

STEAM BOILER INSPECTION.

It is hardly necessary to point out that in the prevention of boiler explosions there is a double interest: first, that of the public, which looks to the preservation of life and property; and, second, that of the owner, who incurs the direct loss. The former interest is represented in the rules promulgated by the United States Government relative to boiler inspection, the stamping and testing of boiler plates, etc., of which a new code has recently appeared, and will be found in full in the *SCIENTIFIC AMERICAN SUPPLEMENT*, No. 113. The owner's interest may be considered as specifically guarded by the private insurance companies, which take risks on steam boilers after proper inspection. Between these two safeguards there is the invariable distinction which always exists between official and private business, namely, that lack of thorough enforcement of regulations which in the latter case is necessitated by pecuniary considerations, absent of course in the former. And these considerations obviously affect both insurer and insured, the first gaining the premium, the second protection against loss, so that on both sides there is ample motive for rendering the examination of the boiler and adoption of the proper safeguards as thorough and well advised as possible.

For some twelve years past special attention has been given to the matter of inspecting and insuring boilers by the Hartford Steam Boiler Inspection and Insurance Company. This corporation regularly causes all the boilers placed under its care to be inspected by competent engineers once a year, occasional visits being made as is deemed necessary in the interim.

The business of the concern is conducted according to a carefully prepared system. On receipt of the proposal for insurance, together with the inspector's report, the boilers are classified, and accepted at a suitable rate of insurance, unless they are found by the inspection to be absolutely unsafe, in which case the applicant is furnished with a written statement of their condition. The policy of insurance which the company issues covers damage to boilers, buildings, stock, and machinery arising from explosion, and is a guaranty that the work of inspection has been thoroughly done. This last is further vouched for by the fact that the company has a pecuniary interest in its sufficiency. Twenty-seven inspectors, practical engineers, are employed, and these hand in monthly reports. In 1877, we learn that there were 34,000 examinations. The number of defects discovered amounted to 15,964, of which 3,690 were considered dangerous. The whole number of boilers condemned was 133. Among the things to which special attention is given are the following: Defective boiler plate, insufficient riveting and staying, external and internal corrosion, burned and blistered plates, deposit of sediment, incrustation and scale, patches, internal grooving, defective water gauges, blow-off cocks, overloaded and defective safety valves, pressure gauges, etc. At the company's rooms, in Hartford, there is what might be termed a boiler museum. The collection of specimens of defective plates, lumps and strata of deposit, corroded braces, plates taken from exploded boilers, etc., is an evidence of culpable carelessness and neglect. This permanent exhibition of boiler defects graphically proves not only the necessity for continual supervision and thorough investigation, but also the value of such constant study into the nature and causes of boiler accidents as is here being carried on. Engravings and descriptions of remarkable flaws, defective plates, and the peculiar forms of boilers after explosion, which have come under the company's notice, are frequently published and are of much scientific interest.

The annual reports are interesting compilations, abounding in facts, statistics, and the relation of observation and experience. A single instance, drawn from the records of the company, and here presented, will illustrate one of the many dangerous cases of incrustation and accumulation of scale occasioned by the use of impure water which, with other serious defects arising from other causes, have been brought to light. While every steam user knows how quickly deposits accumulate in the bottom and on the sides of boilers, few probably have encountered cases where feed water pipes have become choked by the gradual accumulation of foreign substances, as shown by the annexed engraving. This represents a section of water feed pipe taken from a boiler at St. Louis, in 1876, where water from the Mississippi was being used. The extent of the deposit which checked the flow of feed water is remarkably great. During 1876, out of 2,894 cases of incrustation and scale, 392 were regarded as dangerous and due warning given.

Pig Lead from Smoke.

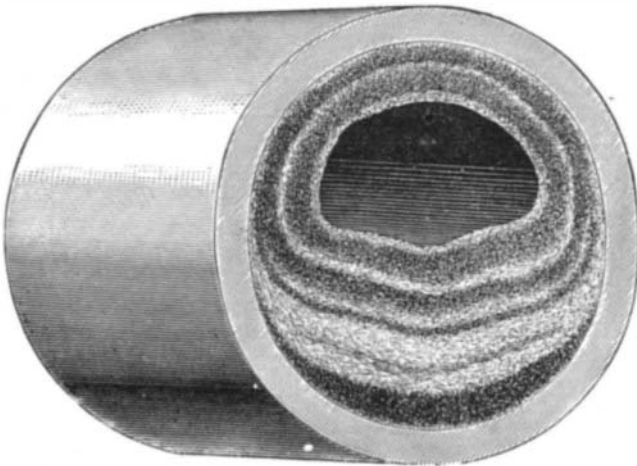
The *Joplin (Mo.) Mining News* says: In the process of smelting the ore a great deal of it escapes in the form of smoke, or lead fumes, as it is more properly termed. It has been known for years that a large per cent of the metal was thus lost by its being sublimized and passing off into space. The white lead company was organized for the purpose of catching this smoke, and by passing it through an almost endless line of pipes of sheet iron and woolen bags, condense it. The result was that after an outlay of many thousand dollars and a year's experimenting they have succeeded in condensing the smoke or lead fumes into metallic lead, the same as steam is converted into water. The product of the fumes is a bluish, impalpable powder, which makes a splendid blue paint, pronounced equal to the corroded article. For the purpose of making it white several furnaces

were built, and the blue product, with the aid of an immense heat, is again changed into lead fumes, which are again condensed and come out pure white lead. In the transforming of the blue lead into fumes, considerable pig lead is made. The object is to sublimate it all, but the heat is not powerful enough to do so.

Lord Granville on the Engineering Trade.

In proposing the toast of the evening at the annual dinner of the London Association of Foremen Engineers, at the City Terminus Hotel, recently, Earl Granville said:

When first invited to take the chair to-night I naturally inquired what were the objects of your association. It was not necessary to ask who the foremen engineers were. I knew that. They are not only what I may call the color sergeants of the skilled mechanics of the metropolis, but they are wholly unlike that delicate machine—the House—to which we have just heard that only ten pounds pressure can be applied. (Laughter.) They are more like the motive power of the most important trade in this country, the center of commercial and manufacturing activity itself, to which year by year and day by day is applied a pressure of something like 80 pounds to the square inch. I found no difficulty in divining the objects of the association, for from your rules and regulations they appear to be "friendly intercourse, intellectual instruction, physical good, abstinence from discussion on the politics of the trade, and a hearty desire to promote that good feeling between employers and employed which we conceive to be necessary to the success of both." (Hear, hear.) Now, it seems to me that these texts would be sufficient for any able writer to fill some folio volumes full of matter of interest and importance, and I cannot help thinking that even an humble individual like myself, if he really took the pains, might make an after-dinner speech upon these texts, exceeding in length and tediousness anything which



FEED PIPE CHOKED BY DEPOSIT.

has ever been heard in this new hall, or even within the speech-beaten walls of the old London Tavern, in which you formerly used to congregate; but as Sydney Smith says, "I will incline to the side of mercy," and content myself with only a few observations on a subject of the deepest importance both to you and to myself.

Unfortunately for me, I am not a great lessor of mineral property; but it happens that I am connected with no less than four iron works in Shropshire and Staffordshire which rent minerals. I am principal partner in one Shropshire concern, of which I am extremely proud to find that the vice-chairman of your dinner last year said we produced the best iron in England. We assume to ourselves the title not only of ironmasters, but of civil engineers, and I might say a great deal about the merits of our work; but I think it is just possible if I did you might think that my sole object in coming was to puff our own merits, and I might lay myself open to the suspicion that I was acting on that percentage and commission system which is one of the greatest evils of the mode of doing business at the present day. (Hear, hear.)

With regard to "friendly intercourse," I quite appreciate your desire for that, and in some ways it appears peculiarly desirable in regard to the foremen engineers of this metropolis. While you are intellectually superior to the great body of workmen, you have not the advantages of the great employers of labor, for you are from your position rather isolated in your respective works.

With regard to "physical good," I apprehend you consider the business of this association is by co-operation to defend the interests of your body, and by intercommunication to afford information where each member can find his services most acceptably employed. Lastly, one of your objects, and certainly not the least, is to afford some help and assistance to such of your members as are obliged, some temporarily, some permanently, to retire from active work.

In regard to the point of "intellectual instruction," that is the point, whether I speak of employers, managers, foremen, or workmen, on which will turn whether we are to retain the predominance in commerce and manufactures which we certainly at the present time enjoy. Probably some of you have read a commercial history and review of 1877 which appeared in the *Economist* of last week. I found it full of interest, and, with regard to the present time, painful interest. It entirely confirms the opinion which I have entertained—that not only in the United States, as in Europe, but throughout the whole world, and exceptionally so in this

country during the last year, there has been a great and universal depression of business. With regard to those interests with which we who are here present are more intimately connected, it is hardly necessary for me to remind such an assembly as this that for the last three years we have been in a state of flatness which has seldom been paralleled. It is not necessary to go into the causes of this depression before men who think upon what concerns them. The first, however, was undoubtedly that fictitious inflation of prosperity which took place during the preceding years. The second was the bankruptcy of a great many nations, who have been good enough to swell that inflation by buying our products and paying for them in the most amiable way with the money they had borrowed from ourselves. Then there were three bad harvests, the year's civil dissension in France, and the dreadful war which has been going on in the East of Europe, and which still throws a shade upon our present prospects, though, I hope, one which will soon be dispelled—all these have had great influence on the present state of things. I feel very much inclined to agree with Mr. Walter in the cheerful view he took in speaking of the danger of competition from the United States, from France, from Belgium, and from Germany. There are a great many matters to be considered in regard to this competition. There is the geographical position of different countries, there is the cheapness or dearth of labor, there is the quality and propinquity of the minerals with which they have to deal; and there is one thing which, I am certain, in the race which is to come, and in which I hope and believe we shall continue to be the champions and the victors, it is impossible to overrate, and that is, the importance of intellectual instruction, whether with regard to those who employ, the foremen, or the workmen of this country. (Cheers.) Another subject which you should keep in view is good understanding between employers and employed. (Hear, hear.) With regard

to both these objects, it appears to me that you foremen engineers have great power in your hands to do good. I am sure that it is impossible for you to increase your intellectual instruction without its reacting both upon those above and those below you. No one has such facilities as you have in giving practical application to the discoveries of science; and none so much as you have that practical experience which often alone gives a real use and application to some of the highest and purest principles of science.

With regard to the feeling between employers and employed, no people are more aware of the difficulties which beset both. You can easily detect the nonsense which is spoken sometimes on one side, sometimes on the other. You know the folly of some employers who strive to lay upon the workmen the whole burden of the failure of old-fashioned concerns on which no sufficient capital or brain work has been bestowed, to compete with other works on which ample capital and ample thought have been devoted. On the other hand, I am sure none will more quickly see or more deeply regret when workmen put forward some claim entirely opposed to the commonest rules of political economy, and which can only result in injury to their employers, in injury to their country, and in permanent injury to themselves—(cheers)—and I am sure you can be useful intermediaries and buffers, as it were, between employers and employed, and that it will be your object to promote a perfect understanding between them. I am aware of the importance of that self-denying ordinance of yours that forbids you to discuss the politics of trade, and one is aware of what a strong dissolvent general politics sometimes are; but, with regard to trade politics, I cannot help thinking that men placed in so singularly good a position for calm and careful consideration of some of the great problems upon which the success of trade depends might with propriety and advantage to all discuss them in such a society as this. I am sure you will allow me, in conclusion, to express with the greatest sincerity my good wishes for the prosperity of this association, whose real vitality is proved by the meeting in such numbers to-night in spite of the general depression.

The toast was drunk with great heartiness.

Two New Planets.

Professor Henry, of the Smithsonian Institution, has recently announced the discovery by Professor Peters, of Clinton, of a star of the tenth magnitude, hitherto unknown, in 10h. 43m. right ascension, 11° 50' north declination, with a daily motion north. This planet, discovered February 4, will carry the number 180, and its discoverer proposes for it the name of *Eunike*, in commemoration of the glorious victories won by the Russian armies in their strife for humanity.

Professor Henry, a few days later, reported that Professor Foerster, of Berlin, had announced the discovery by Palisa (February 7) of a planet of the eleventh magnitude in 11h. 2m. right ascension, 6° north declination, with a daily motion of 8m. north.

In an article on Amyliidenamine Silver Nitrate, by W. G. Mixture, in the *American Journal of Science and Arts*, the author states that, "if the corresponding ammonio compound be regarded as diammonium-argentammonium nitrate, the derivative from valerianammonia may be regarded as di-amylidenammonium-argentamylidenammonium nitrate." This perhaps settles it.

We are indebted to Mr. W. C. Hill, Clerk of the Senate Committee on Patents, for the favor of useful public documents.

A Literary Congress.

It is proposed that a literary congress, to which the writers of all countries are invited, shall be held at Paris during the Exhibition. Preliminary steps have been taken by the *Société des Gens de Lettres* toward assembling this congress, and it is believed that the French Government is favorable to the idea, and will assign one of the halls in the Exhibition building for the accommodation of the members. The chief object will be the discussion of the questions relating to international copyright—a matter which is still as far from settlement as ever, notwithstanding the many diplomatic efforts that have been made. It is announced that Victor Hugo will deliver the opening address. A convention of the distinguished authors of the world, a large number of whom have already responded to the call, would be one of the most remarkable features of the Exhibition; though, if the "literary congress" should degenerate into a mere show, it would of course fail of its object and become as ridiculous as at present the plan appears judicious.

IMPROVED VARIABLE EXHAUST.

The invention herewith illustrated is a new exhaust or blast nozzle for locomotives or other engines, by means of which the blast may be rendered strong in order to increase the draught, or it may be so diffused as to produce little effect on the fire. Figs. 1 and 3 represent vertical and horizontal sections of the device, and Figs. 2 and 4 modifications of the same. It is placed in the front end of the locomotive, directly over the exhaust openings in the center casting. The upper part of the nozzle, A, in Figs. 1 and 3, is turned off conically, and the lower portion is cylindrical. A hollow cone, B, having a sleeve, C, projecting inwardly from its base, is placed upon the nozzle, A, and supported by a shoulder thereon. The open mouth of the cone is equal in area to both of the exhaust pipes, and projects a short distance above the nozzle, so that an annular space is left between it and the latter. The object of this arrangement is to produce a vacuum by the steam issuing from the center nozzle drawing the relief steam after it. The sleeve, C, is accurately fitted to the cylindrical portion, and ports, D, are made through both it and the nozzle. The distance through which the cone is turned is limited by a stop screw, and for moving the cone a rod leading from the cab is attached to the arm, E.

When a strong blast is required the cone, B, is turned so that the ports in the nozzle will be covered by the sleeve, C. The exhaust steam will then issue with great force from the nozzle passage, and, being concentrated, create a strong draught in the smoke stack of the locomotive. When the blast is not required the cone is turned so as to open the ports, D, permitting a portion of the exhaust steam to escape through said ports into the cone. The steam is thus deflected so that its force, and consequently the effect of the blast on the fire, is greatly diminished.

In the modification represented in Fig. 2, instead of the cone, B, there is a solid sleeve, F, on which are two curved tubes, G. These last have ports opening through the sleeve, and communicating when the latter is turned with ports in the nozzle, the orifices of which are shown at H. When the sleeve is rotated so that the ports coincide, the steam escapes at all four openings, and is thus diffused. When the ports are closed it makes its exit as a blast from the nozzle apertures, H.

In Fig. 4, the upper plate, I, is movable in a horizontal plane about the boss, J, through which last the nozzle tubes, K, pass. On the plate, I, are other tubes, L, and ports are made through plate, I, and the plate beneath. By turning plate, I, the ports may be opened or closed, and the steam permitted to escape through two or four orifices.

Patented through the Scientific American Patent Agency, January 1, 1878.

For further particulars address the inventor, Mr. George S. Brainerd, St. Albans Iron and Steel Works, St. Albans, Vt.

Explosive Dust.

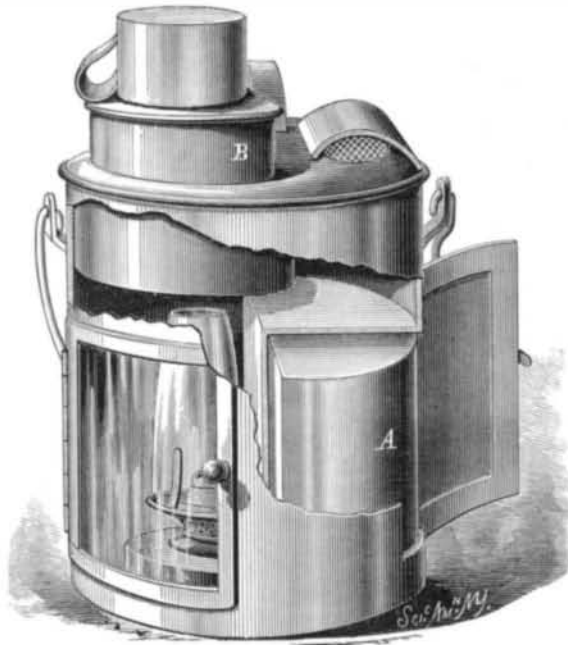
Nature refers to the frequent explosions of malt dust in machines, and speaks of three explosions having taken place in four years, and these not due to any culpable carelessness, but ignited either by a spark from a piece of flint passing

through the steel rollers or from some excessive friction on some part of the wood fittings.

The man in charge of the mill, on one of these occasions, stated that they were grinding at the ordinary pace about mid-day, with the window open and no gas turned on. The explosion was quite sudden, and the flame sufficient to singe the man's whiskers, the force so great that the door of the engine room was blown open, although the only opening between the two rooms was a small hole through which the shafting worked.

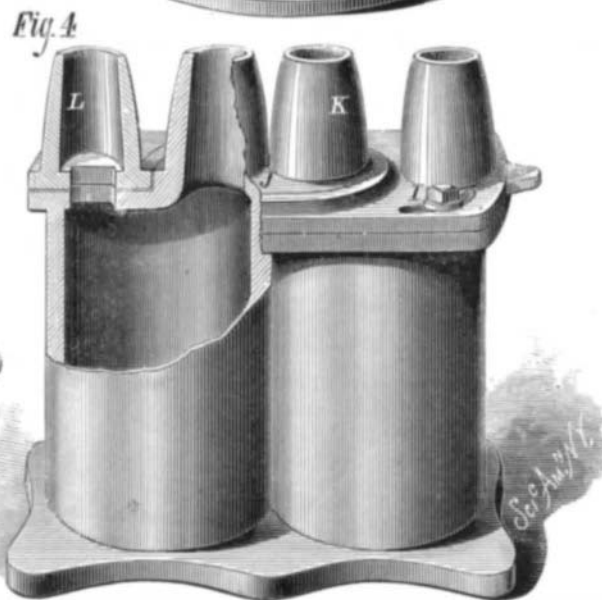
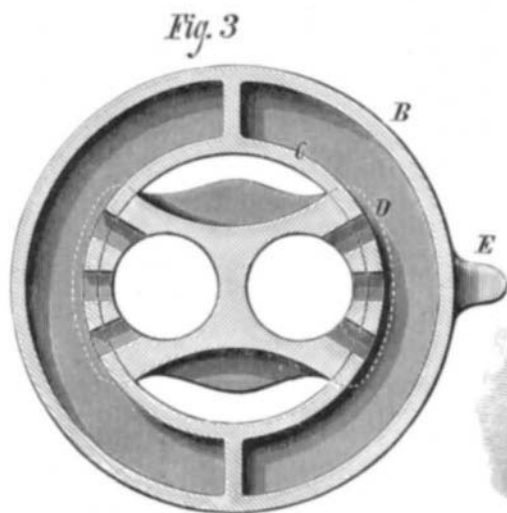
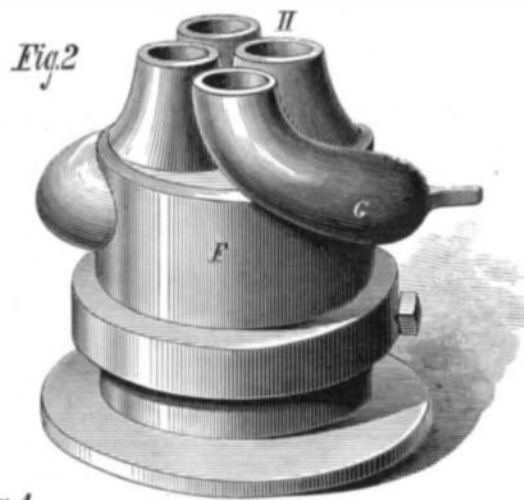
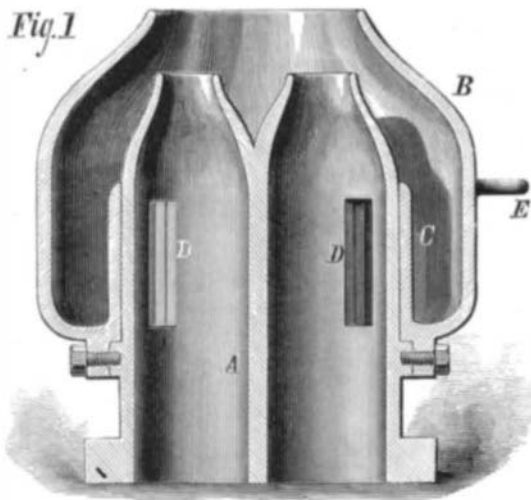
COMBINED DINNER PAIL AND LANTERN.

Our engraving illustrates a very handy contrivance for workmen who labor at night or in tunnels, mines, caissons,



HAIGHT'S COMBINED DINNER PAIL AND LANTERN.

or other localities where artificial light is needed. It consists of a dinner pail and lantern combined, the heat arising from the flame being utilized to keep the food warm. A is a compartment in which a box containing the food is placed. In the main portion of the pail a lamp is arranged, to which

**BRAINERD'S EXHAUST NOZZLE FOR LOCOMOTIVES.**

access may be had through the mica door. In the cover is a coffee receptacle, B, surmounted by a cup, which may be turned over the lamp whenever it is desired to warm its contents. Also in the cover is an aperture for the escape of smoke and heat. The usual bail is provided.

This device was patented through the Scientific American Patent Agency December 18, 1877, by Mr. Joseph Haight, of Port Chester, N. Y.

New Mechanical Inventions.

Mr. Thaddeus Hodgson, of Amherst, Nova Scotia, has invented a new Machine for Gumming and Sharpening Saws. A plate, bolted to the front of a work bench, serves as a support for the saw, and a sliding shaft, guided by a handle, carries a band pulley and an emery wheel, by which the grinding is done.

A horizontal Wind Wheel, invented by Mr. Martin Everhart, of Victoria, Texas, is so constructed as to automatically adjust itself to the force of the wind, and shut itself off entirely in case of a storm, while it may also be regulated by hand as desired. An independently rotating frame carries a pair of adjustable rudders, which hold it in any position required. At the forward end of the frame are two pairs of wings, working together, which are ordinarily held closed by a weighted cord, but expand and screen the wind wheel whenever the wind becomes too strong.

The same inventor has also patented a system of Applying an Irregular Power, such as that produced by the intermittent action of a wind wheel, to driving light machinery regularly. This is effected by an ingenious combination of details, by which two weights are drawn upward independently, and their cords wound upon separate drums, the driving machinery being automatically shifted by whichever weight, in its downward motion, reaches the limit of its movement first.

Mr. C. T. Porter, of Newark, N. J., has invented an improved Journal Box of cylindrical form, which has inclined cheeks, and is secured by wedges and gibs in a novel manner. The inventor claims that by his mode of construction he is enabled to place the supporting wedges as near as possible to the line of thrust, and that it renders a horizontal engine equal to a vertical engine in supporting the shaft in the direction of the line of centers.

An improved Axle Lubricator, invented by Mr. E. W. Moyer, of Bernville, Pa., is claimed to be economical of oil and to exclude the dust. The axle is made hollow, with an interior reservoir, exit duct, and grooves packed with wicks; the cap also has an inclined oil duct, and the hub is similarly supplied with oil receptacles and packed grooves.

Mr. G. W. Ford, of Elba, N. Y., has invented a machine for Expanding and Contracting Metals, for use in upsetting tires and similar work. The gripping attachments are exchangeable, so as to be applicable to various kinds of work, and the power is applied by a pair of hinged levers having a powerful purchase.

An improved Grapple has been patented by Mr. A. L. Larwill, of Beaufort, S. C. The object of the inventor is to improve the construction of grapples used for digging phosphate rock, or for similar purposes, so as to relieve the strain on the claws and bent arms, and to adapt them for cutting a suitable quantity of rock to be brought to the surface. This is accomplished by adding to the grapple one or a series of cutting blades or chisels, for loosening and separating the rock.

Some new improvements in Saw Mill Head Blocks, patented by Mr. W. H. Abrams, of Eugene City, Oregon, are intended to render the action of the saw mill, to a great extent, automatic. This is accomplished by certain ingenious peculiarities in the gearing, by which the clutches are shifted and the pinions turned, with each complete movement of the carriage.

An improvement in Lewises, or appliances for connecting heavy blocks of stone to hoisting ropes, has been patented by Messrs. Walter Graham and J. A. Dennison, of Annisquam, Mass. A pair of wedge-shaped jaws, connected by a pair of links to a single link, are secured in an undercut recess of the stone by driving a key between them, and may be detached by knocking out this key.

An improved Wagon Jack has been invented by Mr. Simeon Smith, of Deersville, Ohio. It consists of a fulcrum cam lever, connected by pivot links, with a vertically guided post.

A device for Cleaning the Mud Pipes of Steam Boilers has been invented by Mr. Henry Green, of Chilton, Wis. It consists in a shaft which extends through stuffing boxes in the heads of the mud pipe, and carrying several screw blades or wings, so arranged that when the shaft is in its normal position none of the blades will extend downward and become imbedded in the sediment. By rotating the shaft the mud and water are thoroughly agitated.