

IMPROVED ATTACHMENT FOR INJECTORS.

Injectors of almost any form are liable to uncertainty of action, after becoming heated; as, for example, when, after a stoppage, steam is let on to start the apparatus before it has cooled. There are other conditions, the inventor of the device below states, under which an injector is also likely to fail, and thus to imperil the boiler; but all such difficulties, he considers, are effectually avoided by the novel attachment represented in the illustration.

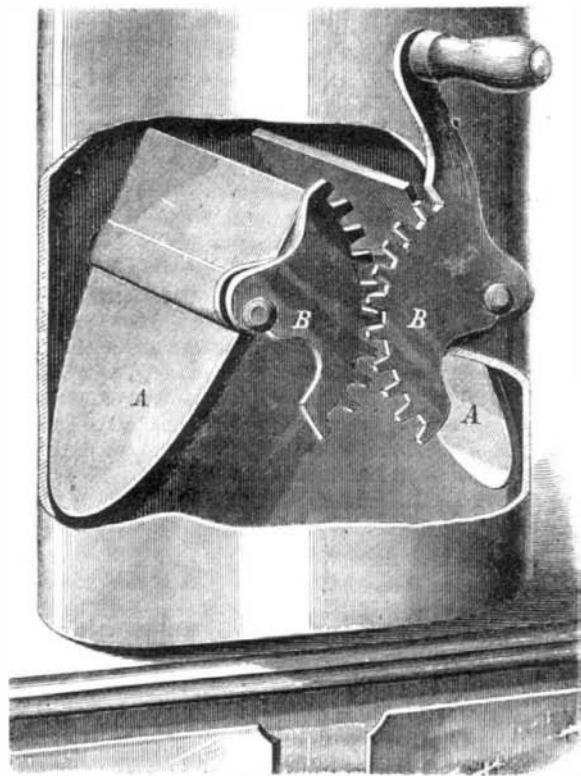
The apparatus is to be attached in the discharge pipe and between the nozzle of any injector and the boiler, and it consists of a lateral tube, A, introduced between the nozzle and a check valve, B, to the pipe which leads to the boiler. In the tube, A, sectional view, Fig. 1, is placed a valve, C, the stem of which passes through guides, and which is held open by a spiral spring when the steam is shut off, and the pressure thus removed. On the admission of steam, and as soon as the pressure of the same becomes greater than the power of the spring, the valve, C, closes. The steam, being thus prevented from escaping, opens the check valve, B, and passes into the boiler. The object of the check valve, placed between the overflow and boiler, is to shut off the boiler pressure from the overflow. If desired, the spring on valve, C, can be dispensed with and the same worked by hand.

A perspective view of the device is represented in Fig. 2. It requires no skill for its operation, as it is entirely automatic. With any injector, we are informed, it will lift hot water or feed under pressure. It is also claimed to obviate entirely the use of the pump. The simplicity of the invention is obvious, and its practical efficiency, it is stated, has been thoroughly proven by experience. It is now in successful use at the works of the Lehigh Zinc Company, Bethlehem, Pa., the Bethlehem Iron Works, Coleraine Iron Works, Redington, Pa., and in various other localities.

Patented through the Scientific American Patent Agency, February 9, 1875. For further particulars address the inventor, Mr. David Lees, or S. C. Stewart, Tyrone Forges, Blair county, Pa.

STEWART'S IMPROVED STOVE DAMPER.

From the engraving of the device herewith presented, it will be observed that the means used for closing more or less the interior of the pipe consists in double plates, instead of the single plate commonly employed. The double in-



clines thus formed, it is claimed, oppose the draft with less abruptness than the single plate damper, and besides may be more tightly closed than the latter.

The two plates, A, are pivoted separately, and are arranged so that they meet and close in the middle for shutting the damper. The pivots are geared together outside the pipe by segmental wheels, B, so that both are worked simultaneously by the same handle. When partially open, the plates incline upward toward the middle opening in a way which facilitates the draft, by directing it to the center of the pipe.

Patented April 6, 1875, through the Scientific American Patent Agency, to Dr. Jacob Stewart, of Moline, Rock Island county, Ill., who may be addressed for further particulars.

Amalgamation of Battery Zincs.

The simplest and quickest method is that of M. Berjot (a chemist at Caen), which consists in immersing the zinc in a liquid composed of nitrate of mercury and hydrochloric acid. A few moments is sufficient for the complete amalgamation of the zinc, however soiled its surface may be. With a quart of this liquid, which costs less than 50 cents, 150

zincs can be amalgamated. The liquid should be prepared in this manner:—Dissolve in warm water 200 grains of mercury in 1,000 grains of aqua regia (nitric acid one part, hydrochloric acid three parts). When the mercury is dissolved, add 1000 grains of hydrochloric acid.

The Galvanic Battery.

In regard to the economical application of electricity, no subject is so important as the relative merits of different forms of batteries. For illuminating purposes and lecture demonstration, we have hitherto had to rely upon the Bunsen or Grove battery. But, during the siege of Paris, a form of bichromate of potash battery, known as the Chutaux battery, was frequently employed to yield the electric light used on the ramparts. Count Moncel gives a full account of

battery will rapidly come into use for the purposes of lecture demonstration.

The Lightning Rod Man.

He drove his team close up to the fence, got down, and rapped at the door. The widow Gilkens opened it, when he said: "Mrs. Gilkens, I am cognizant of the circumstances by which you are at present surrounded, left as you are to trudge down the journey of life through a cold and heartless world—no longer sustained and encouraged by the noble one to whom you gave the treasures of your heart's affection, and bowed down by the manifold cares and responsibilities incidental to the rearing of eight small children on forty acres of sub-carboniferous limestone land; yet, Mrs. Gilkens, you are aware that the season is now approaching when dark, dismal, dangerous clouds at frequent intervals, span the canopy of heaven; and when zigzag streaks of electricity dart promiscuously hither and thither, rendering this habitation unsafe for yourself and those dear little ones; hence, therefore, let me sell you a copper wire, silver tipped, and highly magnetic lightning rod."

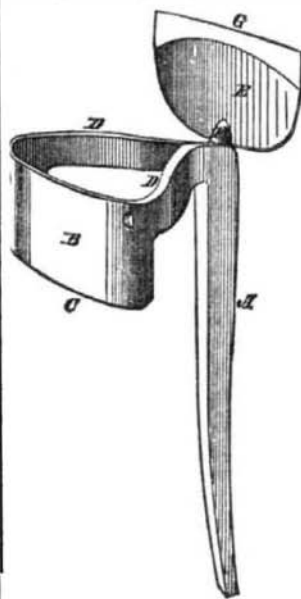
The woman staggered back a few paces and yelled: "Narcis! no fasten old Cronch!" In another instant a savage bulldog came darting round the corner of the house with bristles up, thirsting for gore. The dog had already mangled a machine agent and a patent soap man, and was held in great esteem by the better class of citizens for his courage and service; but when his eye met the hard, penetrating gaze of Mr. Parsons, his chops fell, and he slinked off and hid in the currant bushes. Then the man said: "My dear lady, you seem to be a little excited. Now, if you will allow me to explain the probably inestimable—"

"Dern ye, I know what will start ye," said Mrs. Gilkens, as she reached under some bed clothing, and brought forth a horse pistol; but owing to the shattered condition of her nerves, her aim was unsteady, and the charge of buckshot missed save where a few scattered ones struck his cheek and glanced off. A hard metallic smile spread over his countenance, as he leaned his shoulders against the door frame, and again commenced: "My dear madam, such spasmodic manifestations of your disinclination to make a judicious investment of a few paltry dollars—"

"Hi—eo!" shrieked the widow, and collapsed into a kind of jerking swoon, and before she had recovered a highly magnetic lightning rod decorated her humble domicile, and Parsons had the blank note filled out already for her signature.—*Madison (Ind.) Courier.*

IMPROVED TURPENTINE TOOL.

In gathering turpentine, it is necessary to have a tool for scraping the tree downwards, and one for pushing upwards. Mr. Walter Watson, of Fayetteville, N. C., has recently patented, through the Scientific American Patent Agency, an implement which combines the two appliances, as shown in the engraving. The shank, A, is to be inserted into a handle of any convenient length. B is the scraper, the edge, C, of which is sharp. The arms, D D, are made so strong that the pressure on the edge, C, may not deflect them from the horizontal position. The blade, E, has a sharp edge at G, and is attached to the shank, A, by the enlargement, F. By using one or the other of



these blades, any globules of resinous matter which exude from the bark of the tree can readily be detached.

Steam Transportation on the Canals.

As soon as the Erie canal opens, the Baxter Steam Canal Boat Company will resume operations with twelve boats, each having a carrying capacity of about 225 tons. Contracts have been made for the construction of six additional boats, which are expected to be ready for use in July. When these boats are built, it is the purpose of the Company to send one from this city daily. It is believed that fifteen days will be the average time consumed by each boat in making the trip from New York to Buffalo and return, not including the time occupied in loading. Improvements have been made in construction by which space is gained fore and aft, but no attempt has been made to secure greater speed. As the canal is occupied by boats drawn by horses, the steamers must run carefully to avoid collisions.

The following method is used in Germany for the preservation of wood: Mix 40 parts chalk, 50 resin, 4 linseed oil, melting them together in an iron pot; then add one part of native oxide of copper and afterward 1 part of sulphuric acid. Apply with a brush. When dry, this varnish is as hard as stone.

LEES' ATTACHMENT TO INJECTORS

different forms of the Chutaux battery, and furnishes some interesting data for the comparison of the Chutaux and Bunsen battery when giving the electric light. The following results were obtained from the two batteries, each being composed of 48 cells, and each working for two hours:

BUNSEN'S BATTERY.			
At beginning.	Light equal to	End.	Mean.
100	66		87.5
Carcel lamps.			Surface of zinc employed.
			318.61 square inches.

CHUTAUX BATTERY.			
At beginning.	Light equal to	End.	Mean.
132	63		97.5
Carcel lamps.			Surface of zinc employed.
			22.88 square inches.

In working each of these batteries, for half an hour successively, the following results were found:

	BUNSEN.		CHUTAUX.	
	Light equal to	Carcel lamps.	Light equal to	Carcel lamps.
1st period of half an hour.....	100	66	132	63
2nd period of half an hour....	134	66	100	63
3rd period of half an hour....	106	66	80	63
4th period of half an hour....	66	66	51	63

According to these figures, the bichromate of potash battery flags much quicker than the nitric acid battery, a fact which evidently depends on the polarisation of its plates, to which it is always liable. It is, however, more economical.

One rather important advantage of these batteries is that they can be kept in a closed place without giving out any odor or unhealthy emanation; besides this, the liquid evaporates slowly. The author had also been able to verify the statement that, after a battery had been charged for more than a year, and then left alone, it had hardly lost anything of its power. The relative consumption of zinc and acid, and the comparative cost of working of the whole battery, are not given; but so far as the foregoing data are concerned, the Chutaux evidently promises extremely well. So says the *Telegraphic Journal*. For lecture purposes, an electric light is rarely wanted for more than half an hour, the great desideratum being a rapid means of charging and discharging the battery. In this respect nothing could be better than the Chutaux; being a single fluid battery, the plates can be raised and lowered easily and rapidly. One of the characteristics of this bichromate battery is the constant percolation of fresh solution through the battery; by this means a good deal of the bad effect of polarisation is got rid of. Here is the composition of the solution for his batteries, recommended by M. Chutaux: Water, 1,500 grains; bichromate of potash, 100 grains; bisulphate of mercury, 50 grains; sulphuric acid, 200 grains. The electromotive force of such a cell is at first more than twice that of a Daniell cell, but in duration it cannot, of course, be favorably compared

The cost of working the Chutaux, Count du Moncel finds to be about 35 cents, which he states is less than that of a Daniell cell, the advantage being that in the Chutaux an electromotive force of nearly double is obtained, and an internal resistance less than half that of the Daniell, besides other obvious advantages noticeable in the working of the two forms. A battery of 24 Chutaux cells, according to our author, can furnish a rarely brilliant electric light at a cost of about 15 cents per hour. If this be the case, the Chutaux

The Cincinnati Circular Saw Test.

During the Industrial Exposition held in Cincinnati last fall, a competitive trial between the circular saws of nine well known makers took place. The contest was briefly alluded to by us at the time: and since its occurrence, we have noted the fact that the prize offered, namely \$100 in gold, was carried off by the solid-toothed saw made by Messrs. Emerson, Ford & Co., of Beaver Falls, Pa. The results obtained, owing to the thorough manner in which the competition was conducted, were very complete. We find them in tabulated form in the official report of the jurors, and reproduce them below, not doubting but what they will be of much interest to wood workers generally.

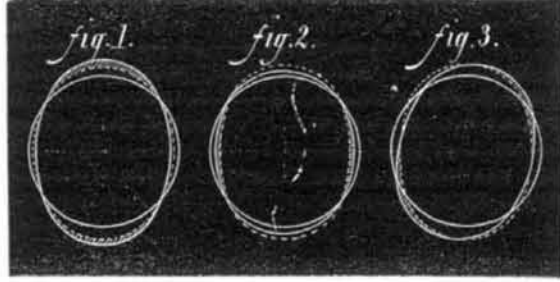
The saws were of a uniform diameter of 56 inches, and each was required to cut a poplar log, 20 x 20 inches, and an oak log, 16 x 16 inches, and to make from each timber, respectively, 16 and 12 boards; or in other words, to saw through 300 and 176 square feet of lumber.

It will be observed from the annexed table that the competition was exceedingly close, and that the winning saw was narrowly pressed by the Hoe planer tooth tool. Comparing the times, the Hoe was but one second behind on the poplar log, and fifteen seconds on the oak log; but on the other hand, the Emerson had the advantage of slightly more revolutions, and in one case a faster feed. The Hoe furthermore produced twelve perfect oak boards, and in this respect stands ahead of any saw on the list. Taking results through, however, the award of the prize to the Emerson was a just one, but substantially the distinction between it and the Hoe saw is so small as to amount to nothing in practical use. There is no doubt but that both saws are exceptionally good tools; perhaps we may say each is the best of its class, the Emerson of the solid-toothed, the Hoe of the planer-toothed implements. At all events, both did admirably well; and for this reason, both are entitled to the best consideration of the public.

The following is the table above alluded to.

Table with columns: Contestants in the Trial of Saws at the Cincinnati Exposition, 1874. Includes Kind of Wood, Diam. of Saw, Revolutions per Minute, No. of Teeth, Eye, Teeth, Kerf, Size of Log, No. of Boards, Time, Square feet of Lumber, Horse Power Indicated, Feed, Perfect Boards, Imperfect, Square feet lumber per minute, and Percent of power used.

not four floods a day, as your correspondent supposed, but merely a diminution of the lunar tide. When the sun and moon form an angle of 45°, or 135°, or any other oblique angle, the solar wave is on one side of the lunar wave, causing, as it were, an inclination of the resulting wave, which may be in advance or in rear of the lunar wave, according to the relative position of sun and moon. The period of the



high tide is, therefore, subject to slight variations; but the mean duration coincides mathematically with the mean apparent motion of the moon.

The height of the wave is in proportion to the depth of the sea, or to the quantity of water exposed to the tidal influences.

The velocity of a wave must not be confounded with the velocity of the transmitter of the wave. The height of the tidal wave is so small in comparison to its length that the motion of the transmitter is next to nothing, comparatively speaking, and it can therefore not do much harm in dashing upon the shore. For the same reason, we have no means of observing the wave on the high seas.

The tidal influence tends to draw the tidal wave round the earth at a rate of about one thousand miles an hour, while the natural velocity of waves (depending on the depth of the sea) is considerably less. The effect will be similar to that of ringing a bell by pulling at intervals which are not in harmony with the period of oscillation of the bell. Such a

acid. It is of great value in certain forms of venereal diseases, which, according to the last developments, are of parasitical nature.

The first specimens of salicylic acid ever brought to America were brought here by me in June last, and given to Professor N. R. Smith of this city, and to the Academy of Medicine in Ohio, who adopted it (on trial) into their hospital; they afterwards published my investigations and their report, edited by Professor Orr, in The Clinic of November 7, 1874.

The first article ever written upon the use of salicylic acid as a disinfectant was written by myself in Leipsic in May, 1874 (Cholera Asiatica, published under the auspices of the Medical Board, afterwards translated into English for the Baltimore Gazette of July 10, 1874).

My object in thus particularizing is to present my claim to having introduced salicylic acid into this country. I hope you will do me the justice to insert this.

GEO. HALSTED BOYLAND, M.A., M.D.

Maryland Academy of Sciences.

American Steel Manufacture.

To the Editor of the Scientific American:

We notice in your paper of May 8, 1875, an article entitled "The Recent Remarkable Progress in the Steel Industry," which, we think, does us an injustice, unintentional, no doubt; but at the same time, we think you ought to correct the same. You say "the Port Henry product yields seventy per cent in the furnace, and the deposit is seeming inexhaustible. The ore, however, is not capable of being smelted into steel."

The remark is correct as applied to our Old Bed ore; but the person furnishing you with information overlooks entirely our New Bed ore, which is used for Bessemer steel purposes. The whole supply, nearly, for the last four years, has been used by Messrs. Witherbees and Fletchers, in their blast furnace, for making pig iron, all or nearly all of which was sold to Messrs. John A. Griswold & Co., of Troy, for making Bessemer steel. Witherbees & Fletchers shipped them about 3,000 tons of the same in this present winter and spring. The Cedar Point Iron Company of this place have a new blast furnace nearly ready to blow in; and they expect to use this same ore for making iron for Bessemer purposes.

WITHERBEE, SHERMAN & CO.

Port Henry, N. Y.

To the Editor of the Scientific American:

In an article in your issue of May 8, you speak of the Crown Point ore "from which steel can be at once produced, without admixture of other ores." By this the reader will understand that the pig iron from the Crown Point ore is of a quality that, by itself, will make first quality Bessemer steel.

We believe that you will, by inquiry, find that this is not correct; and while the Crown Point iron can be and is used for Bessemer steel, it is with a mixture of other irons which are lower in phosphorus and sulphur. The furnace at Crown Point is allowed a maximum limit, in its pig iron, of 0.35 per cent of phosphorus, and 0.23 per cent of sulphur, proportions which are not admissible in Bessemer steel irons without an admixture of other irons which will bring down the average of phosphorus and sulphur.

Cleveland, Ohio.

H. B. TUTTLE.

SCIENTIFIC AND PRACTICAL INFORMATION.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

Mr. F. W. Clarke, of Cincinnati, Ohio, was appointed, at the last meeting of the above named society, to make an effort to obtain a full attendance of chemists, manufacturers, and others interested in the progress of chemical science, a subsection of the Association being especially and permanently devoted to that science and its branches. He asks us to state that the next meeting will be held at Detroit, Mich., commencing on August 11.

RECENT ASTRONOMICAL DISCOVERIES.

The first calculations based on the data obtained by the transit of Venus observations have been announced by Pirseux. The solar parallax determined is 8.879 seconds, data noted by the French observing party at Pekin being used. A telegram from the English eclipse expedition at Bangkok, Siam, announces success in photographing the spectrum of the chromosphere, during the recent solar eclipse. Eight good pictures of the corona were taken.

The discovery of another small planet, No. 144, has been made by Perrotin of Marseilles.

FAULTS OF CONSTRUCTION IN BATTERY CONTACTS.

Emile Girouard points out that one great obstacle in the way of our obtaining cheap electricity lies in the defect of the contacts. The rivets which connect the zinc to the carbon are often ill made; and after having been in use for some time, they are corroded all round, and the oxidation prevents the contact from being perfect. The current, consequently, is unable to pass, unless the tension is considerable enough to overcome the bad conductivity of the oxides. The author proposes to obviate these defects by having all connections, etc., made of platinum.

O. E. W. says: "The SCIENTIFIC AMERICAN is now in its thirtieth year; and during the entire time. I have scarcely missed reading a dozen numbers of it. All that you claim for it and much more is true; it cannot be excelled, and no other paper of its kind equals it. I want to thank you now for the thousand useful things that I have gathered from it, and I hope that its pages may never be less."

Correspondence.

The Cause of the Tides.

To the Editor of the Scientific American:

On page 273 of your current volume, Professor S. H. Trowbridge inquires into the cause of tides. I will try to dispense his doubts in as few words as the subject will admit of.

It is beyond doubt that tides are caused principally by the action of the moon, as their periods keep pace with the apparent motion of the moon, and have done so for centuries. We know that the earth and moon are attracted by each other; and on the other hand, we know that these two bodies are not approaching. There must, therefore, evidently exist another force which balances the attraction. It is generally said that the moon rotates round the earth once a month, but in reality both moon and earth rotate round their mutual center of gravity. By this peculiar rotation, a force akin to centrifugal force is produced, which prevents the approaching of the two bodies. Now we see that there are two forces acting between earth and moon, which are in perfect equilibrium in the centers of either of the two bodies. But the attractive force is greater in those parts of the earth that are nearer the moon, and causes an upheaval of water on that side. On the opposite side of the earth the contrary is the case, namely, the attraction towards the moon is less than in the center of the earth, and that force, which keeps moon and earth apart, gets the overhand and causes an upheaval of water on that side also. The tidal wave produced by the moon must, therefore, be necessarily a double one. The wave caused by the sun is double for the same reason. On the side of the earth nearest the sun the attraction is greater, and on the opposite side the centrifugal force, caused by the orbital motion of the earth, is gaining on the diminished attraction.

A tidal wave caused by the moon alone would have the shape shown by dotted line in Fig. 1 (greatly exaggerated in dimension, of course). If now the sun and moon form a straight line with the earth, no matter whether on the same or on opposite sides, the solar wave will be produced in addition to the lunar wave; and the real tide is shown in the diagram, where the additional solar tide is cross-lined. We see that spring tides are produced in both cases. When, however, sun and moon are in quadrature, the solar flood will be on the lunar ebb, and the solar ebb on the lunar flood, as indicated in Fig. 2. A glance will show that the results are

motion will be very irregular, and will be nearly nil at times. The original tidal wave, transmitted with the greater velocity, will interfere with the naturally transmitted tidal waves from other portions of the same sea; and as this interference is of a purely local character, it will be easily understood how it happens that, on some shores, the tidal wave does not exceed 2 or 3 feet, while on others, where the interfering waves meet each other, the tide may rise even to a height of 30 or 40 feet.

The water of the English Channel is very shallow, and therefore the original tidal wave is very small. However, the reaction of the tide of the deeper Atlantic produces a wave in the channel which progresses towards the east and reaches the North German coast more than 12 hours after its origination. This and other similar facts are not in the least in opposition to the present theory, which the most careful criticism only confirms. HUGO BILGRAM. Philadelphia, Pa.

Salicylic Acid.

To the Editor of the Scientific American:

Your very well written and explicit account of salicylic acid, appearing in a recent number of the SCIENTIFIC AMERICAN, leaves but little to be said upon that subject. However, the statement that salicylic acid has not yet been experimented with in contagious maladies will admit of modification. Almost the first experiments ever made with this acid were made by myself, in Leipsic, at the time of its discovery by the learned Kolbe, who requested me to make such experiments and report them to him. They are briefly as follows (see The Lancet, London, November 28, 1874): Taking two vessels, a portion of the dejections of a patient suffering with violent intestinal catarrh (there being no cholera then) was left in each; into the one was thrown two drachms salicylic acid, into the other nothing. A microscopic examination afterwards revealed parasites (leptothrix and infusoria) in the second, while the first remained entirely free from organic matter. Salicylic acid also eradicates the urate of ammonia from urine. It is, in the crude state, a salmon-colored glistening powder, and it is used in this form to disinfect vaults and cesspools.

It has been urged against this acid that it is not so easily soluble as carbolic acid; but the trifling delay may be overcome by the addition of one part of the phosphate of soda, which makes the solution perfect at once, and does not in any manner affect its disinfecting agency. When thrown in spray from the atomizer, it does not evaporate like carbolic