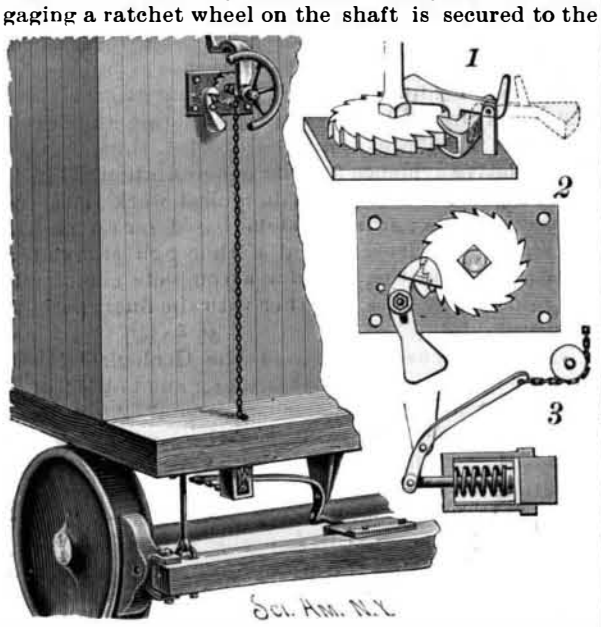
Mixed Material for Glass.

A new use has been found for waste glass by Messrs. Rostaing, Garchey and Geille, of Paris. Any fragments of broken glass of various colors are mixed together, after having been broken to a suitable size; they are then placed in moulds lined with silica, talc, or some other resisting material and fired. A coherent mass is produced which can be dressed and cut into blocks, which are, of course, irregularly colored. Such blocks may be used as artificial marble. The blocks are usually rough on one side, owing perhaps to incomplete fusion; this gives a surface which is admirably adapted for causing them, especially if they are slab-like in form, to adhere to walls with the addition of a little mortar. Fine decorative effects can thus be produced. Designs in relief can be obtained by pressure while the block or slab is still plastic. If a suitable mould be prepared with movable partitions, then pieces of glass can be arranged in such a way that, upon firing, a very effective "stained glass" window is produced, the necessity of using "leading," as in the ordinary way, being thus obviated.

A SAFETY ATTACHMENT FOR CAR BRAKES.

The illustration represents a convenient means of setting brakes by hand, with a safety attachment therefor, together with a spring attachment for the brake beams, so that the brakes shall not be set so hard as to prevent the wheels from turning. The improvement forms the subject of a patent issued to Mr. Lincoln H. Raub, of South Easton, Pa. The perspective view represents the attachments applied to the brake of a freight car, although they may be used in connection with any of the brakes in common use. Secured to the brake beam is a casing, through which extends a rod having next the brake beam a collar, while its outer end is pivoted to a bent lever, as shown in detail in Fig. 3, there being a spiral spring around the rod, so that when the brake is applied, the spring will prevent it from being pressed so hard against the wheels as to stop them from turning. The other end of the bent lever is connected to a chain extending overa guide pulley supported in a depending bracket on the bottom of the car, the upper end of the chain being attached to a shaft in a bracket on the end of the car. The outer end of this shaft has a hand wheel, and its inner end is pivoted in a plate secured to the car. There is a ratchet wheel on the shaft, and pivoted to the plate is a pawl, as shown in Fig. 2, the lower end of the pawl being enlarged to serve as a weight and hold its upper end in engagement with the wheel. The pawl is pivoted on a pin, which rides in a slot of the pawl, permitting vertical movement of the latter, and at its toe end the pawl is flanged to overlap the sides of the ratchet wheel, thus guiding the pawl to a sure engagement. The plate also has a projecting pin in the rear of the pawl, to prevent the latter from being tipped out of place, and between the pawl and the wheel is a fixed block, adapted to engage a flange of the pawl, should the pin break on which the latter is pivoted, and hold the pawl in engagement with the wheel, so that the brakes would be held in place. In applying the improvement to a passenger or platform car, the brake shaft is mounted in the railing in the usual way, and a plate carrying a pawl engaging a ratchet wheel on the shaft is secured to the

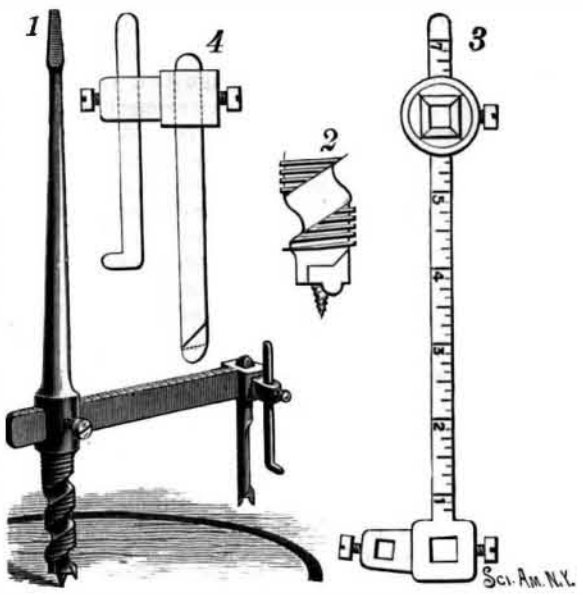


RAUB'S CAR BRAKE ATTACHMENT.

platform. Fixed to the plate behind the pawl is a post in which is pivoted a bent lever, its outer end weighted and its inner end bent to form a finger adapted to press against the outer side of the pawl, while on the other side of the lever is an oppositely projecting finger, so that when the lever is tipped in one direction, the finger will press the pawl into engagement with the ratchet, and when tipped the other way, the other finger will hold the pawl away from the ratchet. In Fig. 1 this lever is shown in full and in dotted lines in both positions, its weighted end in each case holding it securely in place.

A BIT FOR BORING LARGE HOLES.

In the expansion bit shown in the illustration, Fig. 1 represents the device in perspective, Fig. 2 showing the point of its central portion, and Fig. 3 being a plan view, while Fig. 4 is an end view of the extension arm. The shank is squared and tapered to adapt it to a bit stock, and its spirally grooved lower end has a gimlet point and cutting lips, a screw thread being formed on the body of the spirally grooved portion. In a mortise in the shank an arm is clamped by a set screw, the outer end of the arm having two mortises, in one of which is clamped a cutting tool, while the



BEAUCHENE'S EXPANSION BIT.

other carries a guide bar. The tool has at its lower edge a pair of spurs, between which is formed a cutting edge, the spurs being arranged divergently to enable them to cut without pinching the wood, while the shank of the tool is cut away above its cutting edge so that the ascending chips will ride up and off the edge of the tool. The upper surface of the arm has a graduated scale to facilitate setting it for boring a hole of the desired size, which is effected by placing the gimlet point on the center from which the hole is to be struck and turning the bit, when its threaded portion screws into the wood, as the cutting tool on the extension arm forms a channel by which a circular piece is separated from the main body of the wood.

Further particulars relative to this invention may be obtained of the patentee, Mr. Charles Beauchéne, Lake Linden, Mich.

Fossil Flour.

Since the time of the invention of sulphur vulcanization, almost everything in the way of the cheaper metallic oxides, sulphides, or earths have been tried as fillers for rubber. So careful has the experimentation been in these lines that any practical rubber man can tell exactly what results are attained by these different materials.

A curious earth that has not as yet received much attention from the rubber men, partly because the supply has not been regular, and partly because when it could be secured it was found in connection with other substances that made it of little use, is what is known as "fossil flour." Quite recently a vast deposit of this has been discovered in the State of Maine, and that too of such purity as to arouse the wonder of the best analysts. In investigating the properties of this new earth, one is impressed at once by its wonderful faculty for resisting the action of acids, alkalies, oils, and especially by its remarkable quality as a non-conductor of heat. A simple test of this latter quality made by one interested in the company was to take an inch cube of the material and place it on a bar of iron. The iron bar was then put in a blacksmith's forge and heated until it was melted away from the cube of earth. So little did the heat penetrate this cube that one could easily place the fingers upon the upper part of it without inconvenience from the heat.

Exactly what value this non-conducting property might have in rubber is not, perhaps, at first apparent, until one reflects upon the clammy, repulsive feeling of ordinary rubber clothing, and indeed of rubber goods in general. To use a common illustration, we might cite the case of the old-fashioned oilcloth, which has much that feeling, and which is being practically driven out of the market by the later invention of linoleum, the latter being entirely free from the inconvenience described. If rubber garments could be made of a compound of India rubber and a first-class non-conductor, there is no doubt but a surface much more agreeable to the touch would be produced; and that one objection to rubber clothing would be done away with.

It is not in clothing, however, that the strongest points of the new adulterant would be developed. For valve work it is said to be far ahead of anything made in rubber; valves made of it have been subjected to the severest tests, and are said to be almost indestructible.

Fossil flour is almost as white as oxide of zinc. It is so light in weight that a flour barrel of it in its natural condition will weigh not over 50 lb. It is, as we have already stated, absolutely unaffected or unchanged by any sort of mechanical manipulation, by acids, alkalies, or heat. As it is mined, it comes out of the ground a pure white powder, so fine that it cannot be ground any finer. A careful analysis of it shows about 95 per cent pure silica.

In speaking of this as silica, one would perhaps at first get an idea of particles that have sharp edges, and a feeling similar to that of corundum or emery. That, however, is not true in this case, as the earth is what is known as a diatomaceous earth, made up of a vast number of infinitesimally small shells, each individual shell having been the home of a diatom, built for it from silica, held in suspension in water.

This kind of earth has been used in Europe very largely for a variety of purposes; one of the most curious of which was in Sweden, where the poorer classes mined it and mixed it with wheat flour, in order to make bulky loaves of bread, not for sale, but for their own eating. In belting, packing, hose, and boots and shoes, this adulterant has many advantages which, no doubt, the rubber trade will readily discover.—*India Rubber World.*

Alloy for Hermetically Closing Glass Tubes.

It is claimed by F. Walter that an alloy consisting substantially of 95 per cent of tin and 5 per cent of copper may be used for connecting metals with glass, for electrical and other purposes, hermetically sealing glass tubes, etc.

The alloy is prepared by pouring the proper proportion of melted copper into the molten tin, stirring round with a wooden stirrer, casting or granulating, and remelting. It adheres strongly to clean glass surfaces, and has nearly the same coefficient of expansion as glass; it melts at about 360° C. By alloying it with 0·5 to 1 per cent of lead or zinc it may be rendered softer or harder or more or less easily fusible as required. The alloy may also be used for coating metals or wires, as it imparts to them a silvery appearance.

A SIMPLE CLIP FOR PAPERS, DOCUMENTS, ETC.

The illustration represents an extremely simple form of spring binding-clip, having no attached handles for opening it, but provided with apertures to receive independent handles or levers, as shown, by means of which the clip may be readily opened for placing files, etc., within its grip, or releasing them therefrom. This device has been patented by Mr. Harlan H. Ballard, Librarian of the Public Library, Berkshire Athenæum, Pittsfield, Mass., its invention having naturally followed his appreciation of the need of such a clip for the binding of pamphlets, papers, etc., and the holding of covers on magazines and periodicals in reading rooms. The clip is made of spring steel or brass, and a number of them may be made in series of a single strip of spring metal, when desired, to hold an accumulation of magazines, etc., each then requiring to be opened or have its sides

BALLARD'S BINDING-CLIP FOR PAPERS, ETC.

sprung apart in applying it, as with the individual clips. The detachable handles or levers are readily brought into engagement with the aperture in each side of the clip, the aperture having a loop-like seat in one side approximately fitting the bent end of the lever, and only one pair of handles is required by an individual for any number of clips. With suitable wooden rods these clips are adapted to form excellent newspaper files, and they may also be employed to hold bed clothes on children by clipping the clothes to the edges of the crib. Their simplicity, durability and cheapness recommend them for a great variety of uses.

Minneapolis Electric Street Railway.

The electric system of the Minneapolis Street Railway and the St. Paul City Railway companies is without doubt the most complete and one of the most extensive systems in the world. Among other innovations introduced on these roads has been the burying of the feed wires, thus removing from sight and danger the most obtrusive portion of the overhead structure. These feed wires have been buried elsewhere, but the particular feature of interest that attracts attention in this case is the fact that the wires are drawn *bare* into the ducts.

The conduit is located between the tracks and is built as follows: Two-inch plank, first treated by boiling in fernoline, is used for constructing a long trough of the desired size. This trough is so nailed together as to be continuous and without joints from manhole to manhole, a distance of 408 feet. The trough is placed below the surface at such a depth that the top is six inches below the paving blocks.

The conduit proper consists of a number of heavy paper tubes of the Interior Conduit and Insulation Company's make. The tubes employed are one inch and one inch and a quarter inside diameter, laid in the trough in ten foot lengths, and separated from each other and the sides and bottom of the trough by rings or spacers. The tubes are made continuous from manhole to manhole by use of a telescopic joint. After the tubes have been properly put in place, pitch, liquefied by heat, is poured in, filling the interstices and leaving a series of highly insulated raceways with a solid insulating filling, impervious to moisture, around them.

A large amount of this conduit has been in service since September, 1890, and has not as yet developed a single fault. In fact, notwithstanding the conduits have passed through the rigors of a Minnesota winter, recent tests of the various feeders show a maintenance of the originally high insulation resistances, which certainly speaks well for the plan adopted.

With these practical results before them it is not unlikely that others having roads under their charge may do likewise.—*Electricity.*

Tampico Harbor.

Concerning the work at Tampico harbor, Resident Engineer Wrotnowski, in charge of the work, says the north jetty is now 5,835 ft. long and the south jetty 5,340 ft. When 7,000 ft. long the jetties will be in 24 ft. of water, which will be reached by October next. The distance between the two jetties is 1,000 ft. The bar is of sand and mud. The river when in flood has a force of 225,000 cubic feet per second. This enormous force of water will quickly deepen the bar to about 25 ft. when the jetty works are completed. Work was commenced on June 1, 1890. Since that time 1,400 ft. of beach have been gained on each side of the jetties, and from 1,000 to 1,400 hands are now engaged in the work. About 700 cubic yards of stone are dumped daily. An inexhaustible supply of stone is had about 61 miles from Tampico, in the State of San Luis Potosi. The pilings are brought to Tampico from Pensacola and Pascagoula, Fla. The mattresses of brush are from 70 to 85 ft. at the bottom and about 30 ft. at the top. The average current of the river is five miles per hour. The Panuco river has a depth of 25 ft. a distance of about 80 miles inland to the town of Tamos. It is calculated by the engineers that vessels of the largest draught may enter in the fall. When the work is completed Tampico will be the only safe deep water harbor on the Atlantic coast.

A Chance for Inventors.

A well known railroad man declares that one of the most useful inventions that can be thought of in connection with operative railroading is one that will automatically take the rear brakeman by the nape of the neck, and shoot him back from the train a sufficient distance to protect it, when, for any reason, an unusual stop is made. He declares, as a result of considerable experience with the genus brakeman, that nothing short of this will suffice to make it at all sure that trains will be protected under such circumstances, because nothing short of some such device can compel brakemen to go back a proper distance with the flag or lantern.—*Industrial World.*

HOT AIR BALLOONING, WEEHAWKEN, N. J.

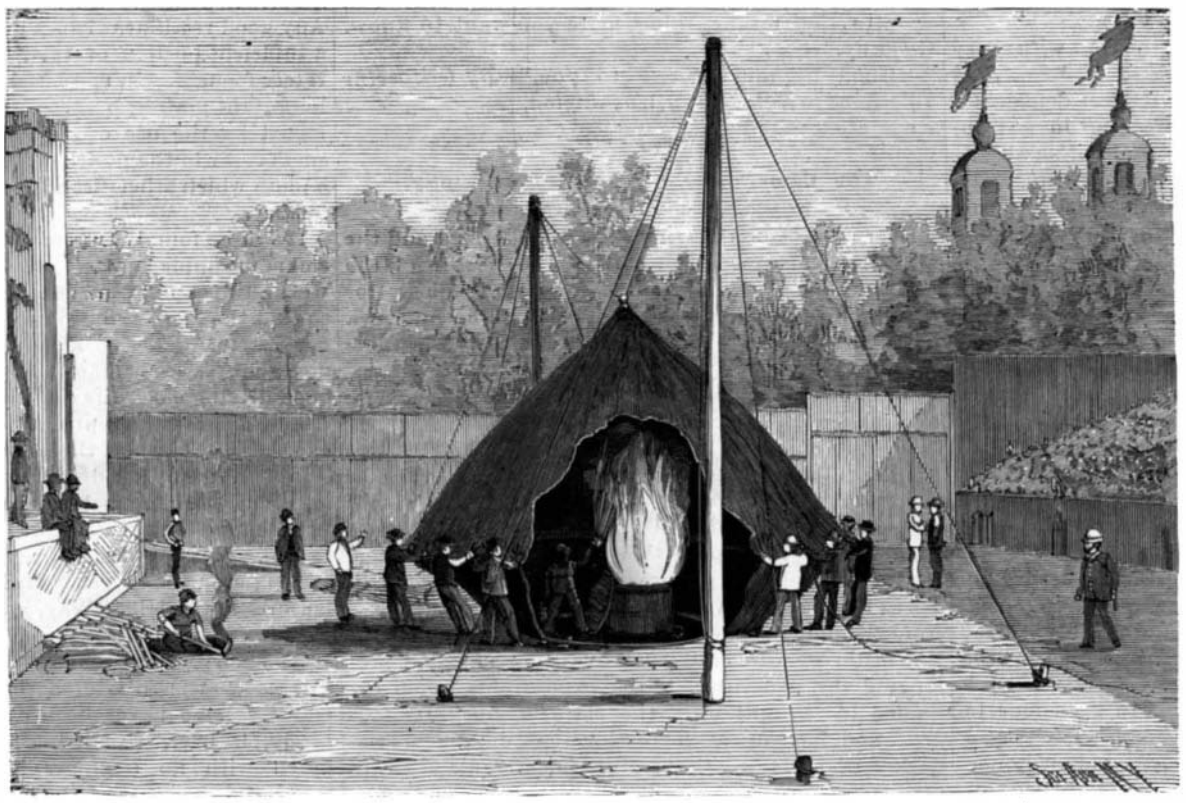
For some time past an exhibition of much interest to those interested in aeronautics has been produced daily at El Dorado, a pleasure resort upon the top of the Palisades on the Hudson River, just above Hoboken. It consists in the ascent of a Montgolfier balloon, to which a ribless parachute is attached. The aeronaut ascends with the two, and when a sufficient height above the earth is attained, cuts loose from the balloon, effecting his descent to earth in the parachute. We illustrate the principal features of the inflation, ascent, and descent with the parachute.

THE CUTTING LOOSE BLOCK.

The balloon is made of sheeting. This is one yard wide, and in the balloon which we illustrate forty segments of it were required for the circumference. For 16 ft. from its top each segment was tapered nearly to a point. The next 15 ft. were untouched, and then the last 29 ft. leading to the neck of the balloon were also tapered to about one-fourth their width. The segments were sewn together, as in making a regular seam; a cord was then laid along side the seam, and the double edges bent over and resewed, making a sort of felling. The top was made of double thickness. The sheeting was sized with a mixture of glue, alum, soda, salt, and whiting, in water.

At the mouth of the balloon a hoop 8 ft. in diameter made of buggy wheel felloes is attached; from this hoop four ropes, called quarter guys, are brought down, to which the parachute is attached.

The parachute in general structure represents the cover of an immense umbrella. When expanded it is about 28 ft. in diameter. It is made in gores, and in its center has a 12 in. hole. From its periphery thirty-two cords lead down to what is known as the concentrating hoop, a strong wooden ring 18 in. in diameter, which the aeronaut grasps in making his ascent. The construction of the balloon with cords felled into it is such that no net is required. As the performer goes up clinging to the hoop of the parachute, it is necessary that he should have some means of detaching himself, at will, from the balloon. This is afforded by the arrangement shown in one of the small cuts. To the quarter guys of the balloon is attached a block of wood by means of a rope passing through a hole in it. Above this hole a knife blade is pivoted, which works in a slot in the block, and held out of contact with the rope by a rubber band. To the end of this blade a rope is attached leading down to the aeronaut's hand. By a second rope the parachute hangs from the same block. It is obvious that on pulling the cutting line the rope will be severed and the parachute detached. One more appendage remains to be noticed. Within the parachute, near its mouth, a wooden hoop 4 ft. in diameter is suspended, and by a proper system of guys is held in a horizontal position. The object of this is to insure the opening of the canvas.



COMMENCING TO INFLATE THE BALLOON.

The inflation is thus conducted: A trench about 18 ft. long, 2 ft. deep, and 2 ft. wide is dug in the earth where the balloon is to be inflated, and, except a small portion at each end, is covered with iron, boards, and earth. Over one end an iron cylinder 3 ft. high and about 3½ ft. in diameter is erected. Around this cylinder barrel staves are placed with earth between them and the iron, forming a sort of rough lagging. On each side of the chimney thus provided, and at a good distance therefrom, two poles 38 ft. high are erected; each carries a pulley, and a rope is rove through the pulleys and carried through a ring on the top of the balloon. The mouth of the balloon is placed over the chimney, and, by means of the rope, the top is hoisted well up from the ground.

A wood fire is started in the distant entrance of the trench; this gradually heats the trench and smoke-stack, the draught at first being about as much one way as the other. After a few minutes, however, the draught begins to tend strongly toward the chimney, which is encircled by the mouth of the balloon, the sides being held well out from the center by a corps of assistants. From time to time a little kerosene is thrown on the fire. All this while an attendant stands within the balloon, by the side of the chimney, armed with a circular board to act as fire screen, and with a pail of water and a cup near him to throw water upon the cloth should it become ignited The balloon gradually feels the buoyant effect of the heated products of combustion, and as it tends to rise, more and more cloth is fed out, the assistants shifting their hold lower down upon the sides of the balloon. After ten or fifteen minutes the suspending rope is cast off and pulled away from the balloon, and four guy ropes leading from its top are used to keep it in position. It swells continually, and the canvas rises until only the hoop rests upon the ground. A number of the assistants now stand upon this hoop.

The last heating remains to be done. At short intervals kerosene is thrown upon the fire, by this time largely consisting of a mass of very hot embers. The oil is at once volatilized and rushes as a gas into the balloon, within which it suddenly bursts into ignition, producing a great sheet of flame, plainly distinguishable through the cloth. This is repeated over and over again, each addition of kerosene producing a great flame as it ignites, almost with explosive violence, within the expanded canvas, now straining violently upward. The upper end of the parachute during the inflation has been attached to the balloon, and the aeronaut, Mr. M. L. Macdonald, of New Haven, Conn., professionally known as "Daring Donald," stands off to one side, as the balloon is nearly ready, grasping the concentrating ring. When all is prepared, the word is given, and the balloon is released. The chimney is covered, and, as the balloon rises, the aeronaut walks or runs forward under it, and is carried up clinging to the parachute ring. A loop of rope is attached to the ring, and, when some distance up, he steps into this loop and thrusts his head up through the concentrating hoop, so as to leave his hands free to manipulate the cutting rope. When a sufficient height has been attained, and he deems himself over a favorable ground for a descent, he pulls the cutting rope and severs the connection between himself and the balloon. He commences to drop with accelerating velocity until the air, catching the parachute, suddenly opens it just as an umbrella is opened by hand. The velocity of the descent is checked. With some oscillation the earth is approached quite rapidly; in half a minute or less the surface is reached. The object of the aperture in the center of the parachute is to make these oscillations as slight as possible. The earth is struck with some violence, about as if the jump was from six or eight feet elevation, indicating a velocity of about twenty feet per second. The deserted balloon capsizes, owing to the greater weight of its top, the hot air and products of combustion with considerable smoke escape, and it collapses and rapidly falls.

As the ascent is made, the entire distance from the top of the balloon to the aeronaut hanging to the parachute is about 175 ft.; the inflated balloon is about 40 ft. in diameter. The general operations of the inflating and of the ascent are in charge of Mr. Mortimer McKim, aeronautical engineer, of this city, himself an experienced aeronaut. Accidents in the