ers are provided at one end with gripers to grasp the wire, and the other ends of the levers are operated by a screw rod to stretch the wires and draw the ends together.

Messrs. Joseph B Eaton and Charles Latham, of Shamokin, Pa., have patented an improved Machine for Cutting and Threading Pipe, which consists in a divided and hinged sleeve, having at its ends projecting rims for receiving the ends of a forked lever, which carry pawls for engaging ratchets carried by the rims. A thread cutting die is fitted to the sleeve, and the sleeve carries a leader for starting the thread.

Mr. James Keefe, of Port Eads, La., has patented an improved Fastening for Dredges, for connecting the backing chain with the dipper handle, to enable the dipper to be lowered to the bottom at the desired angle without its being necessary to throw the drum out of gear.

An improved Pump has been patented by Mr. Friederich A. Helmecke, of Round Top, Texas. The object of this invention is to furnish, for the purpose of sprinkling liquid poison on cotton plants, as well as for sprinkling and watering purposes, and for extinguishing fires, an improved pump of simple and effective construction, that may be operated with great facility, and used in connection with any suitable receptacle.

Correspondence.

Curious Suggestion for the Measurement of Stellar Distances.

To the Editor of the Scientific American:

I read with much interest your speculative editorial, a week or so past, on the possibilities of Professor Edison's new heat measuring instrument, the tasimeter.

Granting that it can be so sensitively made and adjusted as to detect a star by invisible radiations, then I would propose, for your criticism, an adaptation which I have not seen advanced heretofore, namely, for the measurement of distances of heavenly bodies from the earth.

If it is not already known, it would be a matter of comparatively easy experiment to establish a ratio of increase or decrease of indication on the scale of the instrument for a given temperature measured at regularly approaching or receding distances. For instance, the heat of the flame of a candle, being, say, 10° at 12 feet distance, will indicate on the scale, say, 9° of arc; removed to 15 feet, the indication will be, say, 8½°; and so on regularly for the increase or decrease of distance. So that if at the least distance from the instrument measurement is made of a heated object (which, if at a greater temperature than that previously ascertained, might be reduced to the necessary quantity), and measurement is then made at an increased known distance from the instrument, by the quantity indicated on the scale, with the law previously established, we might ascertain by mathematical formulæ the distance of the body from the point of observation. To illustrate, we will take the sun for example. Let one observer observe at exactly the mid-day meridian passage, and another, at the same instant of time, so far west of the first that the distance the observed ray has to travel is, say, one, two, or three thousand miles further, as the case may be, to the western observer than to the eastern: it being understood that observation is made at the same point on the sun by both observers; hence it will be seen that if the distance between the instruments is known, and the instrument sufficiently sensitive to detect the loss of heat by the passage through the larger space, we can then at once determine the distance of the sun from the earth, and bid farewell to slow coming transits.

To give an idea of the sensitiveness of the instrument required for such an observation, it is only necessary to state that, assuming the distance between the two stations of observation to be 3,000 miles, and the already known distance of the sun as about 95,000,000 miles, such an instrument, to detect a difference in the loss of heat, coming from a source so far distant, while traversing 3,000 miles, or 3-95,000 of the whole, must be able to detect the loss of heat for every inch of removal of a body distant half a mile from the instrument! Can it be done?

"It's a big thought to think;" and yet, if it is possible for the spectrum to pick up and photograph upon the eye the millionth part of a grain of matter, why is not this and more quite as possible?

Ascribing all honor to the inventor of this most wondrous instrument, putting new possibilities and grand thoughts into the minds of men, I am, JOHN THOMSON.

New York, August 24, 1878.

A Note from Mr. Edison on the Above.

To the Editor of the Scientific American:

Referring to the communication from Mr. John Thomson which you kindly sent me, I have every reason to believe that the tasimeter will do all that he proposes. It certainly is infinitely delicate, and its only limit seems to be in dexterity of manipulation. Last evening, while using the Thomson galvanometer, the spot of light went off of the scale when my hand was placed in line with the tasimeter standing at a distance of fifty feet away from the instruments.

Menlo Park, N. J., Sept. 4, 1878. T. A. EDISON.

The First Gold Payments.

To the Editor of the Scientific American:

We notice in No. 9, current volume, of your paper, a **statement that the Yale Lock Manufacturing Company paid** off in gold August 15. Being subscribers to the SCIENTIFIC AMERICAN, we would call your attention to the fact that we paid our May pay roll in gold. So far as we know, we made the first gold payment on pay roll of any manufacturers in the country. WILCOX, CRITTENDEN & Co.

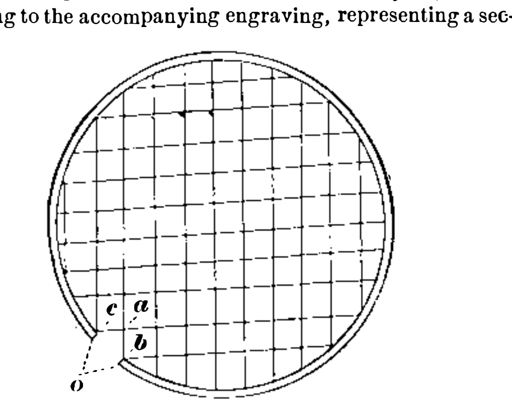
Middletown, Conn.

The Loss of Expansive Force of Steam at High Temperatures.

To the Editor of the Scientific American:

"Water and steam cannot be forced through narrow openings in the red-hot generator of a steam engine." Perham, in *Quarterly Journal of Science*, July–December, 1827, p. 471, also *Annal. de Chim. et de Phys.*, xxxvi., p. 435 (see *Silliman's Journal*, pp. 36–245), refers to the above principle as a well known fact, and in explanation it has been assumed that "steam, at a very high temperature, loses its expansive force." This does not seem a feasible supposition, namely, that heat, in certain degree, applied to water, renders it expansive, but in a greater degree it ceases thus to affect it.

Cannot this phenomenon be more satisfactorily explained? Referring to the accompanying engraving, representing a section of steam generator, having a narrow opening, *o*, I have drawn lines through this diagram equidistant and intersecting each other, as at *a*, *b*, *c*.



Let *a*, *b*, and *c* represent the molecules of water no longer divisible by heat, while the lines represent the repellent force of heat operating as inflexible rods. Now suppose the molecules of water to be separated, as at *c*, *b*, until two of them cannot pass through the orifice, *o*, abreast, then the repellent force of the heat will prevent the escape of the steam until the orifice is enlarged or the heat diminished.

If this be the correct explanation it follows that it would be no difficult task to ascertain the number of molecules of water, at a certain temperature, in a given space.

W. A. G.

The Spanish Language.

The Spanish language is derived from the Latin. It has preserved none of the various indigenous forms of language; of all the Latin tongues it is the purest, for it has taken nothing from the barbarian conquerors who overran Spain; and in spite of several centuries of foreign occupation, only a few foreign words have retained a place in the language; it is homogeneous. Much more Latin than Italian is, it does not disfigure its words either by elisions more or less arbitrary, or by illogical constructions, and its syntax is strictly laid down; it does not easily lend itself to the caprices of fashion or the whims of authors; it still remains what the sixteenth century authors made it.

Even in the Middle Ages the language of poetry was already formed, and required only the necessary lapse of time to polish it. Spanish literature flourished from that period, and Cervantes found ready to his hand the marvelous instrument which was to create the first masterpiece of really European literature.

The most singular feature of the Spanish language is its capability of being a perfect instrument at once for prose and poetry. In this respect it surpasses all others; Greek alone can be compared to it. As if this marvelous language were destined to be perfect in every way, it is as well adapted to the portrayal of the most vigorous passions as to that of the tenderest sentiments.

In prose, as in verse, the language shapes the idea, and, as it were, carves and moulds it. The great poet Villegas, had already, in 1500, adapted it to every variety of Greek rhythm and meter. Ercilla, one of the conquistadores, about the same time, wrote his epic poem "Araucana," in language as delicate and flexible as his own sword. Quiros, and Cervantes himself, drew poetical arabesques which throw the modern romantic school into the shade.

But let us leave these highly educated authors, distinguished Latinists, Hebraists, and Hellenists, and let us seek the fountain head, the unknown, popular, simple, uneducated authors, the romanceros (ballad singers).

In those times—more glorious, perhaps, than we think—whether war were carried on against Goth or Vandal, Saracen or King, the romanceros sang of everything—a romance of religion or love, a rustic song, a heroic deed, a ballad, civil or political history, celebrated paladins, noble ladies, provincial rights, liberty, famous palfreys, the Cid Ruy Diaz de Bivar and Ximena, Ogier and Durandarte. A fine and copious stream of poetry, drawn from the very fountainhead—the heart, the head, and the arm. What sap! what vigor!

History may break off, monks may impose silence, but history will live on in ballads—true, national history, the **progress of civilization, exalted faith, *fueros* (charters),** gallantry, chronology, sieges, dynasties, marches, and provinces, bishops and clergy, civil rights and canon laws, political life—all these the ballad treats of, and the language allows of it. Without a settled language it would have been impossible. We may judge of the glorious artists Spain possessed in those days when she outshone all Europe by the works they have bequeathed to us.

After the resplendent talents and literary genius of the fifteenth and sixteenth centuries came, alas! the wretched, passionless classicists; conventional poetry, more varied, more regular, assimilated the literature of Spain to her kings, swathed in etiquette, stiffened in ceremonial. It no longer attracts by its national vigor; poetical originality fades away; authors seek rather to imitate, to draw from Greek and Latin sources; impotent rules of poetic art can only supply lifeless forms, as is always the case where inspiration is wanting; art vainly seeks to support talent. All the works of these authors of the decadence have been preserved, and are still admired. Why? The language has saved them; it has given a body to the feeble idea, like those preparations which give substance and firmness to vaporous gauze.

Essentially poetic in character, being essentially dreamy and contemplative, the Spaniard still preserves his ancient gravity, and his language is the most solemn as well as the most poetical in Europe. It sings in a serious manner the subject which inspires it, and this seriousness adds to its grace. Strength, grace, and dignity are the principal characteristics which render it a language worthy to be spoken by the gods. E. OGIER.

[To the foregoing eloquent tribute to the literary merit and importance of the Spanish language, we may add the more prosaic, yet to American students and business men the more suggestive remark that the Spanish tongue competes with the English for the mastery of the New World. With the single exception of Brazil, the language of the South American States is Spanish. It is also the dominant language of the West Indies, Central America, and Mexico. These are our neighbors, and they furnish the nearest market for our surplus goods, as well as the sources of many of our importations. Every year draws the commercial ties between us more and more close, and every year makes a knowledge of Spanish speech more and more valuable to our manufacturers and merchants. During the coming winter evenings our young people will do well not to neglect the pleasures and profits of Spanish in choosing their studies.—ED.]

Optical Effects of Intense Heat and Light.

The following facts have lately come under my observation at the rolling mills at this place:

While looking at the eclipse of the sun July 29th, I handed the glass to one of the mill "heaters." He at once told me he could see as well with the naked eye as with the smoked glass. I then tried another "heater," and he at once repeated the same statement. I then went to the rolling mill and tested every "heater" at his furnace. They all told the same story. I hunted up every "heater" in the town except two (who were not found), over twenty in all, and every one declared he could see the phenomenon, and all its phases, as well or better with the eye unshaded. I took the precaution to test each one by himself, told him nothing of what I expected, or of the testimony of others. I made no suggestions to any of them, but let each tell his own story. All told the same tale; one peculiarity all agreed to—the image in the glass was upside down from what they saw with the naked eye. They would describe many peculiarities of color which could not be seen by others with the aid of the glass. It should be remembered that the "heater" has to see his iron in the furnace while it is enveloped in a flame whose intense glare prevents unskilled eyes from seeing anything, an education of the eye peculiar to this class of workers, as no other class of workmen is exposed to the same degree of heat or light.

I noticed as soon as the eclipse had progressed some time that I became nervous. I observed the same fact in many others about me. My wife at home did not think of the phenomenon at first, but became so nervous that she had to rush out of doors; she then saw the eclipse for the first time. I found this nervousness more in women than among men, chiefly in persons of debilitated frame, such as convalescents. Is this magnetic?

In accordance with your request, I repeated the experiment of Ericsson, and submitted a spherical piece of iron, eight inches in diameter, to a heat of over 3,000° Fah. It was carried to an almost melting point, withdrawn from the flame and placed on a stand. It had the appearance of a disk at all distances tried, up to over 100 feet. As seen by Mr. Hughes, the chief engineer of the mill (one of the most scientific men in his line in the West), myself and others, it was perfectly flat. The convexity did not appear; it was, while in this state, to all appearance no longer a sphere, but a disk. As the iron cooled off it resumed its original appearance of a sphere. Our mill men were much surprised by this phenomenon which they had been seeing all their lives, but till now had never observed.—*Joshua Thorne, M.D., in the Kansas City Review.*

TO FACILITATE the loading of heavy guns it has been found of advantage to enlarge the bore at the muzzles by half an inch or more, by turning out the metal to the depth of about two inches. The process is termed "bell mouthing," and is to be applied to all the guns in the English service of ten inches and upward.

The Lontin Electric Light.

The electric light chiefly known to English visitors to Paris is the Jablochkoff candle, which displays its beautifully white glow from opalescent glass globes placed at a great height along the Avenue de l'Opéra and among the trees of the Orangerie. There is, however, another electric light used in Paris by the Chemin de Fer l'Ouest, for example, which has just adopted the Lontin system for lighting the Gare St. Lazare, the station at which the traveler by the Newhaven and Dieppe route enters the French capital. The Lontin light is now exhibited in London outside the Gayety Theater, and by comparison with its pure white radiance the gas lamps of the Strand appear to burn with a dull yellow glare. So far as the illumination of open spaces, streets, and houses is concerned, the future, supposing gas to be to a certain extent superseded, appears to lie between the Lontin and the Jablochkoff light. The Siemens light has proved of great value for the purposes of light-houses, where great intensity is desired. For ordinary uses, however, the problem is to moderate, not to increase, the intensity of the light. The Jablochkoff and Lontin lights have many points in common, and, as the former light has already been described, it is unnecessary to enter into all the details of this method of illumination. The points of importance in each are the generation of electricity by a machine, the distribution of the current, and the supply and regulation of the "candles." To the Jablochkoff lights the electrical force required is supplied by a Gramme electrical machine. The Lontin light is worked by a machine invented by M. Lontin himself. It produces at will a unique current or multiple currents, direct currents, and inverted currents. These can be distributed on several circuits. A great advantage in distribution is thus obtained. The machine produces several focuses of light, which can be entirely independent of one another. With a single machine 36 lights have already been produced. The motive force employed to produce a light equal to 100 Carcel burners is half a horse power. A Carcel burner is a conventional measure, the standard of which is a Carcel lamp burning 42 grammes of purified colza oil in an hour. The electric force having been produced by the Lontin machine is conducted toward the "candles."

In 1813 Sir Humphry Davy took two hot coals, put them in contact, and made a voltaic current pass through them. He then slightly separated them, and saw between them a bow of fire, which he called the electric arc. The "candles" of the Jablochkoff and Lontin lights are sticks of carbon representing the coal used by Sir Humphry Davy. M. Jablochkoff employs kaolin in addition to carbon in a very ingenious manner, but the main superiority which the modern manufacturers of electric lights have over Sir Humphry Davy is in the superior economy with which electric force is now elicited. The carbons are vertically placed, one above the other, in the Lontin light as in that of M. Jablochkoff. The light comes not only from the electric arc between them, but also from the carbon candles themselves, which become incandescent and are consumed. A clock work regulator advances them as they waste away, and it is stated that to such perfection has this contrivance been brought that for a week or more the lights at the Gayety have required no adjustment during the four hours for which they burn every night. Having once been set, the regulator has each night advanced the points without any aid from men. At Paris little accidents are not unfrequent with the electric light. The Avenue de l'Opéra is occasionally left in sudden darkness by some *contretemps*, and anything which renders this result unlikely to happen is, of course, an improvement. A Lontin light exhibited in experiments at the Paris Exhibition has remained luminous for 21 hours. The Lontin regulator and the Lontin machine are, it will have been seen, the specialty of this invention.

The lights at the Gayety are worked by a steam engine in the *Echo* office. For the display of the light as a novelty in a shop window a small gas engine would probably supply sufficient motive force to bring the Lontin electro-magnet into vigor. The wires which convey the current pass under the road to the theater, and might be prolonged to Charing Cross, for instance, and Covent Garden Theater, so that all three points could be lighted at once by the same machine. The advantages which this, like the other systems of electric lighting, possesses over gas have been summarized as follows: Gas emits a fetid odor; the electric light is without smell. Gas may occasion explosions and fires; the repairing of the pipes is often difficult; great heat is developed together with the light; the flame is always colored even when gas has been completely purified. In the transmission of the electric light the pipes are replaced by wires; the voltaic arc diffuses very little heat (the hand may be held with impunity 12 inches above the Gayety lamps), and the light attained is white, perfectly compounded of all the colors in the spectrum, like sunlight. Indeed, it is so white that spinners and dyers can utilize it for sampling their stuffs. It may be added that the appearance of the lamps when sufficiently roughened glass is used is very beautiful.—*London Times.*

Canning Fruit Cold.

A lady in Springfield, Mass., according to the *Union*, has been making some experiments in putting up canned goods without cooking. Heating the fruit tends more or less to the injury of the flavor, and the lady referred to has found that by filling the cans with fruit and then with pure cold water, and allowing them to stand until all the confined air has escaped, the fruit will, if then sealed perfectly, keep indefinitely without change or loss of original flavor.

The Sewerage and Irrigation Farm at Bedford, Eng.

In a thickly populated country like England, the uniform removal of offensive matter from the dwellings is of immense importance. The health, comfort, and decent habits of the inhabitants are mainly preserved by the regular removal of excreta and other impure feculent accumulations from their habitations. For such salutary purpose no method that has hitherto been devised has succeeded in an equal degree with the water closet system, combined with well arranged sewerage, and a proper disposal of the effluent contents. Yet many towns are still deficient in sewage appurtenances, and pollute their brooks and rivers with the noxious refuse of their imperfect drainage. It becomes, then, important to inquire respecting the sewage contrivances of such places, where they have been already most elaborately and successfully executed, with a due consideration in what respect they may have been imperfect, with suggestions for improved methods, the expense of their construction, and the average cost of their maintenance.

In the town of Bedford a system of water, sewage, and irrigation works has been in operation for the last ten years which has been attended with satisfactory results. Previously, some imperfect drains polluted the beautiful River Ouse, and the greater part of the houses had offensive middens and cesspools. The town is in many respects unfavorable for drainage, lying low in the Ouse Valley, and being deficient in declivities. The fall in the lower parts is very limited, but the disadvantages have been successfully surmounted. The plan consists of a main sewer into which, from all parts of the town, lateral drains are discharged, and at the terminus of the main sewer it empties itself into a tank 16 feet deep, so that an artificial fall is obtained, from which it is pumped up, and distributed by pipes over the irrigation farm, which consists of about 180 acres. The pumping and irrigation works are distant a mile from the town.

The population of the town is about 19,000, and from the water works receives daily 350,000 gallons of water; the greater part of this, of course, passes from the houses and streets into the sewers, which, in addition, take a considerable quantity of subsoil drainage, making together about 700,000 gallons daily to be pumped up, and distributed over the farm. So much of the subsoil drainage passing into the sewer is owing to the main drains not having been made water tight, which is certainly a defect, for a subsoil drain, and a sewer when properly constructed, are not convertible. The sewers are intended to convey offensive fluids and excremental matter from our habitations, the ultimate disposal of which, and its transformation to an innocuous state, has been considered a question of difficult solution. The subsoil drain is intended to convey from the land the surplus water that it may receive, and it may properly be discharged into and supply the regular water courses.

So large a quantity of water passing into the sewers causes the manure to become excessively diluted, and, as a liquid manure, it does not contribute so much richness to the soil as many suppose; and what fertilizing matter it does impart to the land is soon exhausted by the rapid vegetation. The great value of the irrigation is not so much for the solid matter held in solution, as maintaining a constant and sufficient supply of moisture in the arid seasons. So far from land irrigated with sewage becoming surcharged with manure, to keep it in good condition it will bear a considerable quantity of solid in addition.

A subsoil drain should be made of porous bricks or tiles, to allow the water to percolate through them, so as effectually to carry off the moisture with which the ground may be overcharged; but a sewer should be perfectly water tight, as the quantity of water thrown down our closets, and discharged after domestic usage, will render the contents of our sewers sufficiently fluid. Beyond this, for purification or clearing away obstructions, occasional flushing will accomplish all that will be required.

The land, being near the town, is heavily rented. In such situations it is everywhere let at, what is called, accommodation price, being often required for purposes which are not expected to yield a direct agricultural profit. The average rent—it is rented of several landlords—is about five pounds per acre; but it is very suitable for the purpose, being on a bed of gravel, and the sewage water is rapidly absorbed by the soil. Excepting in very rare instances, no unpleasant smell can be observed on going over the farm, as the sewage, passing immediately into the ground, at once becomes deodorized.

The sum expended in engineering works, buildings, pumping apparatus, and embankment was £25,000, which was borrowed, to be repaid with interest by half yearly installments running over 35 years. It would be unreasonable to expect any portion of this sum to be obtained from the profits of the cultivation, as, although directly paid out of the rates, the public is fully remunerated for the outlay by the important benefits conferred. Previously to the establishment of the sewage works, each housekeeper was at considerable expense in the removal of the offensive refuse matter, which may be considered a fair set off against the increased assessment, besides the improved healthiness of the town, and its having a clear magnificent river flowing through the town, instead of a stream turbid with various pollutions.

The production of the land has been extraordinary, and it is admitted that on no irrigation ground have more luxuriant crops been obtained. The Italian rye grass, mangel-wurzel, and cabbages have been a great success, and the root crops generally have been distinguished for obtaining prizes at many agricultural exhibitions. Potatoes, parsnips, and other succulent crops have been cultivated with equal success. The produce has been sold by auction, and has generally realized good prices. For a public body this method of disposing of the crops is, perhaps, the most satisfactory, although a private individual might possibly turn them to better account.

During the last two or three years farming has been generally unremunerative, and the Bedford farm has only paid the rent and expenses of cultivation; but this has not been doing amiss, considering the charge for rent—altogether £928 10s. per annum. For irrigation cultivation, a dry season must always be the most successful. Italian rye grass and roots being the principal crops, and the demand being at such times very considerable, good prices are always realized. The produce sold by auction, and privately by the manager, amounted altogether in the year ending last December to £1,751 10s., and in addition a portion of meadowing was sublet at a rental of £119 17s. In favorable seasons we may fairly calculate upon obtaining, with all our disadvantages, a considerable profit.

In the tank, rags, paper, and other solid articles are intercepted by a simple grating; and the sewage is then pumped into a cast iron tower seven feet in diameter and twelve feet in height, from which, by gravitation, it is distributed over the farm. It is first conveyed through covered piping to the land, and over twenty acres along ridges by a 9 inch half round drain tile, which is sunk into the ground. The ridge is twelve inches above the furrow, and the sewage water running over the tile sinks into the land, very little reaching the bottom. The other fields are less carefully laid out, but are watered in like manner from surface furrows along the higher lines; heavy crops are regularly grown.

The effluent water percolating through the banks on the side of the land is perfectly clear and tasteless, and, so purified, passes into the river.

Two engines, of 12 horse power each, and two centrifugal pumps, are employed at the pumping works.

The length of the main sewer exceeds a mile and a half, sufficiently capacious to serve as a reservoir during the night, and has a storm overflow, with a self-acting flap. An excessive rainfall will pass without trouble in the night into the river.

WATERWORKS.

To complete the sanitary arrangements of the town, water works were indispensable, and accordingly formed part of the system. A good supply of excellent water was obtained by sinking a well about half a mile distant, 40 feet deep in the oolitic limestone. This water is thrown up by pumping into a covered reservoir at the top of a hill in the neighborhood, and is raised 170 feet above the general level of the town, and gravitates through pipes to supply the inhabitants. The pumping is performed by two engines, which work alternately; one is nominally of 40 and the other of 60 horse power. The cost of the waterworks, piping, and all appliances connected therewith, amounted, in the first instance, to £19,600, but various additions and extensions that have since been made have increased the expense incurred to £24,000. This outlay, although it may seem large, considering the extent and importance of the works, has been very economically carried out, and has been a lucrative investment. At this time the gross income per annum derived from them is no less than £2,028, which leaves a fair profit after deducting the interest of the capital, £1,080, and £700 working expenses.

The expense of these works has necessarily caused a considerable increase of the rates, and will continue to do so until the repayment of the loans shall have been completed, when a permanent benefit and fixed capital will be secured. The cost is by no means to be regretted, as the advantages are more than commensurate with the outlay. The comfort of the inhabitants being greatly improved, and the healthiness being permanently secured, the mortality of the town, according to the last returns, was little more than 19 to the 1,000 of the population, which is below the average of the country.

Dr. Prior, the Medical Officer of Health, in his report for 1878, remarks that—

"Bedford has now reached a point at which it has come to be regarded as one of the best sewered, best appointed, and most healthy and agreeable towns of England. It is visited for the purpose of obtaining particulars as to its management by many strangers—sometimes from foreign countries."—*Journal of the Society of Arts.*

FOR stopping holes in castings, or for covering scars, a useful cement may, it is said, be made of equal parts of gum arabic, plaster of Paris, and iron filings, and if a little finely pulverized white glass be added to the mixture, it will make it still harder. This mixture forms a very hard cement that will resist the action of fire and water. It should be kept in its dry state and mixed with a little water when wanted for use.

A New Feature in Puddling Furnaces.

The London *Mining Journal* describes a recent English invention for economizing fuel in puddling, heating, and steam generating furnaces, which consists in making openings in the smoke stack, and in the sides of the furnace near the fireplace, and connecting them by pipes or tubes, furnished with valves or dampers for regulating the passage of gas.

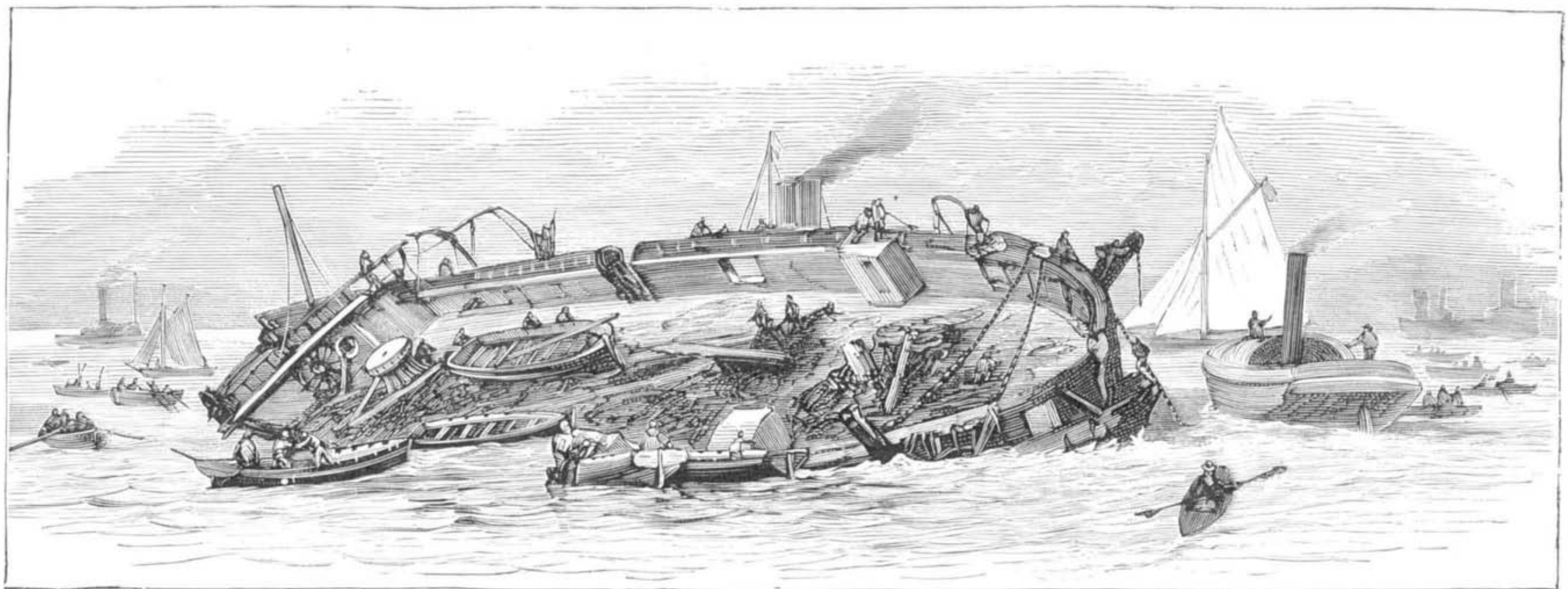
By the combustion in the furnace a powerful ascending current of the products of combustion and gaseous matters from the furnace is produced; this gaseous current, when the damper at the top of the stack is raised to its full extent, passes into the atmosphere, but when the damper is lowered so far as to obstruct the ascending current, part of it descends the tubes described, and, re-entering the furnace, any unburned gaseous fuel contained in it is burned. Considerable economy in fuel is claimed for this method, and complete control over the working of the furnace.

The return to the furnace of the products of imperfect combustion, which are produced in large quantities in the process of puddling iron, should, we think, effect good economies; but we question if these products could be induced to return to the furnace simply by the closing or partial closing of the damper on the stack, for the more the damper is closed the less powerful becomes the furnace draught, upon which the return flow of the gases depends.

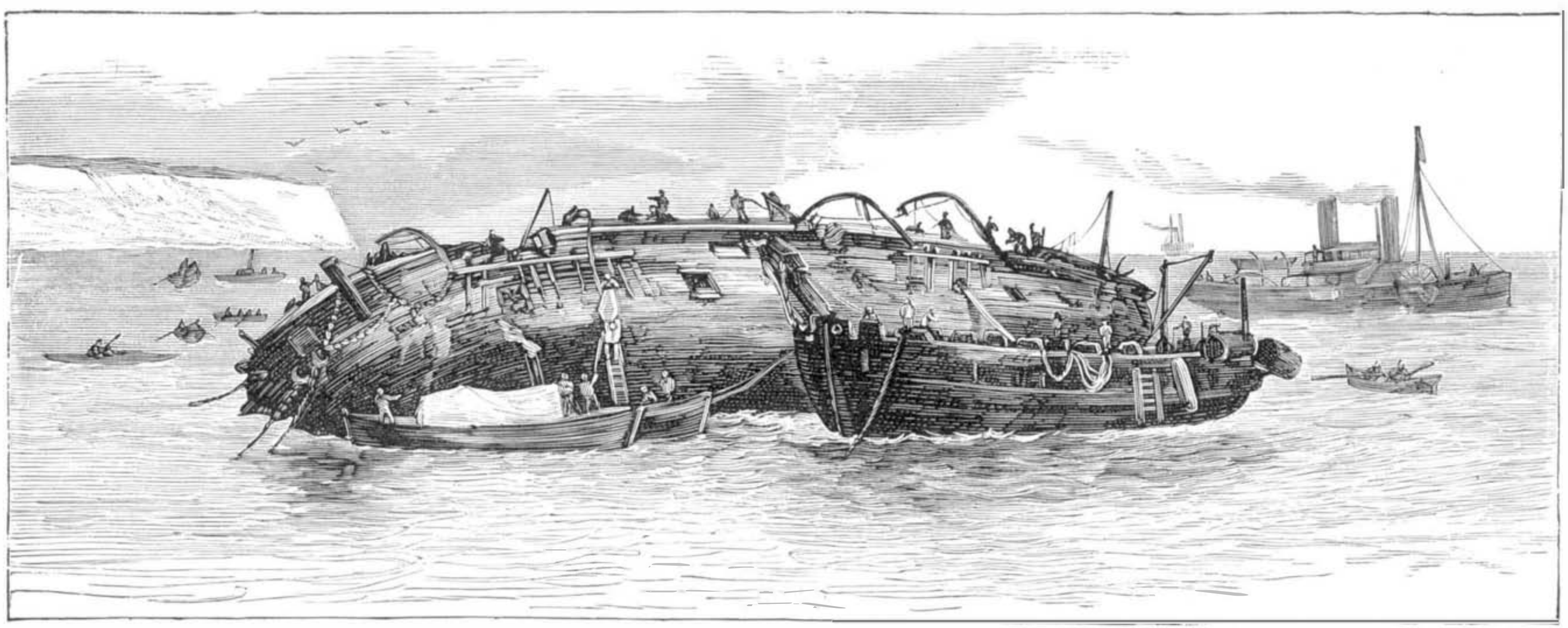
This precise method was patented here in 1870, but with the added improvement of an exhaust and force fan for withdrawing the gases from the stack and returning them through the fireplace. Probably this has been laid aside to await the returning prosperity of the iron industry.

THE RAISING OF THE EURYDICE.

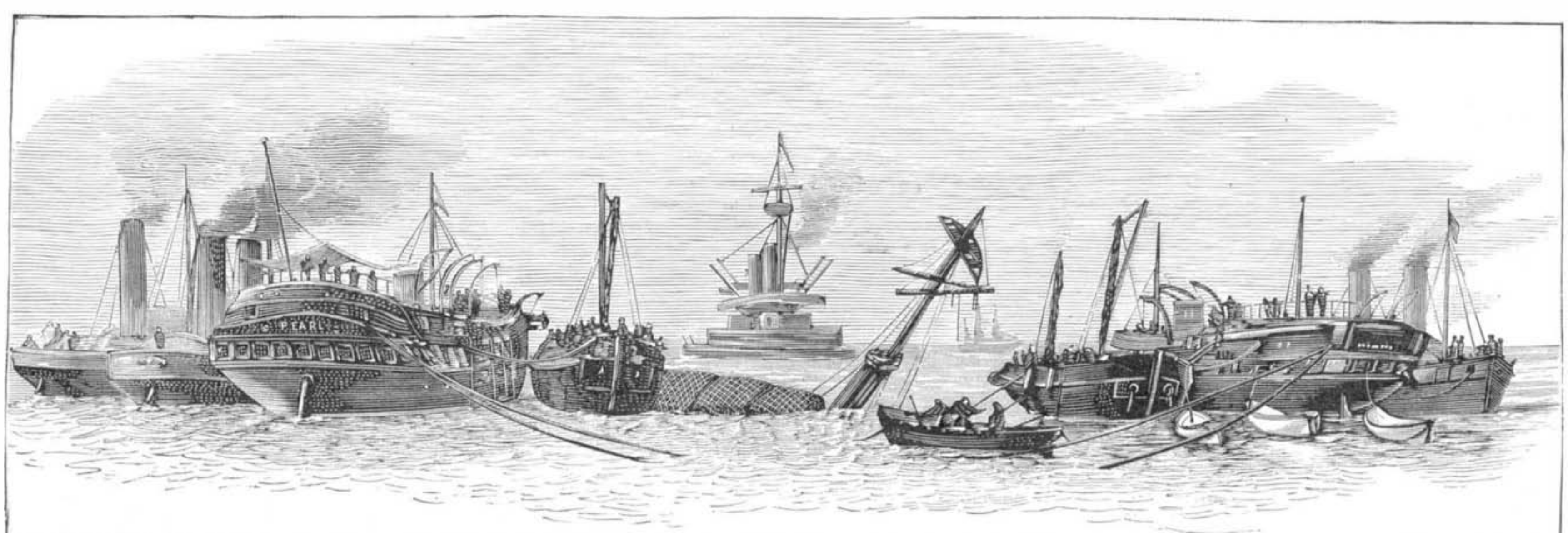
After four months of arduous labor, the wreck of H.M.S. Eurydice has been successfully beached at Sandown Bay. The positions of the vessels employed in the lifting process are shown in the engravings and in the accompanying diagrams, a reference to which will enable our readers to understand the somewhat complicated arrangements which were necessary for the accomplishment of the work, which has all along been of the most difficult character. One great point must be borne in mind, that everything depended upon the divers, and that they could only work at slack tides and in very fine weather, the under currents on the Isle of Wight coast being exceptionally strong. The ship lay at first in seven fathoms and a half of water, and to this must be added eight or nine feet of mud in which the wreck was embedded, making in all a depth of about fifty-six feet from the surface. Wire ropes were from time to time attached to the inner sides of the ports by means of "toggles," pieces of timber six feet long by twelve in diameter, which acted as buttons; the other ends of the ropes were made fast to the four floating hulls placed over and across the Eurydice; and, when everything was ready, and the tide at



RAISING THE EURYDICE.—THE WRECK BEACHED IN SANDOWN BAY—DIVERS CLOSING THE LEE PORTS.



PORT SIDE OF THE EURYDICE AFTER THE LAST LIFT—REMOVING THE BODIES.



Pearl. Swan. Popoff Bag. Thunderer. Wave. Rinaldo.

METHOD OF LIFTING THE WRECK OUT OF DEEP WATER.