ANOTHER MAMMOTH LOCOMOTIVE.

The locomotive which we illustrate this week is unquestionably the most powerful ever constructed. As we have shown elsewhere, the continually increasing size of American engines is due to the desire to secure the most economical results in operation. As between the policy of hauling a heavy train with a single engine or two light trains with light engines, there is, in the former case, a saving of the expense of a complete train crew. Further advantages, at least on tracks where the traffic is heavy, result from the reduction of the number of separate trains in operation.

The two locomotives of the type shown have recently been built by the Pittsburg Locomotive and Car Works for the Union Railroad Company, Pittsburg. They are at work on a short stretch of line between Munhall and North Bessemer, Pa., which forms part of the Carnegie system and connects the Duquesne Furnaces, Homestead Steel Works and the Edgar Thomson Steel Works. Four miles of the line are built on a grade of 70 feet to the mile and another stretch of the road (about 2,000 feet) is built on the unusually heavy grade of 2·7 per cent.

We are informed by Mr. D. A. Wightman, the general manager of the Pittsburg Locomotive and Car Works, to whom we are indebted for the photographs from which our engravings were prepared, that, owing to the great amount of wet weather since these locomotives went into service, the company have been unable to secure any reliable data of their performance in actual service on the various grades of the road.

The estimated tractive force, however, is 53,280 pounds and the estimated hauling capacity on a practically level track is about 6,650 tons. Now, just what these figures mean can perhaps be best understood by expressing them in other terms. The accompanying sketch, which is, of course, purely imaginary, shows what an engine with a drawbar pull of 26½ tons could accomplish in the way of lifting dead weight. The locomotive slung in chains represents a passenger engine of the average size used in this country thirty to forty years ago. If a cable were passed from the slings over a pulley and carried to the drawhead of the tender of one of these Pittsburg consolidations, she would be able to raise the smaller locomotive by direct pull without the use of any kind of purchase.

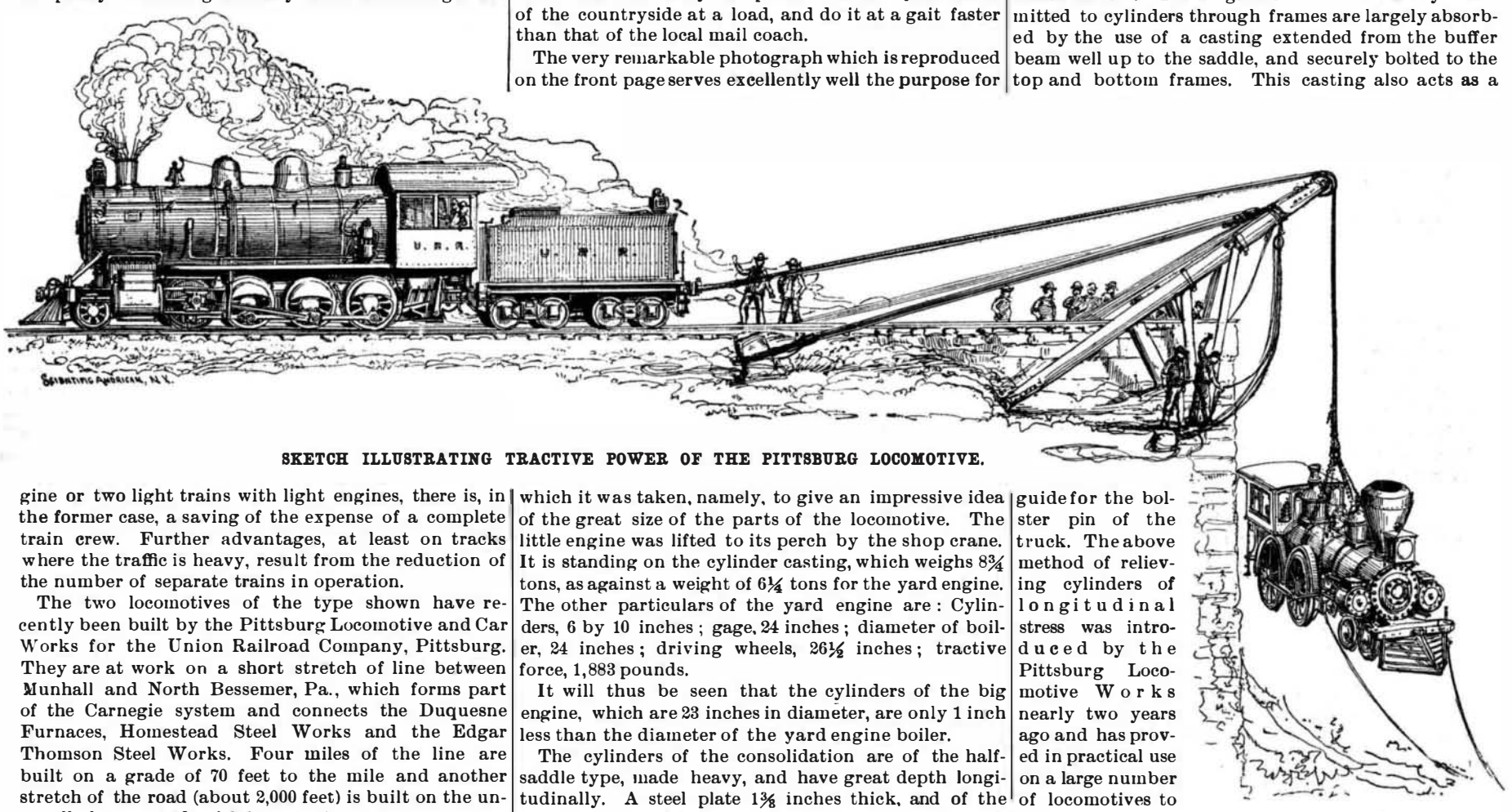
The hauling capacity on a level of 6,650 tons represents a train of 166 box cars loaded with wheat. The total length of such a train would be 5,700 feet, or considerably over a mile, and the wheat would represent, at an average of 15 bushels to the acre, the product of 9,000 acres, or over 14 square miles of land. And this enormous load could be taken over the road, or rather the level portions of it, at a comfortable speed of 10 miles an hour.

He would have seemed a bold prophet to our forefathers who would have dared to foretell that at the close of this century we should have steam horses that could cart away the products of 14 square miles of the countryside at a load, and do it at a gait faster than that of the local mail coach.

The very remarkable photograph which is reproduced on the front page serves excellently well the purpose for which it was taken, namely, to give an impressive idea of the great size of the parts of the locomotive. The little engine was lifted to its perch by the shop crane. It is standing on the cylinder casting, which weighs 8¾ tons, as against a weight of 6¼ tons for the yard engine. The other particulars of the yard engine are: Cylinders, 6 by 10 inches; gage, 24 inches; diameter of boiler, 24 inches; driving wheels, 26½ inches; tractive force, 1,883 pounds.

It will thus be seen that the cylinders of the big engine, which are 23 inches in diameter, are only 1 inch less than the diameter of the yard engine boiler.

The cylinders of the consolidation are of the half-saddle type, made heavy, and have great depth longitudinally. A steel plate 1⅜ inches thick, and of the same width as the bottom of the saddle, extends across and is bolted to the lower frames, and to this plate, as well as to the frames, the cylinders are securely fastened. Heavy bolts passing through the top frame bars at the front and back of the saddle form additional transverse ties, and relieve the saddle casting from all tensile strains. The longitudinal strains usually transmitted to cylinders through frames are largely absorbed by the use of a casting extended from the buffer beam well up to the saddle, and securely bolted to the top and bottom frames. This casting also acts as a guide for the bolster pin of the truck. The above method of relieving cylinders of longitudinal stress was introduced by the Pittsburg Locomotive Works nearly two years ago and has proved in practical use on a large number of locomotives to be of great value in reducing the breakage of saddle castings. The frames are 4½ inches wide. They were cut from rolled steel slabs made by the Carnegie Steel Company and weigh 8½ tons per pair, finished.

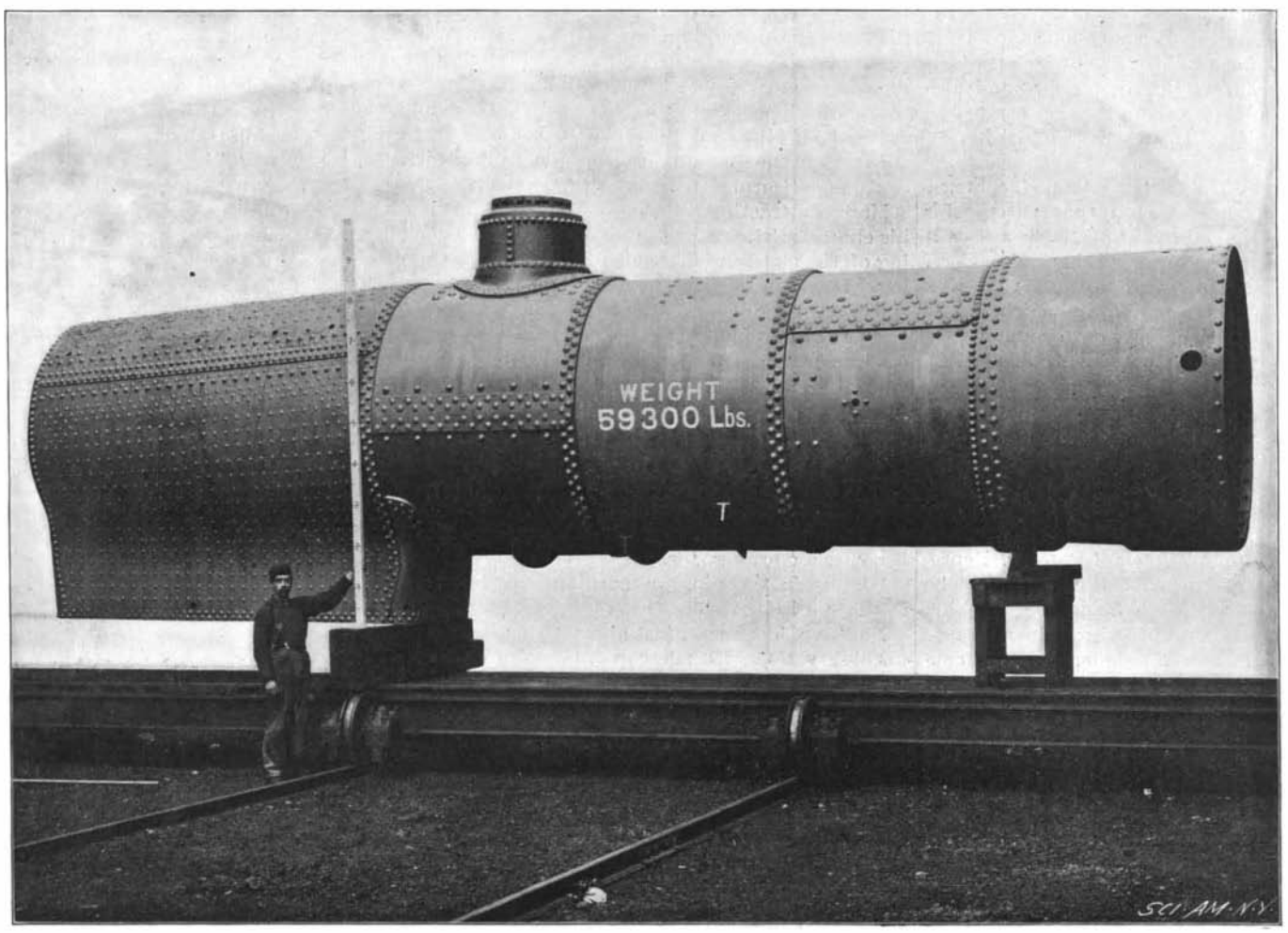


SKETCH ILLUSTRATING TRACTIVE POWER OF THE PITTSBURG LOCOMOTIVE.

	Decapod Tank Locomotive, St. Clair Tunnel.	Decapod, Erie.	Twelve-wheel Locomotive Northern Pacific.	Pennsylvania, Class H—5, Consolidation.	Twelve-wheel Locomotive, Great Northern.	Pittsburg Consolidation.
Name of builder	Baldwin.	Baldwin.	Schenectady.	Penn. Railroad.	Brooks.	Pittsburg.
Weight on drivers, pounds	180,000	172.000	150,000	177,000	172,000	208,000
Weight, total	180,000	195,000	186.000	198 000	212,750	230,000
Heating surface, firebox	193·0 sq. ft.	234·3 sq. ft.	206·5 sq. ft.	197 sq. ft.	235 sq. ft.	205·5 sq. ft.
Heating surface, tubes	2,218·8 sq. ft.	2,208·8 sq. ft.	2,721·6 sq. ft. Water tubes, 15 3	2,720 sq. ft.	3,045 sq. ft	3,116·5 sq. ft.
Heating surface, total	2,411·8 sq. ft.	2,443·1 sq. ft.	2,943·4 sq ft.	2,917 sq. ft.	3,280 sq. ft.	3,322 sq. ft.
Grate area	38·6 sq. ft.	89·5 sq. ft.	35·0 sq. ft.	.....	34 sq. ft.	33·5 sq. ft.
Drivers, diameter	50 in.	50 in.	55 in.	56 in.	55 in.	54 in.
Cylinders, diameter	22 in.	16 and 27 in.	23 and 34 in.	23·5 in.	21 in.	23 in.
Cylinders, stroke	28 in.	28 in.	30 in.	28 in.	34 in.	32 in.
Working steam pressure, pounds per square inch	160	180	200	185	210	200
Boiler, outside diameter barrel	74 in.	76 in.	72 in.	.....	78 in.	80 in.
Firebox, length	11 ft. 7/16 in.	10 ft. 11 9/16 in.	10 ft 3/16 in.	.....	10 ft. 4 in.	10 ft.
Tubes, number	281	354	332	369	376	355
Tubes, outside diameter	2¼ in.	2 in.	2¼ in.	2 in.	2¼ in.	2¼ in.

In the accompanying table we give a comparison of some of the most notable of the recent big freight locomotives, from which it will be seen that the latest is considerably the largest of the big fellows. They are arranged in the order of their construction.

The tender is of the standard type and weighs, loaded, 52 tons, so that the weight of the engine and tender in working order is 167 tons. The total length over all of engine and tender is 63 feet 3½ inches. The center of the boil-



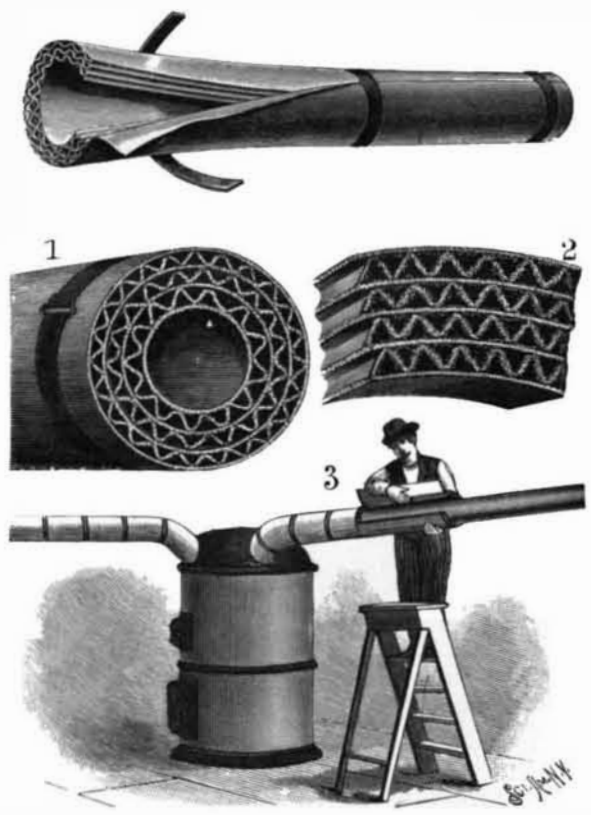
BOILER FOR 115-TON PITTSBURG CONSOLIDATION LOCOMOTIVE.

Largest diameter of barrel, 83½ inches. Thickness of barrel plates, ⅞ inch. Length of fire box, 10 feet; front depth, 76¾ inches.

er is 9 feet 3⅜ inches above the rails, the top of the boiler is 13 feet and the smokestack 15½ feet above the rails. The driving axle journals are 9 by 12 inches, and the main crank-pin is 7 by 7 inches. The steam ports are 1⅜ inch wide by 20 inches long, while the exhaust ports are 3¼ inches by 20 inches. The tender has a capacity of 5,000 gallons of water and 10 tons of coal.

A NEW COVERING FOR BOILERS AND PIPES.

Where pipes are used for the conduction of steam heat, water, or heated air, considerable loss results



GAST'S ASBESTOS AIR-CELL COVERING.

from the radiation of the heat. This causes not only decreased efficiency of service, but increases the cost of the fuel.

To overcome and prevent this loss of heat, and thereby reduce the amount of fuel required, a covering known as "Gast's" Air-Cell Covering, manufactured by the New York Fireproof Covering Company, No. 23 Dey Street, New York, has been devised.

This covering, as is shown in Fig. 1, combines in its construction the well-known non conducting qualities of the "air-cell" structure and the fireproof characteristics of asbestos. The covering is composed of divided air-cells, each independent of the other, produced by arranging in alternate layers sheets of plain and corrugated asbestos paper, wound into cylinders of proper interior diameter to fit all standard sizes of pipes. These cylinders are split longitudinally, so that they can be readily slipped on the pipes. They are provided with an exterior canvas covering and with metal fastening bands.

The covering is neat, light, and easily applied, as well as non-conducting; it is fireproof (a feature that should receive consideration), will not harbor vermin, and will not decay or deteriorate with age. The covering is strongly and compactly made, and, owing to its peculiar construction, will not crack or powder from vibration of the pipes or hard usage. It may be removed and reapplied an indefinite number of times without loss or deterioration.

As indicated in Fig. 2, the covering is also made in blocks, slabs, and other special forms suitable for the non-conducting jackets for boilers, steam-drums, smoke-flues, breechings, hot air ducts, etc., and when so used is superior to ordinary cement, not only as a non-conductor, but as a preventive of rust.

The covering, on account of its fireproof and non-conducting qualities, is particularly serviceable for incasing the hot air pipes of the furnace heaters in the cellars of dwellings, etc. These pipes frequently lose in transmission more than half of heat generated in the furnace. This lost heat, when the pipes are covered by air-cell covering, would to a large extent be saved. The amount of fuel required would thus be reduced, and increased delivery of heat through registers would be attained.

A special form of this covering is also made for ammonia and brine pipes used in the manufacture of artificial ice and in the refrigeration of cold storage buildings. When applied to these pipes, the covering effectually prevents the formation of frost on the outside, thus increasing the efficiency. The covering may be employed in preventing cold water pipes from freezing and "sweating."

A New Hungarian Patent Publication.

As the Hungarian Patent Office does not publish any official gazette containing a record of the patents issued in that country, a journal has recently been established with a view to supplying this want. This journal is printed in four languages—Hungarian, German, French, and English. Some of the English descriptions are unique. We give below a specimen of the translations:

PROCEEDING AT' THE PRODUCTION OF STOCKINGS OF THE LIGHT WITHOUT FLAME OF SPONTANEOUS IGNITION.

Claim.

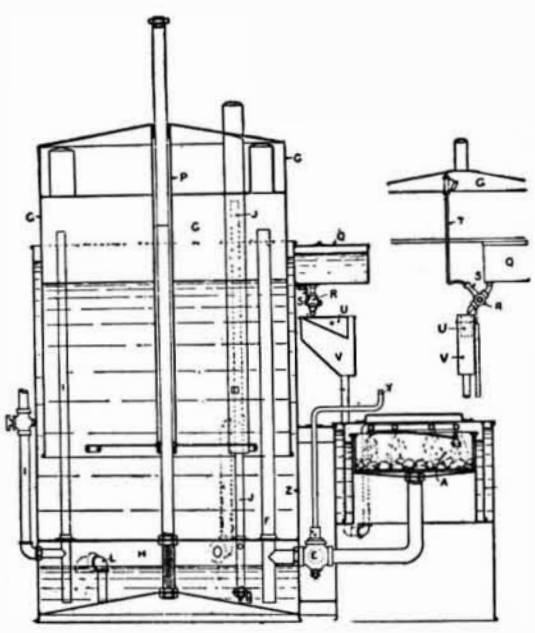
Proceeding at the production of stockings of the light without flame of spontaneous ignition without use of heaters or putting-in of lighters, characterized by a stocking of light without flame of a provenience whatever prepared in such a manner after it's treatement in an alcalic bath by impregnation of one portion of it's surface by platina—or iridium—salts, that these salts form ethiops of platina or iridium or the oxydes of incandescence—oxyde of thorium or cerium, etc.—causing the ignition of the stocking at the contact with the mixture of gas and air.

THE NATIONAL ACETYLENE GAS GENERATOR.

Not many years ago acetylene gas was merely a product of the chemical laboratory. Although the great light-value of acetylene was well known, the great cost of the gas prohibited its general introduction as an illuminant. Acetylene may now be said to have emerged from the experimental stage and entered into competition with other illuminants. Three years ago but little was known of automatic acetylene gas generators; now many manufacturers are actively engaged in selling their apparatus and perfecting the forms they have already devised. Among the manufacturers who early entered into the making of acetylene gas generators may be mentioned the National Acetylene Gas Company, of Cleveland, Ohio. The apparatus made by the company is distinguished by its automatic action, by the means provided whereby the gas may be readily controlled, and by the simplicity of construction and of operation.

The National acetylene generator, as shown in our cut and diagrams, embodies essentially a water supply, *Q*; a generator containing a carbid receptacle, *A*; and a gasometer or gasholder, *G*. The gas generated in the chamber, *A*, is conducted downwardly by means of a pipe, and, passing through the triple valve, *E*, controlled by the handle, *Y*, is discharged into the gasholder, *G*. Water is supplied from the tank, *Q*, to the carbid receptacle, *A*, by means of a pipe controlled by the valve, *R*, operated by the lever, *S*, through the medium of the rod, *T*, attached to the gasholder, *G*. In its course from the tank, *Q*, the water enters a tipping bucket, *U*, is discharged into the chamber, *V*, and, after having been conducted to the receptacle, *A*, is sprayed over the calcium carbid. The gas generated by the action of the water on the carbid, after filling the gasholder, is distributed by means of the pipe, *I*. As the pressure of the gas increases, the gasometer rises, and having reached a predetermined height, causes the rod, *T*, automatically to close the valve, *R*, in order to shut off the water from the carbid. When the gasometer descends, the valve is reopened and gas is again generated. Should the pressure become abnormally excessive, the surplus gas is discharged to the open air through the vent pipe, *J*.

THE NATIONAL ACETYLENE GAS GENERATOR.



SECTION OF GENERATOR AND DETAIL OF THE WATER-SUPPLY.

A SAFETY-ATTACHMENT FOR SCAFFOLDS.

Swinging scaffolds which are used in painting the outer faces of buildings are generally suspended from ropes passing through blocks. The ropes may break or become detached, and thus cause the scaffold to fall. To prevent such accidents, the safety attachment shown in the annexed illustration has been devised.

To some portion of the building above the highest point reached by the scaffold a device is secured to which a rope is attached. This device consists of a turnbuckle provided with rods extending far enough from each side to engage the inner faces of a window opening. A rope is secured to the turnbuckle by means of a hook, and is carried down around the scaffold and extended up beyond the other side, thus forming a loop in which the scaffold is inclosed. After having been passed around the scaffold, the rope is secured to a second turnbuckle by means of a hook adapted to slide on the rope and temporarily secured at any point by tying a knot in the rope. The second or lower turnbuckle can be moved up or down on the

CODY'S SAFETY-ATTACHMENT FOR SCAFFOLDS.

wall of the building, and is always held a short distance above the scaffold.

The first or upper turnbuckle is firmly secured to the upper part of the building and is left there until the work is completed. That portion of the rope which is secured to the upper turnbuckle is passed behind the lower turnbuckle, and thus serves to hold the scaffold against the building. The lower portion of the rope should be of such length as to reach the ground.

The safety rope encircles the scaffold with a slight slack, so that it may receive the weight of the scaffold, should the suspending ropes part or become detached from their support.

The attachment is the invention of Martin Cody, 106 East 109th Street, New York city.

AT the Colonial and Indian Exhibition, a few years ago, specimens of a whitish resin, bearing some resemblance to Manila elemi in appearance, were shown from the West Indies, and labeled "Gommier or Incense." These products are now referred to several trees of the natural order Burseraceæ. The Gommier or mountain Gommier, or Gommier rouge of Dominica and the Gommier à Canots of St. Lucia, appear to be Dacryodes hexandra, Griseb. Another species yielding a similar resin is Bursera gummifera, the birch tree of Jamacia, the Gommier of the Windward and Leeward Islands, and the turpentine tree of St. Vincent. The resin of Protium guineense affords the Gommier à l'encens of St. Lucia, the Tacamahaque huilense inicolore, the encens of Cayenne, and the Tacamahacca of Venezuela.—Kew Bulletin.