A RAILWAY-CROSSING INVENTION WANTED.

Notwithstanding the fact that American railroad managers have adopted various devices to prevent accidents where highways cross railways at grade, the list of accidents at crossings is a long one. In many instances of death and damage at crossings the blame should properly rest with the victims, as it is usually the result of their own carelessness or stupidity. But in case of storms the bell or whistle may not be heard, or in foggy darkness and deep cuttings on curves the head light may not be seen, and the passer may keep a sharp lookout and still be caught. It not unfrequently happens that enginemen neglect to sound either whistle or bell at crossings; this is often the cause of disaster; or the attention of one or both enginemen is suddenly drawn to some urgent matters pertaining to their duty, and the whistle and bell escape their minds until the crossing is passed.

Formerly, railroad companies were constantly under prosecution for neglecting to give the customary warnings at crossings, or not blowing the whistle, or commencing to ring the bell at the distance from the crossing prescribed by legislative enactment. As a remedy for this, the prescribed distance was measured each way from crossings, and posts set that engineers might know at what point the law required them to sound the alarm, which would relieve the company from blame in case of accident. This plan was not without its merits, but for reasons already explained these posts would be run past unheeded, and they did not afford the desired protection.

Another plan was the steam bell ringer. By this arrangement the bell could be set ringing at any desired point, and the ringing would continue until stopped by the engineman. By this arrangement the bell could be set going at any desired point, and firing, oiling, or other duties attended to until the crossing was passed; the bell needing no attention. But it occasionally happened that, like running past the whistle or ring posts unheeded, the bell was not set ringing, and the crossing was passed without any warning.

Another plan was to place a bell stationary on the truck frame, under the head light, and a hammer that struck the bell was actuated by a rod and eccentric attached to the driving shaft. This gave a stroke of the bell at every revolution of the driving wheel. Residents along lines using this device could judge of the speed of the train by the strokes of the bell. When it was not desired that the bell should ring, it was thrown out of gear. This plan, like the others, was good when properly attended to; but when forgotten was liable to cause serious mischief.

The public are accustomed to listen for warning at crossings, and if a sound is not heard or signal shown, they are led into a trap; hence such devices as above mentioned, not being self operating, are elements of danger rather than protection. The foregoing has reference to grade crossings in the country. In cities and towns, safety gates are operated by an attendant, or flag-men are employed, but at country crossings the whistle and bell are relied upon as protection.

Various other devices have been resorted to to save life at crossings, but none of them meets the requirements, and a *perfect crossing alarm* is one of the pressing needs of the day. Railroad companies are subjected to enormous expense by interminable lawsuits arising from accidents at crossings, and it is believed that every railroad company would willingly pay any reasonable price for a *reliable* crossing signal. Here is a rare opportunity for inventors, and it is earnestly hoped they will take advantage of it.

The foregoing has been written to point out to inventors, in a measure, what has been done in this line in order that they may not go over ground already worked; and, although we have not mentioned a tithe of the inventions that have been brought out for the purpose under consideration, those alluded to are the nearest perfect of any in use, and would be the most likely to be reproduced by inventors who are not familiar with the general subject.

There are also gongs placed at the crossings which are designed to be sounded by approaching trains through the medium of electric appliances, or a system of wires and levers operated by the wheels of passing trains; but none of these is satisfactory on account of liability to derangement. Either of these two latter plans contains the elements of success when thoroughly perfected, and this would seem to be the right direction for the inventor to work to insure success. As already explained, any device depending on the vigilance of train-men to operate is unreliable, and the only safe arrangement seems to be in providing a gong at crossings which shall be sounded automatically and continuously from the time a train reaches the point prescribed by law until the crossing is covered by the train. Semaphores have been made to act automatically with tolerable success in daylight, but are of no account in fogs, snow-storms, or at night. If the gong is used it must be placed in a suitable box or housing at the crossing, and so arranged as to render a failure to sound at the proper time an impossibility. This may seem as putting it rather strong, but it must and can be done. Of course such an arrangement will need constant supervision to be kept in order, and must be so arranged as not to be rendered inoperative by snow or ice. Another requirement is that the apparatus shall not interfere with the work of track repairs. With a gong ringing sharply at a crossing, no one would attempt to cross the track with that stupid indifference engendered by familiarity with crossings and so characteristic of a large class of people.

The public demands faster trains, and the increase of traffic requires a greater number of them, all of which creates a greater necessity for a reliable danger signal at crossings.

Perhaps some good might result from the enactment and *enforcement* of a law compelling all persons to come to a halt at crossings before attempting to cross. This would afford them an opportunity to decide whether or not they could cross with safety; but as no amount of legislation would be effective in all cases, it remains for inventors to guard the public safety to a great extent in this as in many other matters connected with travel by rail and water.

WM. S. HUNTINGTON.

[Our correspondent has omitted the mention of the best plan of all for the prevention of accidents at crossings, which consists in depressing the track of the railway so as to pass under the road; or the bridging of the track so as to carry the road above it. We believe that in some countries, and in some towns in this country, this method is required by law.—ED.]

How to Make Paper Negatives and Prints.

BY CAPTAIN ABNEY, R.E., F.R.S.

In compliance with your request to me, I beg to communicate to you the method of preparation of the bromo-iodized paper with which my lectures already delivered before the Society of Arts have been largely illustrated. Before the rapidity attainable by the gelatino-bromide paper, however, it cannot be hoped that it will be largely utilized. It has, however, the good quality of cheapness and ease in preparation, which the gelatine paper has not. The preparation paper was described at a meeting of the Photographic Society, in 1880, and with one exception its preparation is the same as before.

The method of preparation must be adapted to the purpose for which it is intended to be used. 1st. For the production of paper negatives.. 2d. For the production of prints. In the first case the paper is soaked in the following: Potassium iodide, 200 grains; potassium bromide, 300 grains; water, 20 ounces.

To this is added a solution of iodine in alcohol till it assumes a deep claret color. (This is added for the convenience of knowing when the sensitizing is completed, and is not necessary.) After filtering the solution. the paper, which should be as smooth as possible (Saxe or Rives answers), is immersed in it, taking care that no air-bells cling to the surfaces, and allowed to remain soaking for half an hour. The sheets are turned once or twice during the operation. They are then taken out and allowed to drain and dry spontaneously, after which they are floated on silver nitrate, 500 grains; glacial acetic acid, 1 ounce; water, 20 ounces.

The smooth side of the paper is floated as is done when albumenized paper is sensitized; after a couple of minutes the purple or brown tint at the back of the paper will be replaced by this yellow bromo-iodide of silver tint. After a couple more minutes the sheets are removed to a dish of water to remove the excess of silver. After another wash the paper is transferred to water containing about fifty grains of potassium bromide to the pint of water, and allowed to soak ten minutes. It is then thoroughly washed and dried. By this plan the paper will be slow. In order to render it more sensitive it may be given a soak in beer diluted to half its strength with water to which a little white sugar has been added, say one lump the size of a nutmeg to a pint; or it may be floated in a solution of potassium nitrate or sodium sulphate, about half a grain to the ounce, and then dried. These would render the paper a good deal more sensitive than in its normal state, and can be used with safety. Any sensitizer, such as gallic or pyrogallic acid, might be mixed with the beer, but in this case care must be taken to wash it all out before applying the iron developer, since any trace left will form ink with the iron. The exposure is long, compared with gelatino-bromide paper—say thirty times longer. I now prefer to develop by brushing over the ferrous-citro-oxalate developer, using a nearly vertical plate on which to hang the paper, which should be previously dampened. This is more economical than using a dish, and is a great saving in time. The ferrous-citro-oxalate gives even purer whites than the ferrous-oxalate, and I therefore recommend it. The brushes I use are three inch flat badger hair brushes, and I have found no deterioration in them by use. From time to time the paper should be examined to see what density has been obtained, and when the image is through the paper it will be found sufficient for printing purposes. After fixing, washing in hot water (to remove the size), and drying, the paper is waxed in the usual manner.

To obtain prints, plain paper is brushed over on its smooth surface with the above solution, to which about five grains to the ounce of gelatine may be added. When dry, a second coating is given, and when that is dry the paper is floated on the above silver nitrate solution for four minutes, after which it is washed and treated exactly as above, and developed in the same way.

Pure bromide paper answers almost as well. A solution of thirty grains to the ounce of potassium bromide is brushed over the paper twice, which is floated on the silver bath, and treated as before. To develop such paper it is, however, as well to add to each ounce of ferrous-citro-oxalate developer about five grains of common salt. This keeps the whites purer than they would be without it. Paper so developed should be beautifully bright and clear in the lights and shades, and gives excellent prints on which to work if considered desirable. There is a tendency, however, for the prints prepared with bromide alone to have a greenish tint. The use of the iodide gives a black. This is not astonishing when it is considered that silver iodide alone develops a ruddy color. This, mixed with the green, gives a black tone.

I may add that many photographers apparently fail to make ferrous-citro-oxalate. The plan is as follows: Take 500 grains and dissolve in 5 ounces of water, warm the solution to boiling point, and then add to it 110 grains of ferrous oxalate powder. Shake this up immediately in a corked flask, and it will be found to dissolve It should have a greenish-red tint, and is then in its most active state. I advise those who develop collodion dry plates, or gelatino-chloride, to try this developer, and use it without any restrainer.—*Photo. News.*

How Mosaics are Made.

The London *Telegraph* has the following: The guardian in the velvet skull-cap came to my aid, when I was at fault, with most courteous explanations. He mentioned incidentally that in a portrait of Pope Pius V. there were 1,700,000 pieces, each no larger than a grain of millet; but this statement I take to have been merely guesswork. The enamel, he proceeded to tell me, is a kind of glass, colored with metallic oxides, and it is so fusible that it can be drawn out into threads, small rods, or oblong sticks of varying degrees of fineness, slightly resembling the type used by compositors. These polychromatic rods are kept in drawers properly numbered, so that the artist always knows to which case to repair when he requires a fresh supply of a particular tint or tints. When the picture is commenced the first step is to place on the easel a slab of marble, copper, or slate, of the size fixed upon; and this slab is hollowed out to a depth of about three and a half inches, leaving a flat border all round which will be on a level with the completed mosaic. The excavated slab is intersected by transverse grooves or channels, so as to hold more tenaciously the cement in which the mounts of enamel will be embedded. Then the hollowed slab is filled with "gesso," or plaster-of-Paris, on which the proposed design is accurately traced in outline, and usually in pen and ink.

The artist then proceeds to scoop out a small portion of the plaster with a little sharp tool. He fills up the cavity thus made with wet cement or "mastic," and into this mastic he successively thrusts the "spiculæ," or the "tesseræ," as the case may be, according to the pattern at his side. In the broad folds of drapery or in the even shadows of a background, or a clear sky, his morsels of enamel may be as large as one of a pair of dice; in the details of lips, or eyes, or hair, or foliage, or flowers, the bits of glass may be no larger than pins' heads. The cement, or mastic, is made, so far as I could gather from my informant, of slaked lime, finely-powdered Tiburtine marble, and linseed oil, and when thoroughly dry is as hard as flint. Sometimes the mastic which fills the cavity is smoothed and painted in fresco with an exact replica of the pattern, and into this the bits of glass are driven, according to tint, by means of a small wooden mallet. If the effect produced wounds the artist's eye, he can easily amend the defect by withdrawing the offending piece of enamel and driving in another while the cement is still wet; and, by observing proper precautions, it can be kept damp for more than a fortnight. When the work is completed any tiny crevices which may remain are carefully plugged or "stopped" with pounded marble, or with enamel mixed with wax, and the entire surface of the picture is then ground down to a perfect plane, and finally polished with putty and oil. Byzantine may be broadly distinguished from Roman mosaic by the circumstance of the surface of the former being left unground and unpolished—save where there is burnished gold—thus leaving an irregularity of surface productive of great vigor of effect. A virtuous picture of the Byzantine style can at once be recognized as a mosaic, even if it be hung at an altitude of one hundred feet from the ground; but a perfected mosaic picture, after the Roman manner, might easily be mistaken, even at a very short distance, for a very elaborately finished and highly varnished painting in oils.

Remarkable Brain Wound.

A young man named Leonard E. Spencer, of North Fenton, Broome County, N. Y., was wounded in the head October 8, 1881, by the bursting of his gun. His physicians were able to insert a finger its full length into the wound, but were unable to find the fragment of the gun which penetrated the brain. Partial recovery took place. He was at work February 20, when unfavorable symptoms set in and he died the next day. At the autopsy the cylinder and tube of the gun were found embedded in the brain, inside the membranes and on the floor of the middle fossa, near the fore part of the skull. The cylinder and tube were connected in one piece and weighed about three-quarters of an ounce. The patient had survived the injury four and a half months.

Export Edition of Scientific American.

If any of our friends have back numbers of the EXPORT EDITION to spare, we should be glad to obtain them to complete our files.

© 1882 SCIENTIFIC AMERICAN, INC

The Science of Teaching and the Teaching of Science.

The annual general meeting of the Teachers' Training and Registration Society and of the Bishopsgate Training College was lately held in the theater of the Society of Arts, Lord Aberdare presiding.

Professor Goldwin Smith, in moving the election of the council, said that the void in their system was in secondary education, and to that point the efforts of the friends of education should be specially directed. In America at the present time they were afraid that superficial education made some persons restless, and induced them to leave the small towns and flock into the cities. That objection, however, applied to the lower strata of society rather than to that with which the association dealt. What was, however, to be guarded against was the mere show of education—the attempt to teach what teachers did not know. After all, it was not in the culture but in the character of the individual that the usefulness of their lives appeared.

Professor Huxley, who seconded the resolution, said that more than twenty years ago he was appointed one of the examiners in the Science and Art Department, as now, and one of the first things his colleagues and himself discovered was that their great difficulty was with the teachers. In respect of the teaching of science, he had constantly brought before him the wide gulf fixed between the two different kinds of what persons called knowledge. The one was a mere learning to repeat a verbal proposition, and the other was knowing the subject at first hand—a knowledge based upon a knowledge of the facts. That which they had constantly to contend against in the teaching of science in this country was that teachers had no conception of that distinction; for they thought it quite sufficient to be able to repeat a number of scientific propositions and to get their pupils to repeat them as accurately as they themselves did. If he might offer one suggestion to the governing body of the college it was that so far as they taught science at all they should aim at giving real and practical scientific instruction; that it should be confined to those things about which there was no dispute; and that the teacher should be instructed that his business in teaching was to convey clear and vivid impressions of the body of facts upon which the conclusions drawn from those facts were based. The resolution was adopted unanimously, as were two others.

Another Ballooning Failure.

An attempt was made March 4, by Colonel Brine, of the British Royal Engineers, and an aeronaut by the name of Simmons, to cross the English Channel in a balloon.

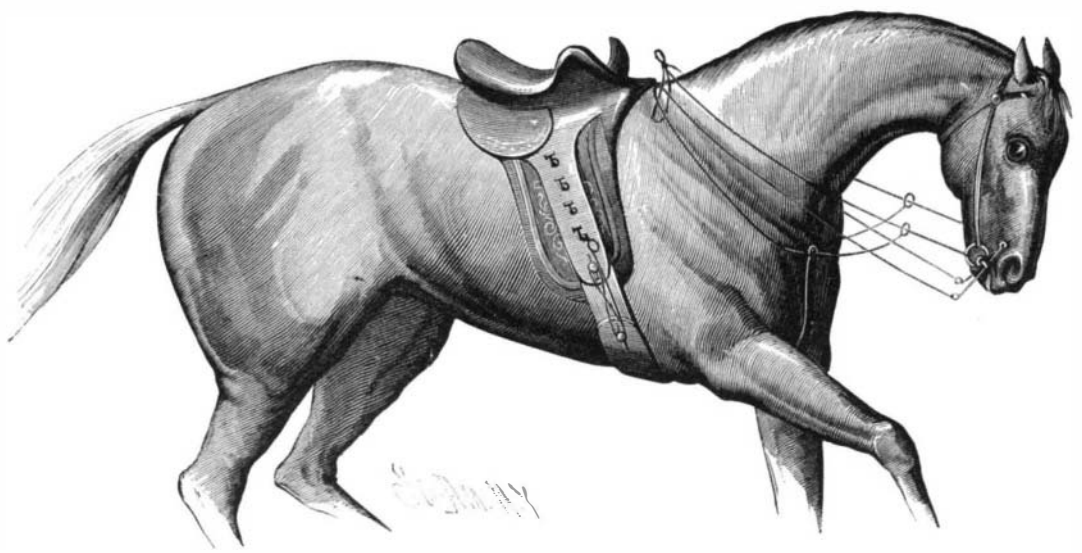
Before they were halfway over the wind shifted and was driving them toward the North Sea, when they dropped into the sea and were picked up. They say that their descent was intentional.

NEW SIDE-SADDLE GIRTH.

The engraving shows an improved side-saddle girth which can be tightened by the rider without leaving the saddle. The girth is composed of two sections, united at two adjoining ends by straps and buckles, the other ends overlapping each other, one end sliding upon the other, both being provided with pulleys over which a rope or strap passes which is fastened to the end of the sliding band and terminates in a ring which is hooked on one of a series of hooks on the fixed band above the upper pulley.

When the girth is in use the ring at the end of the rope is hooked on the lowest hook and the girth is passed around the horse, and is fastened by means of the straps and buckles in the usual way. If the girth becomes loosened—as it generally does a short time after it has been fastened— the rider seizes the ring with the right hand, unhooks it, and by pulling on it brings the two pulleys, F and G, together (Fig. 2); by this means the girth is shortened and consequently tightened. The ring is then hooked on one of the hooks, L, and should the girth again become loosened it may be tightened in the same way.

This invention was recently patented by Mr. William McNaught, of Cartersville, Ga.



McNAUGHT'S SIDE-SADDLE GIRTH.

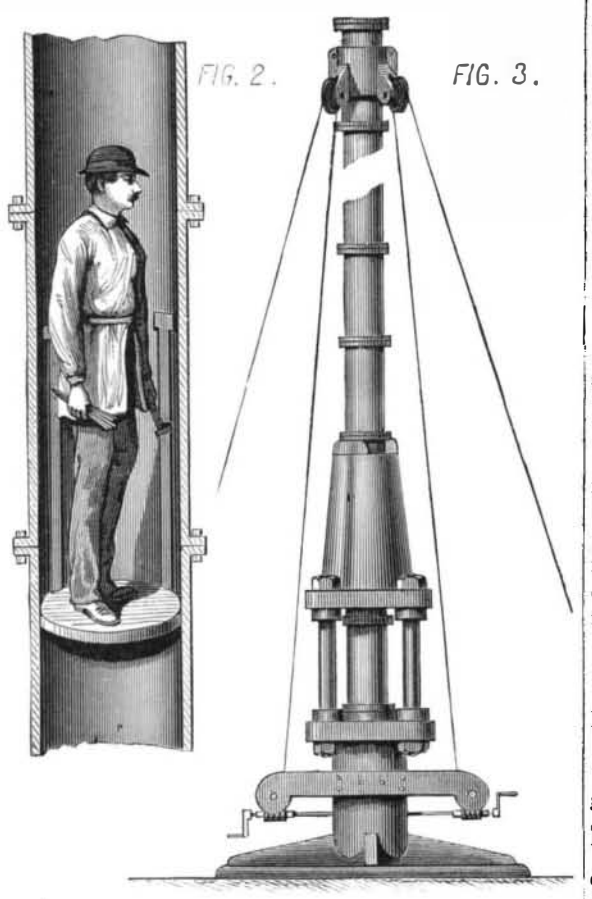
Some Representative Americans.

The theory that the human race will not be able to maintain a high order of physical development on this continent did not receive much encouragement at a recent social gathering in this city. The Titans, a society to which only gentlemen of position and of a stature not below six feet two inches are eligible, now numbers about a hundred members, largely representative of our oldest and best known American families. Seventy-three Titans sat down together at the recent annual dinner of the society. The tallest measured six feet six inches. There were a dozen generals and colonels among them, as many prominent physicians, and a long list of distinguished lawyers and business men.

PROPOSED ELECTRIC LIGHT TOWER AT NEW ORLEANS.

[*Continued from first page.*]

build his home at the top. With the boldness of the genuine inventor, Mr. Wm. Golding, M.E., not only essays to accomplish this proverbially impossible task, but actually shows how it may be done in a way that certainly presents no obvious features of impracticability.



VERTICAL PLAN OF GOLDING'S ELECTRIC LIGHT TOWER.—SECTION SHOWING LIFT FOR LIGHT TRIMMER.

Mr. Golding dispenses with stagings and the usual machinery of tower building, and raises his tower into the air by additions made at the bottom. The tower is a cast iron cylinder built up of short sections, five hundred feet high, if need be, and kept vertical while in process of erection and afterward by means of guys. The top sections, to which the lamps are to be permanently attached, are put together first, and, by means of an ordinary derrick, are set vertically over a hydraulic press placed upon the intended foundation of the tower. The hydraulic lift raises the top sections until a new section, say five feet long, can be set underneath. While the lift is returning to admit a new section the raised tower is held in position by a clamp and kept vertical by means of the guys which are simultaneously fed off by a wormwheel gear as the tower is pushed up. When the new section has been securely bolted on, the whole is lifted another length; and thus by successive lifts and additions at the bottom the tower is raised until the required altitude is attained. The method of lengthening the guys is simple and practically automatic, and no trouble is anticipated in keeping the rising tower steady and exactly vertical.

Each section of the tower will be bored out before it is put in place, and have a diameter sufficient to allow the easy passage of a circular platform carrying the lamp trimmer, who will be lifted to the top of the tower by means of a piston operated by compressed air supplied by pumps or a rotary blower. The inventor thinks that the pressure need never exceed half a pound to the square inch. The cost of a five hundred foot tower complete (without the lamps) raised in the way described is estimated at about $30,000.

Mr. Golding proposes for the levee at New Orleans a five hundred foot tower, to carry an electric light of 40,000 candle power. He would have it placed at the intersection of Canal street, as shown in our large engraving. Such a light so placed, it is evident, would abundantly illuminate the levee, the harbor, and the opposite shore.

The smaller engraving shows the method and machinery requisite for raising the tower and for lifting the lamp trimmer to the top.

Mr. Golding suggests that the tower might be used as a look-out station for the fire department, and be further used as a telegraphic center, wires being run from the tower to the different offices about the city and across the river to Algiers without other support, the over-river wire being high enough above the water to be entirely clear of ships' masts.

The erection of lofty light towers such as Mr. Golding proposes would not only be clearly advantageous to the commerce of New Orleans, but would make that port conspicuous for its convenience to shipping as well as for its nocturnal splendor.

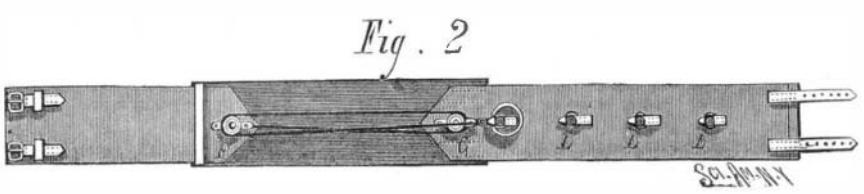
MISCELLANEOUS INVENTIONS.

Messrs. Thomas Neely and Alfred Marland, of Pittsburg, Pa., have patented a simple and effective guard for fence wires so constructed as to prevent the skin and flesh of cattle from being torn as they are liable to be when barbed guards are used. The invention consists in combining with one or more wires metal disks having smooth, sharp edges, by which a clean cut is made in the skin of cattle coming in contact therewith.

Mr. Richard Mills, of Buffalo, Ill., has patented an improvement in gang plows, in which the plows are constructed with forwardly-projecting prongs upon their shears and guards upon their mould boards, by which the furrow slices will be raised and kept upon the mould boards till they reach the proper point to be turned.

Explosion of a Locomotive.

A singular explosion was that of locomotive No. 419, used on the Peoria branch of the Wabash, St. Louis and Pacific Railway, which exploded in the round-house at Lafayette, Ind., at 7 A.M. of the morning of February 20. Neither the engineer nor fireman had arrived, and as one of the men in charge of the building was in the act of turning the table in front of the engine, without any kind of warning the boiler burst, carrying destruction and injury in every direction, but happily without loss of life. The roof of the building, which was 154 feet in diameter and of sixteen stalls, was cone shaped, supported by brick walls and covered with tin. The explosion forced the walls outward, and the roof fell down, a complete wreck. Only fragments of the walls are standing. A correspondent of the Chicago *Tribune* says: One singular feature about the explosion is the fact that it made comparatively small noise, the concussion being more in the nature of a heavy thud, causing the earth to jar for a moment. The pieces of the wreck were not blown over all creation, as is usually the case, but the force of the explosion seemed to have spent itself in the demolition of the wall. There were a number of narrow escapes, but outside of the men who were in the building no serious accident occurred. One of the locomotives was about half way out from beneath the arch when the explosion occurred. The fireman was thrown from the cabin to the tank, but aside from an injury to the hand like that produced by a falling brick, he was not hurt, though stunned. The engine was considerably damaged, the smokestack knocked off, rods bent, and other like injuries. There were thirteen locomotives in the building at the time of the explosion. All of them are damaged, but probably not to any great extent. Headlights are broken, smokestacks demolished, and rods and bars bent and broken, but as soon as they are gotten out they can be very speedily repaired. The men in charge are unable to account for the accident, save from some defect in the boiler. There is said to have been an abundance of water therein. Five men were injured—one only seriously.



McNAUGHT'S SIDE-SADDLE GIRTH.

© 1882 SCIENTIFIC AMERICAN, INC