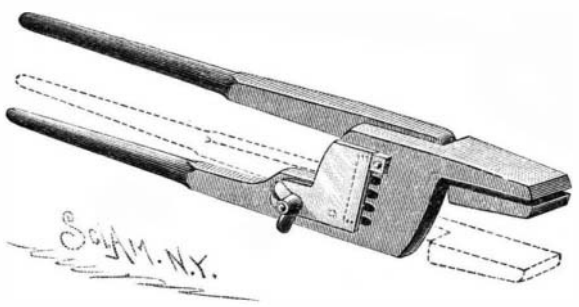
ment by wire rods connected by eyes to the case at one end and engaging by hooks with eyes at the other end, as shown in the detail views. Supporting braces are connected to each end of the cases, and they are arranged to enter properly located recesses in the standards of the frame, in order that the cases may be held extended, as shown in one of the views, when any one or more of the shades may be drawn down for inspection. The strips forming the recesses which receive the shade fixtures break joint with each other, so that the pendent portions of the shades will hang in distinct planes.

IMPROVED ADJUSTABLE TONGS.

An improved form of tongs, with which the operator is enabled conveniently to hold a large or small object,



MANNES' ADJUSTABLE TONGS.

is shown herewith, and has been patented by Mr. William H. Mannes, of No. 1720 Blake Street, Denver, Col. One of the tong parts carries the pivot pin, and the other has a number of parallel slots leading into a cross slot, a guard plate being held on this slotted tongue part by means of a bolt with a winged nut screwing down on the plate. With the adjustment shown in the illustration, the jaws will hold very small objects. To hold larger articles, the winged nut is unscrewed, allowing the guard plate to swing downward, uncovering the cross slot, when the operator can move the shank of the pivot pin carried by the other tong part to any of the other slots, thus altering the position of this tong part and its jaw to a position such as shown in dotted lines, when the guard plate is again swung upward and screwed in position, engaging one of the sides of the square head of the pivot pin.

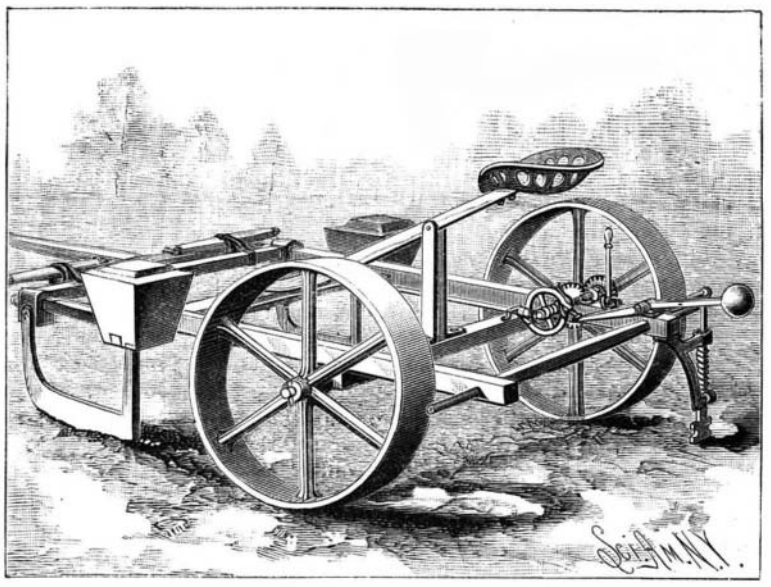
A SWITCH OPERATED BY THE LOCOMOTIVE.

A novel construction of railway switch, operated by the locomotive without any attention from the engineer, and with which there is no necessity of applying to the locomotive any fixtures, is represented in the accompanying illustration, and has been patented by Mr. James B. Suffern, of Hillburn, Rockland County, N. Y. The movable rails are attached at their free tapered ends to a switch bar, connected with a switch stand, the bar having a slot near its center. To one of the ties, a short distance therefrom, is pivoted a curved track lever having a forked end which embraces the switch bar, being connected therewith by a bolt passing through the slot. The convex side of the curved track lever is normally in contact with one of the rails, so that a car wheel passing along in either direction would throw the track lever away from the rail. Upon the side of the switch bar is pivoted a weighted cam lever, embraced by a yoke, connected with a slide placed on the switch bar beyond the forked end of the track lever, and this slide may be locked in position away from the slot, to permit of the free movement of the track lever without moving the switch bar, or it may be locked against the side of the track lever, when the latter cannot be moved without moving the switch bar. When the weighted cam lever at the side is raised, the track lever is free; but when this weighted lever is depressed, the track lever is locked to the switch bar. A short distance beyond the point at which the curved track lever is pivoted is placed a vertical shaft, with an arm projecting into the path of the locomotive pilot and another arm connected by a rod with a toggle joint operating the weighted lever to move the switch bar. A train approaching the switch from the opposite direction passes over it in the usual way, leaving the main track continuous. But when a train is approaching as indicated in the engraving, the pilot of the locomotive engages the projecting arm connected with the rod which trips the toggle joint and allows the weighted lever to fall, and, the track lever being then locked with the switch bar, the engagement of the wheels with the track lever moves the switch rail to render the track continuous, and the train may then pass over the switch in safety without danger of being run on the siding.

AN IMPROVED CORN PLANTER.

A novel construction of marking and dropping devices for a corn planter is shown in the accompanying illustration, and has been patented by Mr. Isaac H. Athey, of Marion, Ark. On the drive wheel which operates the dropping and marking mechanism is a gear wheel meshing into another gear wheel mounted loosely on one end of a short shaft held in bearings on the main frame. Sliding on and rotating with this shaft is a clutch, connected with an upright shifting bar, for moving the clutch into or out of contact with a ratchet wheel, whereby the forward movement of the drive wheel imparts a rotary motion to the short shaft. On the latter is a cam wheel with sidewardly projecting arms, which, with the rotation of the shaft, operates a lever connected with the dropping bar working in the seed boxes in the usual manner, the lever being constantly shifted from one side to the other by the cam wheel, thereby imparting a sliding motion to the dropping bar. On this shaft is also held, by set screws, two curved arms, extending in opposite directions, which, with the revolution of the shaft, engage by their outer ends one end of a lever fulcrumed on a bar secured to the main frame. This lever carries a weight at its rear end, and just forward of the weight is a sidewardly extending arm, with a friction roller operating on the marking bar. The latter is held to slide in a bracket secured to either of the side beams of the main frame, the upper arm of the bracket having an elongated slot, and its lower arm carrying a friction roller resting with its rim against one side of the marking rod. A spring secured to the side beam of the main frame presses with its free end against one side of the marking rod, on which also is a coiled spring. As the machine is operated by its forward movement, the arms on the short shaft lift the weighted lever, and cause it in dropping to strike the top of the marking rod, forcing the latter downward until its foot makes an indentation in the ground at the point where the corn was dropped by the dropping bar.

As the machine travels forward, the marking rod swings on its fulcrum, and is lifted and held in vertical position again by the springs, by the time that the weighted lever has been raised by one of the arms on the short shaft, and the marking rod is again pressed downward at the point where the corn was dropped. The machine is simple and durable in construction and very effective in operation.



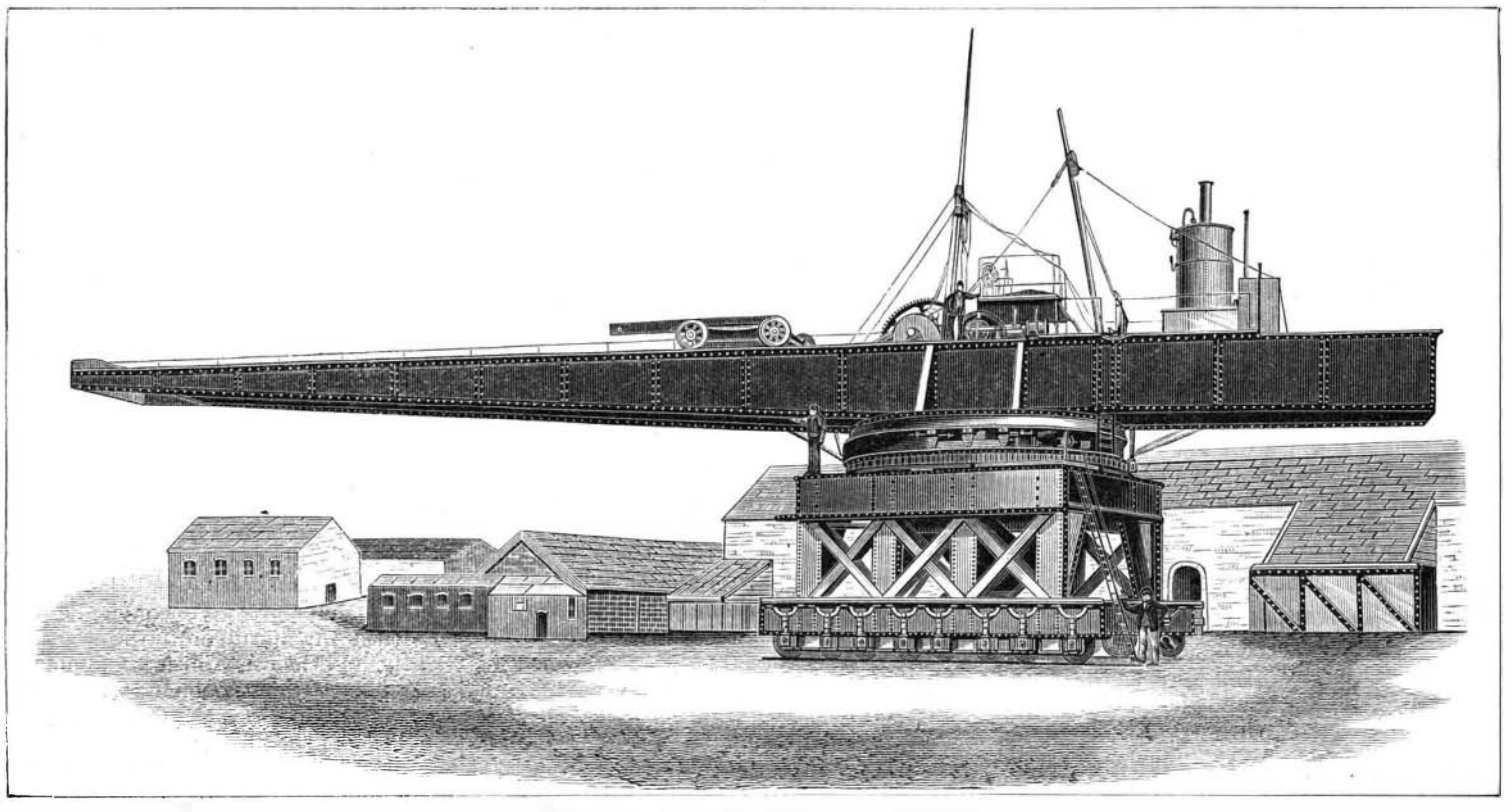
ATHEY'S CORN PLANTER ATTACHMENT.

Euphorbia Rubber.

Up to a comparatively recent date, small parcels of this gum have occasionally appeared on the market, but for some time rubber manufacturers could not succeed in satisfactorily making use of it. At last, however, a method has been discovered which renders the gum available for mixing with various kinds of India rubber to the extent of 50 per cent. A piece of vulcanized rubber containing 50 per cent of the euphorbia gum has been tested for some time in an exposed position on a roof, and it has kept better than a similarly exposed piece of ordinary pure (vulcanized) rubber. Mixed with gutta-percha, it prevents the latter becoming brittle. Washers made with 30 per cent of this gum and vulcanized rubber stand well and retain their elasticity. Tubing for supporting high pressures is far less likely to split and crack when a proper quantity of euphorbia gum is employed.

NEW ALL-AROUND CRANE.

We illustrate a new all-around crane by Ransomes & Rapier, Ipswich, designed to lift a test load of 33 tons at a radius of 67 feet; the maximum radius which can be obtained with it in ordinary work being nearly 80 feet. The *Engineer* says: "The machine is self-propelling, being borne on a carriage which is mounted with 32 springs on 16 wheels, and has a gauge of 21 feet and sufficient height to allow a railway train to pass under it. The various motions of lifting the load, traveling, altering the radius, and turning are all performed by the steam engine."



IMPROVED ALL-AROUND CRANE.

Curious Fires.

In a late interview with a gentleman identified with the insurance interests, and one who has had a wide experience in the insurance of mills and manufactories, the attention of the reporter for the Boston *Commercial Bulletin* was called to some instances of curious fires which had taken place under circumstances and in situations hitherto deemed impossible.

Cotton in bales was always supposed to be free from spontaneous combustion until lately, when a case was discovered in a storehouse in northern New Jersey. A number of bales of Sea Island cotton stored there were found to be on fire, and when extinguished in one spot it would break out in another. A careful examination of the cotton and its condition showed that it was roller-gin cotton—that is, cotton which had not been run through a set of saws, after the method of Eli Whitney, but the lint had been drawn away from the seed by a pair of rolls, one large and the other small, set at just the proper distance to prevent the seeds from passing through, while the fiber passes on and goes into a bag. It was found in this lot of cotton that some of the seeds had passed into the rolls and been cracked, which caused the oil to exude, saturating the fiber, which, by the time it arrived in the North, was thus in a proper condition for spontaneous combustion. Careful and extensive inquiry among Northern mills failed to reveal any other such case, and, therefore, it can hardly be taken as a strong objection to the use of roller-gins in general. The ordinary roller-gin is a prehistoric tool, as it has been in use since cotton was known in ancient India. It is not nearly so fast as the ordinary saw-gin, but does its work somewhat better, and with the least possible injury to the fiber, and is therefore preferred for Sea Island cotton, which is of long fiber and almost double the value of the ordinary grades.

Another curious and inexplicable fire was one which occurred in a boiler room in a central New Jersey town. The room was 72×80 ft., with masonry wall 18 ft. high, covered by a roof of 1 inch plank, slated, and supported by wooden trusses. The boilers were set in batteries, with clear spaces all around them. They were 8 ft. from the trusses and 16 ft. from the roof. One Sunday morning, on his way to church, the mill superintendent visited the boiler room, and found there only the fireman, who was engaged in setting in new gauge glasses. There had been no fire under the boilers since 11 p. m. Saturday, and the fireman had thoroughly inspected the premises. The superintendent did likewise. Both left at the same time, and got about 1,000 feet away when they saw flames break through the roof, which was damaged so much that a new roof was necessary. This case was thoroughly investigated, but no satisfactory explanation of the fire, which had taken place under such apparently impossible conditions, has been made.

And a third peculiar instance was a fire started by some cotton waste, which, in clearing up a mill, the engineer put in front of a boiler, where it would be convenient for the fireman to burn in the morning. During the night, the waste got on fire from spontaneous combustion, setting the kindling on fire, and succeeded in generating sufficient steam to cause the boiler to blow off, scaring the watchman, who naturally thought the boiler, which he knew had been left without a fire, was going to explode. Still another curious fire was that caused in the picker room of a jute inill, by a man driving a nail in the ceiling. The nail glanced off and was struck by the rapidly working beaters, and the sparks caused thereby resulted in a serious fire.

Reports to the manufacturers' mutual insurance companies show that about two fires a week are put out by automatic sprinklers. In these reports there is only one instance of a fire getting out of a room protected by automatic sprinklers, and it is a somewhat peculiar case. The fire started under a mule-carriage in a dirty mill, and was thus protected from the flow of water from the sprinklers, which were of old construction and not so sensitive as the later ones, and therefore did not work so quickly. The fire worked its way under the mule-carriage, and then to an open and unprotected staircase, and so throughout the building.

Sanitary Drainage of Buildings.*

Mr. Paul Gerhard, C.E., of New York City, has issued, through D. Van Nostrand, a useful little work on the above subject, which is useful for plumbers and all persons about to build a new house, embodying notes on recent practice in sanitary drainage. The author, who is an authority on sanitary matters, and whose works on the subject of house drainage and plumbing are well known, has condensed a great deal of information in this little guide for architects, engineers, and others. With the help of it one may easily prepare a plumbing or drainage specification. The leading requirements of plumbing work will be found briefly mentioned, and the second part, "Maxims of Plumbing and House Drainage," embodies in terse sentences the rules to be observed on planning. He commends the following rules to all architects:

"Avoid a useless multiplication of plumbing fixtures. Let the amount of plumbing work in a house be reduced as much as possible. Above all, avoid locating fixtures in unoccupied or spare rooms. Do not place plumbing fixtures of any kind in sleeping rooms, nor even in unventilated closets adjoining them. Always arrange fixtures so as to be concentrated as much as is consistent with convenience in use, in compact groups. Have as few vertical lines of pipe as possible. Avoid long horizontal runs of pipe.

In small cottages place the bath room as nearly as possible over the kitchen, in order to reduce the amount of piping and to simplify the whole work. In small houses it is preferable to separate the water closet from the bath room, and to give to each of them a well lighted and ventilated apartment. In toilet and dressing rooms adjoining bed rooms, the water closet, lavatory, and bath may be, however, arranged together. . . . Place all soil, waste, and supply pipes outside of walls or partitions. Let pipes pass in sight through closets, and have them fully exposed in bath rooms."

After a list of such rules the author describes the construction and lays down general conditions to be observed by the plumber, the materials to be used, and the weight of lead pipes for different pressures. Referring to wrought iron pipes, the following specification is given for soil, waste, and vent pipes:

"To be of standard wrought iron pipe, having a uniform thickness of not less than one-quarter of an inch, the pipes to be lap-welded and proved at the iron mills to 530 pounds per square inch by hydraulic pressure, to be coated after being heated with a preparation of coal tar and asphalt (or to be treated with the Bower-Barff or other rustless process); fittings for soil and waste pipes to be protected against rust by the same process as applied to the pipes, to be tapped truly straight, and to have a strong shoulder."

Mr. Gerhard furnishes concise descriptions of traps, supply pipes, stop cocks, valves, solder, pig and sheet lead, fixtures, cement, putty, sand, and mortar. The workmanship is next described, such as pipe joints, etc. Test of the work during construction and after completion and suggestions for a sanitary code are included in this compendious little book, which will be a useful *aide memoire* to the professional man. The memoranda of cost will be of service to the American architect and builder.

* The work may be had at the office of the SCIENTIFIC AMERICAN. Price, 50 cents.

Electricity as a Motive Power.

In a recent lecture before the Finsbury Technical College, London, by Professor Silvanus P. Thompson, D.Sc., on "Electricity as a Motive Power," the lecturer commenced by saying he wished to draw attention to one of the novel sciences which was now taking root here. The science of electricity, the lecturer added, originated in England, but we had allowed America, Canada, and even Japan to leave us far behind, the reason being that we were tied down by prejudice and even stupidity, and thus prevented going ahead. It was said that the countries he had mentioned were protected by their laws; but if protection made them go ahead, they would do so still more without protection, and his impression was that in a few years the United States would wipe out protection altogether. There were plenty of places in America where they had no gas company, and would not have one, but where every house was lighted by electricity. There were 700 local electric companies in the United States, who distributed motive power to the districts around; and England might count on going ahead as soon as local factories were established here, from which the electric power could be supplied and distributed wherever required.

The lecturer then explained the principle upon which various electric machines were constructed, illustrating his remarks by numerous experiments, showing how the motive power was generated by the application of the magnet. Mr. Sturgin, to whom was due the discovery of the electric magnet, demonstrated that it caused a circular current through insulated wire round a piece of iron, by which the iron itself became magnetized and an alternative power produced. This discovery was gradually developed as the science became more known. The question of importance was how to produce electricity cheaper than by using zinc, which was twenty-four times dearer than coal. Dr. Faraday discovered a new way of getting a current, simply by passing magnetism in or out through a coil of wire round a piece of iron. These currents could be used for all sorts of purposes, and the current by this means was produced at a much cheaper rate than by zinc. It was possible to transmit power for 100 miles by a system of wires, and to work engines, etc., wherever wanted. He strongly advocated the establishing of local factories for the supply of electric power, and referred to Rochester, N. Y., as having such local factories and hiring out the motive power at cheap rates. They put up the machines where wanted, and charged for one horse power, working six days from 7 A.M. to 6 P.M., 1*l.* 16s. a month, and two or more horse power upon easy terms. There was no fire required, or trouble or expense, but just put on or off the connection as the power was wanted.

In America there were 30 of these local factories. One company sends out 50 machines per week, of various sizes. Thus manufactories were supplied with motive power and light at small expense. It was the wretched Lighting Act in this country which stopped the progress of electricity. Then there was the social effect it would have. The advantage to small men, who could not afford to pay for steam, was that they could hire one of these machines for 1*l.* 16s. per month, and thus prevent the aggregating of operatives together in large workshops, where no man was his own master. All kind of work would be facilitated.

Easy Places.

It seems nothing but natural, says the editor of the *St. Louis Miller*, for every person, man or woman, to think the position they occupy is just a little bit worse than that of any one else. And they imagine that if they could only exchange places with some one else, what a relief it would be. Much of the worry and fretting in life is caused by a desire to secure an easy place.

Success is only obtained by earnest effort. And this implies hard work of some kind. And when you are doing hard work, you certainly cannot be considered as having found an easy place. It is those who do not make a success that are always on the lookout or hunt for an easy place. And after they find themselves in positions where a little earnest effort would considerably improve their conditions, rather than make the effort they allow themselves to make an easy place for their individual comfort, and let the chance slip. Many a young man, in an effort to find an easy place, has allowed opportunities to pass by which, if he would have taken them up and added a few years of hard, well-directed labor, would have placed him in a condition where, if he desired, he might take upon himself an easy place.

One item should by no means be overlooked in this, and that is that many places are like the ones you are occupying, that is, they are very deceiving. Others imagine that you are having a very easy time as compared with theirs, and they would gladly exchange with you, while at the same time you are thinking the same with them.

We often make our lot in life not only harder, but considerably worse than it really is, by continually looking at the dark side. We try to see all the drawbacks rather than trying to better our condition all the while, and this at least adds nothing to it. The fact is, if life were all sunshine, if we all secured what we might consider as easy places, it is very doubtful if we would appreciate it as fully as we do our present blessings. Better wear out than rust out. Life can be made much pleasanter if we would try to make the best of everything, and then when we are able to better ourselves, we are in a condition to enjoy better. It is an impossibility that each and every one of us should be able to secure a place that we might consider as easy. Added to this is the fact that much that we see is deceiving, and that if we fail to find what we are seeking in making a change, we are only breeding discontent instead of bettering ourselves.

It is certainly to the interest of every man to better himself or his condition when he can do so honestly. This is what, to a certain extent, we are all aiming to accomplish, but we will not be able to reach this if, instead of earnest, faithful work, we devote our energies to seeking out and obtaining an easy place.

Filling Wood and Removing Old Paint.

The *Carriage Monthly* tells its readers how to remove varnish from a panel after it has pitted, and has stood so long that it is too hard and dry for turpentine to soften it, but too wet for the stone to rub it. A good way is to run over it lightly with spirits of ammonia. Do not let the ammonia remain too long on the varnish before you use the scraper on it, as it will be likely to eat through and affect the under coats. The object to be gained is only to take off the pitted coat. After removal, wash off with Castile soap and water. Let stand an hour or two to enable the under coat to get hardened. Again rub down with rag and pumice stone lightly, and then revarnish. It would be better, if the time will warrant it, to coat over again with a light wash of rubbing varnish, to guard against a possible repetition of the pitting.

From the same source we are told how to stop the grain in polished wood with simple ingredients.

Take a small quantity of white beeswax, melt it down, and, while liquid, mix with whiting. As it gets thick, keep adding boiled oil until you have it as you wish it. When using it, sheet the wood over solid. Let stand until the next day, when you can remove the surplus by using No. ½ sandpaper. It is cheaper and easier than the shellac, and can be leveled sooner, leaving nothing but the pores or grain of the wood filled, which is better than having your wood all stained up with the shellac.