so much modesty that they have always been in the wrong as to the pressure on a slide valve, it is to be presumed they will hold their "erroneous ideas" notwithstanding the demonstration which makes the case much clearer to Mr. Hill than to men who know better by experience. There need be no question in any one's mind, if he obtain his data for balancing slide valves from these conclusions, that it will not require even a "very short time" for them to become so leaky as to be voted a nuisance. In fact, were Mr. Hill to construct a valve of the dimensions indicated in his article, deducting as constant counterpressure his steam post and additional area, which at full steam chest pressure shall be the equivalent of the highest pressure reached by compression acting constantly upon the exhaust cavity of the valve, allowing besides a liberal margin for holding the weight of valve, there is no doubt any of the "half mechanics" would guarantee his valve to stay anywhere else in the chest rather than in its proper place against its seat.

Troy, N. Y.

NOT A PEDDLER.

Facts in Nature.

To the Editor of the Scientific American:

I read in your journal for March 17 an article entitled "Do Snakes Catch Fish?" Perhaps it is not a generally known fact, but most of our water snakes are expert fishers. Especially so is our common species, *tropidonotus sipedon*, Linn. Last spring my brother witnessed the capture of a water snake in a small stream flowing into the Schuylkill. The stomach of the snake was observed to be greatly distended, and on being cut open, to ascertain the cause, a large catfish, apparently just swallowed, was extricated. The snake measured two and a half feet in length, and the catfish seven inches. The fish was fully armed with the long sharp spines common to the genus, and must have proved a reluctant dinner, dying "game to the last."

I once saw a water snake in full chase of an eel. I was sitting on a small rock, quite near the surface of the stream, and observed them well. As they passed me, the eel led by about two feet; and as far as they were visible, the snake seemed to be gaining ground. But although I dropped my rod, and soaked my lower extremities considerably in the attempt, I was unable to see the termination of the affair. The snake appeared to be three feet in length, and the eel about the same size, certainly not more than two inches less. Professor Allen once saw a water snake hauled from the water and killed, that had a live pickerel in its mouth a foot in length.

The common water snake does not always capture its prey by a fair chase. I have several times seen it lying in wait among rocks and stones, with its head and part of its neck only visible; and when a fish or tadpole swam by, it would instantaneously dart forward and seize the unknowing trespasser.

Philadelphia, Pa.

C. F. SEISS.

Patterns for Fret Saw Work.

To the Editor of the Scientific American:

Those who wish to duplicate the above named patterns find the use of impression paper tedious and inaccurate. My method is as follows: Take two pieces of wood of proper size, cut any number of sheets of common writing paper to the same size as the wood, place the sheets on one piece and tack the other piece of wood to it with the paper between. Paste your design on one side and saw through paper and all. Saw the holes first and then the outlines accurately; and when done you will have as many beautiful designs as you wish with the least possible labor.

McLean, Ill.

FRET SAW.

The Frost Plant of Russia.

To the Editor of the Scientific American:

In your issue of February 24, I see a picture of what is entitled "The Frost Plant of Russia." I have seen the identical phenomenon on a certain kind of weed stalks in Fayette county, Tenn. While teaching a country school in that county, in 1873-4, my school children and I gathered the "frost flowers" frequently. They were most beautiful in the morning, and usually melted away during the day when the sun shone. I do not think that snow had any influence over them, and am of Dr. Darlington's opinion as to their formation.

Fall River, Mass.

T. R. VESTAL.

Beavers in California.

The Stockton (Cal.) *Independent* publishes the following: "As the tules of this vicinity abound in beaver, numbers of hunters and trappers have made an excellent living in capturing them for their pelts. The latter are worth \$2.50 each, and an industrious trapper can catch from 30 to 50 a month. In the equable climate of California the time of year seems to have no especial effect on the excellence of the beaver fur, it being equally good in summer and winter. The trapper can, therefore, pursue his avocation uninterruptedly the year through. With the beaver he can catch and the other game he can send to market, an industrious man can make \$100 a month and live as his own master. The trapper's outfit for the San Joaquin tules is a peculiar one. Two hunters usually join together in the outfit of an ark, or floating house, with which they paddle out through the innumerable sloughs that intersect the pathless jungle of tules. The ark affords one small room or cabin, provided with sleeping bunks, and furnished with a stove and complete culinary outfit. In this ark the hunter lives in comfort, always having a shelter, while its compact shape and size allows it to float in the smallest stream, thus bringing the hunter and his home in the very midst of his game."

A New Fire Extinguisher.

A new fire-extinguishing chemical compound has been lately devised, which, in its application for extinguishing fires, is quite different from the fire annihilators in general use. The new composition is a mixture of chemicals which, on being ignited, evolve sulphurous acid and carbonic acid gases, which fill the apartment or building, producing an atmosphere which smothers combustion. A successful trial of the invention was recently had in front of the City Hall in this city.

A board shanty, 13 feet square and 10 feet high, was erected to represent an apartment, and furnished with a door, window, and a stovepipe coming through the roof. The interior was coated with tar. On a bench were placed seven basins containing benzine, coal oil, and naphtha. In one corner was a 10 lbs. box of the extinguishing compound, with a fuse attached to it running round the walls, on the self-igniting plan. The combustibles were set on fire, and in an instant the interior was one sheet of flame, bursting out through the door, window, stovepipe, and every aperture. A few moments after the compound was ignited, the gases that were generated therefrom instantly subdued the flames; and in less than half a minute the fire was entirely extinguished.

The new substance is called "Reec's Compound Fire Extinguisher." G. J. Crikelair, of 263 Broadway, is the general agent for New York, New Jersey, and Connecticut.

Good Forgers.

The question has often been asked us, says the *Carriage Monthly*, "How is it that some smiths are able to make better forgings than others?" or "How is it that — is always so successful with his welds?" The secret of all this is in first knowing how, and after knowing how, in doing, or trying to perform, what we know. The knowing smith so lays out his work at the close of the day that his first work in the morning will be the heaviest, and such as requires but little welding. By doing this he not only leaves the lighter portion of his labors for the waning of the day and also the tiring of his arm, but he removes the chill from the anvil and other tools to such an extent as to prevent the iron from becoming chilled before the weld is properly made. His fire is always clean. His tool rack is always in order, thus enabling him to grasp the required tool at the proper time. He never places his iron in the fire a second time until, with a file, he has removed all the scales. The ice-cold anvil will chill the thin part of the "scaff," and prevent the welding of that portion. It is impossible to take a clean heat with a fire full of slag. If you have to hunt five minutes for a tool, your iron has become cold, and unless you remove the scales and other matter, your forgings will not be perfect.

Sawdust in Rough Casting.

Siehr recommends very highly the use of sawdust in mortar, as superior even to hair for the prevention of cracking, and subsequent peeling off, of rough casting under the action of storms and frost. His own house, exposed to prolonged storms on the seacoast, had patches of mortar to be renewed each spring; and, after trying without effect a number of substances to prevent it, he found sawdust perfectly satisfactory. It was first thoroughly dried, and sifted through an ordinary grain sieve, to remove the larger particles. The mortar was made by mixing one part of cement, two of lime, two of sawdust, and five of sharp sand, the sawdust being first well mixed dry with the cement and sand.