BAGASSE AS A FUEL.

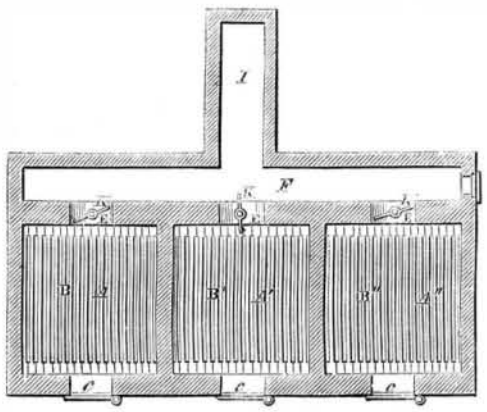
The following communication was addressed to us by an esteemed correspondent, resident in Louisiana, a long time ago. We intended to have given it an earlier reply, but circumstances have prevented. Perhaps it is "better late than never":—

The suit of "Moses Thompson *vs.* A. Lesseps and others," was tried in the United States Circuit Court—Judge McCalop presiding—in New Orleans, some time ago, and resulted in the jury not agreeing.

The principal grounds upon which this case hangs is, that Moses Thompson claims to be the original discoverer of the principal of decomposing the water contained in wet fuel, and using the oxygen resulting from said decomposition for the support of the combustion of the said wet fuel, he having his furnace closed and not admitting atmospheric air, except as occasion may require; and he uses a series of chambers (air-tight) to continue his process. Mr. Thompson claims that no person can burn bagasse or other wet fuel to produce any good result without violating his patent; therefore he has brought suit against the planters who are using Hagar & Allyn's furnace, and also Skelly's and Gilman's. This suit is of the utmost importance to the sugar planters of this and other soutliern States, and involves interests of some hundreds of thousands of dollars, as well as deterring all parties from erecting furnaces until its final decision. I am of opinion that Mr. Thompson's claim cannot be sustained; because, if so, then all parties who use any kind of wet wood or other fuel in any kind of perfect furnace that consumes the gases with any degree approaching perfection, would be in violation of Mr. Thompson's patent, and good furnaces of this description have been at work for various mechanical, chemical and scientific uses ever since human ingenuity began its researches and developments.

Yours, very respectfully,
A. J. CHAPMAN.

Our correspondent is slightly in error in respect to Mr. Thompson's claim and invention. The decomposition of water in the burning of fuel is so very old that no person could claim that principle, broadly, at the present day. In Thompson's first patent (1855) three separate furnace chambers, A A′ A″, are arranged



side by side. These furnaces have the usual ashpits and doors in front; while at their rear ends, there is a short flue, E, and a damper, K. The flues all open into a large chamber, F, called a mixing chamber, which communicates with the chimney. All the furnaces discharge their products of combustion into the mixing chamber, and the steam boiler which is to be heated is placed at I, in or near the mixing chamber, so as to receive the heat occasioned by the combustion of the gases.

The furnaces are first intensely heated with dry fuel; the bagasse or other wet fuel is now thrown into the two outer furnaces, A and A″, and their front doors closed to prevent the admission of air, and their dampers, K, nearly closed. But the hot fire in the central furnace, A′, is maintained; its front door, for the admission of air, is opened; so is its damper, K. The flames and heated air from this central furnace, therefore, drive into the mixing chamber, F, and supply with oxygen and ignite the gases that are escaping from the partially closed chambers, A A″. For the success of this furnace, it is requisite that there shall be at least one hot fire plentifully supplied with oxygen, constantly discharging flame and air into the mixing chamber, F.

The chambers into which the fresh bagasse or other wet fuel is placed serve to a certain extent as retorts, in which the fuel is dried and partially distilled, and the water contained in the fuel is partially decomposed; the resultant gases being ignited in the mixing chamber in the manner before described. After the distillation is complete the dampers, K, are opened, and the fire burns like other dry fuel fires. Two of the furnaces are left charged with wet fuel, while one is alternately left burning with a strong flame, as before mentioned.

Thompson's furnace, so far as we can learn, is a useful invention, and serves a good purpose for the burning of tan bark bagasse and other wet fuels. But it is by no means the only practical and serviceable furnace that may be employed for this purpose.

Annexed we give engravings of some devices for consuming the gases of fuels, either of which could, no doubt, be made serviceable in the burning of wet fuels. As these are English patents, not secured in this country so far as we know, any person has the right to make and use them. Of course, the mere idea of burning bagasse or tan bark in a furnace is not patentable; it has been practised more or less, probably, for fifty years past.

Thomas Hall—English Patent Granted Feb. 21, 1839.

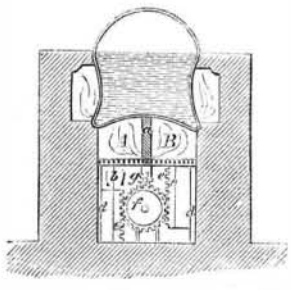
This invention consists in a peculiar arrangement of two or more fire places under one boiler, with the flues or dampers necessary for their effective operation, whereby the smoke and gases arising from the combination of a fresh supply of fuel become consumed by passing over the surface of a glowing fire in the fire place contiguous.

This is effected by dividing the furnace longitudinally into two or more parts in order to form two or more distinct fire places which are to be supplied with fresh fuel alternately, allowing that in the adjoining fire place, over which the fresh smoke is to be directed, to have become completely red.

The direction of the smoke and gases is to be regulated by dampers placed at the end of the furnaces, in order that the communication with the flue may be cut off from such fire place while the fresh fuel is introducing and the smoke emitted is driven over the red hot fuel of the next fire place through a lateral opening, by which means the smoke becomes consumed.

In the accompanying engravings Fig. 1 is a transverse

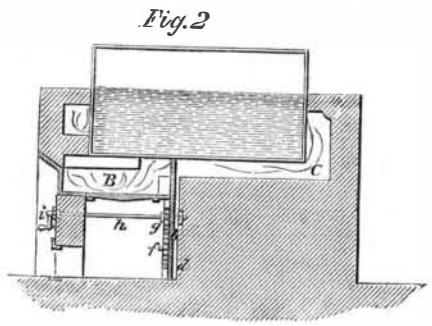
Fig. 1



section, taken about through the middle of one of the improved furnaces.

Fig. 2 is a longitudinal section of the same.

Fig. 2



The furnace is divided in two compartments, A and B, by a longitudinal partition, *a*; *b* are the dampers which slide in grooves, *d*, and which are operated by toothed racks, *e*, that are secured to the dampers, and which gear in a cog-wheel, *f*, which is actuated by a pinion, *g*, fixed on the shaft, *h*, and revolved by a crank, *i*.

Fig. 1 represents the fire, B, having received a fresh supply; damper *c* is up and damper *b* down. The fire, A, burns brightly. The claim is on the arrangement of the parts of furnaces for steam boilers, &c., or the division of the furnace into two or more fire places by means of a longitudinal partition or partitions, having a lateral aperture or apertures communicating from one fire place to the next fire place adjoining, with movable dampers at the ends of the respective fire places for occasionally stopping the flues, in order that the dense volume of smoke and combustible vapor evolved at every fresh supply of fuel may be conducted into the adjoining fire place, where, by passing over the ignited red hot fuel, it may become burned and consumed.

James Bristow and Henry Atwood—English Patent Granted April 29, 1853.

This invention relates to a mode of constructing or arranging the flues of adjacent furnaces or fire places, so that the smoke or gases of combustion arising from one fire place or furnace may be conducted over the bright fire of another fire place, and be thereby consumed.

This object is obtained by bringing the several adjacent furnaces into communication with a flue or flues provided with dampers. When fresh fuel is thrown on to one of the fires, the damper in the exit flue of that furnace is closed, and the smoke or gases generated are directed into the flue which connects with all the other furnaces, and thereby admitted into a furnace having a bright fire to be there consumed. When no smoke is given up from the recently charged fire place, the damper in the exit flue is opened and communication with the smoke-conducting flue is cut off. Any number of fire places or furnaces can be thus connected together, so as to admit of the smoke and gases from any one fire place of the series being conducted to any other fire place to be consumed.

In the accompanying engraving Fig. 1 is a longitudina vertical section.

Fig. 2 is a horizontal section.

Fig. 1

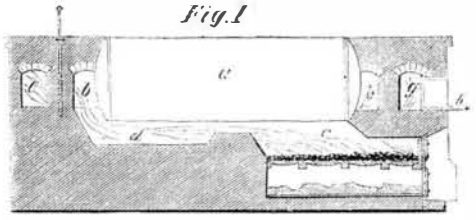
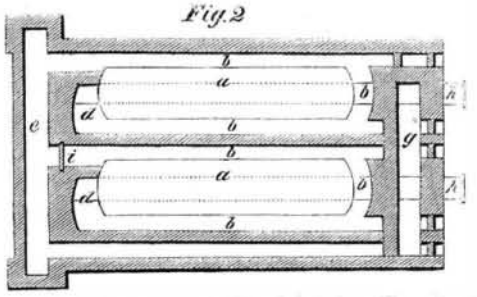


Fig. 2



The boilers, *a a*, are set in brickwork, with a flue, *b*, around each in the ordinary manner. Into this flue the smoke and gases from the fire place, *c*, pass by a flue, *d*, which runs under the boiler, and the gases having circulated through the flue, *b*, escape into a common flue, *e*, and finally make their exit through the chimney, *f*. Immediately over the fire place, *c*, in each furnace is an opening which leads to a flue, *g*, formed in the brickwork and running from end to end of the furnace.

Dampers *h*, when closed, cut off the communication between the several furnaces and the flue, *g*.

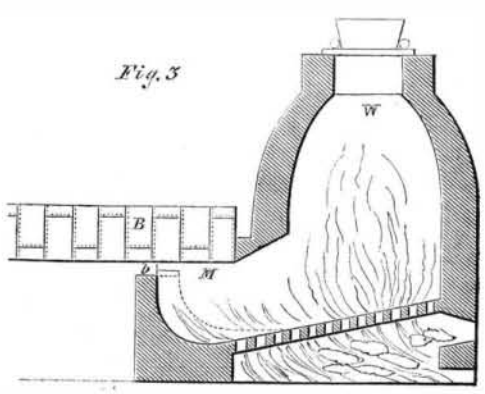
The flues, *b*, are provided with dampers, *i*, for cutting off the communication of their several furnaces with the flue, *e*.

The inventor says:—"I disclaim the broad principle of diverting the smoke, but I claim the means herein described, by which any two of a series of furnaces may be readily brought into connection with each other for the purpose of effecting the combustion of the smoke given off from the successive charges of coal supplied to each furnace.

We might recite many other instances in which furnaces have been made for consuming the gases arising from the burning of the fuel, whether wet or dry. The very earliest practical device for this purpose was probably that invented by the celebrated James Watt in 1785. It is thus described by him in his specification: "My newly improved methods of constructing furnaces or fire places, consist in causing the smoke or flame of the fresh fuel, in its way to the flues or chimney, to pass, together with a current of fresh air, through, over, or among fuel which has already ceased to smoke, or which is converted into coke, charcoal or cinders, and which is intensely hot; by which means the smoke and grosser parts of the flame, by coming into close contact with, or by being brought near unto the said intensely hot fuel, and by being mixed with the current of fresh or unburned air, are consumed or converted into heat, or into pure flame, free from smoke. I put this in practice, first, by stopping up every avenue or passage to the chimney or flues, except such as are left in the interstices of the fuel, by placing the fresh fuel above or nearer to the external air than that which is already converted into coke or charcoal; and by constructing the fire places in such manner that the flame and the air which animate the fire must pass downward, or laterally, or horizontally, through the burning fuel, and pass from the lower part or internal end or side of the fire place to the flues or chimney."

In 1857 Mr. Thompson obtained a second patent, of which Fig. 3 represents a side elevation. Two furnaces are built side by side, the fires being divided by a partition. Each furnace has two grates. The bagasse

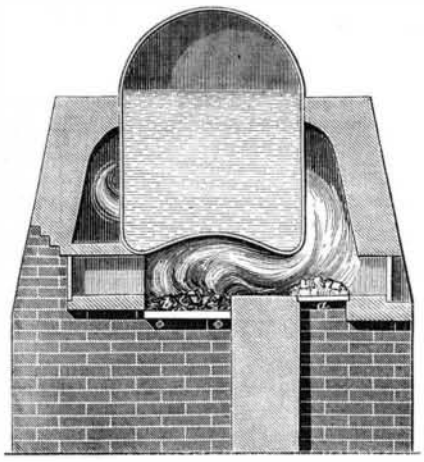
Fig. 3



is fed in at W and falls upon the inclined grate, below which a strong fire of dry fuel is made. The heat and

gases from the dry fuel fire pass through the bagasse, drying the latter and carrying its gases into a mixing chamber at M.

The idea of using two fires in the combustion of fuel is not new. We annex a sketch of a method invented in 1785 by James Watt, and intended to facilitate the ignition of the volatile portions of bituminous coal. This device can perhaps be successfully employed in the burning of wet fuels.



Mr. Watt observes:—"In some cases I place the fresh fuel on a grate, as at *a*, and beyond that grate, at or near the place where the flame passes into the flues or chimneys, I place another smaller grate, *b*, on which I maintain a fire of charcoal, coke or coals, which have been previously burned, until they have ceased to smoke, which by giving intense heat, and admitting some fresh air, consumes the smoke of the last fire."

Electrical Atmospheric Phenomena and Disease.

At a late meeting of the Manchester (England) Philosophical Society a paper was read by Thomas Moffat, M. D., on the prevalence of certain forms of disease in connection with snow, hail and rain storms. During observations made for eight years it was found that persons subject to apoplexy, paralysis, and vertigo were affected in a most marked manner when hail and snow storms prevailed. A table had been formed of 236 cases of the above diseases and upwards of one thousand observations were made with the electrometer, and it was shown that the nervous centers were affected according to the electrical condition of the atmosphere. On the approach of great storms the air was electrically negative, and diseases of the nervous centers and convulsions were common. Other forms of disease also frequently accompanied such electrical conditions of the atmosphere, such as cramps, vertigo, and diarrhœa. It therefore appears that negative electricity in the atmosphere plays an important part in relation to the morbid conditions of the human system.

As in England so in America, the condition of the atmosphere affects the human system almost in the same manner as related in the above abstract of Dr. Moffat's paper; and although we are not aware of any observations having been made to determine the electrical condition of our atmosphere during storms, we have no doubt butthe causes are the same on both continents. During the prevalance of east, northeast, and southeast winds on the American Atlantic coast, persons subject to rheumatic and nervous diseases generally suffer acutely. Is there any remedy for this?

A Four Thousand-Dollar Prize.—The French government has founded a biennial prize of 20,000 francs for the work or the discovery most worthy of honoring the national genius, to be decreed in the public annual session of the five academies of the institute. In the recent meeting of the five academies, when the subject of decreeing the first of these prizes was brought up, it was decided, with remarkable promptness and unanimity, to bestow it upon Mr. Fizeau, in consideration of his beautiful researches on the rapidity of light, measured on the surface of the earth.

Patents under the New Law.—The patent claims published under the proper head, on another page, are the first issued under the new law, and therefore are granted for seventeen years.

ROMANCE OF THE STEAM ENGINE.

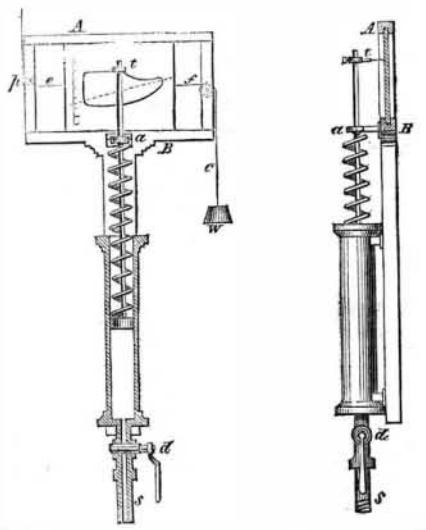
Article XV.

WATT'S INDICATOR.

The actual power of a steam engine is ascertained by a little instrument called the "Indicator," which consists of a small cylinder with a piston in it, moving against a spring, and compressing it to an extent corresponding to that ot the steam pressure. This instrument is also due to the genius of Watt, and by it what are called "indicator cards" are taken from an engine. In America, Stillman's indicators are in quite common use, in England, McNaughton's, but we give a representation in two figures—a vertical section and a side elevation—of the one said to be constructed as designed by Watt.

A small brass cylinder is shown, with a piston inside, and having its rod surrounded with a spiral spring abutting on a button above. This rod passes through a collar at *a*, and it has a pencil holder at *t*. It is screwed at the foot, *s*, into a hole on the top of the cylinder of the engine. *d* is the cock by which communication may be opened or closed between the indicator and the steam cylinder.

When the indicator piston rises, the spring is compressed; and when it falls, the spring is extended. The spring is in equilibrio when the piston is at the middle of the cylinder, and the space through which it rises and falls is proportional to the force which presses the piston upward or downward. When both



extremities of the cylinder are open to the atmosphere, the spring is at rest, and the piston in the middle of the cylinder; but when steam is allowed to pass from the cylinder to the indicator, by opening the stopcock, *d*, such steam will press the piston upward, and compress the spring with a force equal to the excess of the steam above that of the atmosphere. When, on the other hand, a vacuum is produced in the engine cylinder, by the condensation of the steam, the same vacuum will be produced under the piston in the indicator, and the piston will be forced downward by the excess of the pressure of the atmosphere above that of the uncondensed vapor in the cylinder.

An index is placed near the extremity of the piston rod, and *t*, the pencil, ascending and descending on this index, indicates by the space through which it ascends the excess of the pressure of the steam over that of the atmosphere, and by the space through which it descends, the excess of the pressure of the atmosphere over that of the uncondensed vapor. Both spaces added together, or the entire play of the piston, will therefore indicate the excess of the pressure of the steam above the pressure of the uncondensed vapor which resists it, and, therefore, the effective force of the piston, exclusive of friction.

The engine itself records the above effects, as the indicator is a self-registering instrument. The small square, A B, has a card capable of sliding in a horizontal direction in grooves; a string, *e*, is fastened to the side of the card, and, passing over a pulley, is carried upward toward *p*, and attached to some part of the machinery which rises and falls with the piston of the engine. Another string, *f*, is attached to the other side of the card, and carried over a pulley is fixed to a small weight, W. When the piston rises, the string, *e*, is drawn to the left, the card is drawn in the same direction, and the weight, W, rises. When the piston falls, the weight, W, acting on the string, *f*, draws the cord to the right. Thus, as the piston rises and falls, the card is drawn alternately through a certain space left and right.

Let us now suppose steam admitted above the piston of the engine, pressing the piston down. This steam presses the piston of the indicator up, and the pencil, *t*, passing on the card, would, if the card were at rest, mark upon it a straight line, the length of which would indicate the pressure of the steam; but as the card is drawn from left to right while the piston falls, the pencil will describe upon it a curve by the combined effects of the vertical motion of the pencil and the horizontal motion of the card. The suddenness of the curvature thus described will indicate the rapidity of the action of the steam on the piston.

When the piston has reached the bottom of the cylinder, and the upper exhausting valve is closed, a vacuum is produced in the cylinder, which vacuum extends to the indicator, the piston of which therefore descends, the pencil, *t*, descending at the same time and at the same rate. While this takes place, the card is traced from right to left, and has a corresponding curve described upon it by the pencil, the curvature of which will indicate the suddenness with which the vacuum is produced, as well as its degree of perfection.

From what has been stated it will appear that in a single ascent and descent of the piston, or in one stroke, as it is technically called, a diagram is formed upon the card, which will exhibit not only the entire mechanical effect of the steam acting on one side against the uncondensed vapor on the other, but will show the entire character of its progressive action at every point of the stroke.

Cleaning Platinum Vessels and Wires.

Platinum vessels, such as crucibles, that are much used and exposed to a high heat, gradually become tarnished, and the surface acquires a gray coating. When this is examined with a microscope, the metal is found to have acquired a rough surface, which may be removed, as follows, without injury: Take a small lump of soda amalgam, and rub it gently over the tarnished surface with a cloth until the whole surface is brilliantly metallic. Water is then applied; this oxydizes the sodium, and the mercury can then be easily wiped off, when the platinum surface is found to be in an excellent condition for burnishing with a proper tool. Sodium possesses the property of imparting to mercury a power to wet platinum, while the latter does not undergo the least trace of amalgamation. Platinum wires, which are frequently ignited in a gas flame—for example, the triangles which are used to support crucibles—become, as is known, gray and brittle. If such wire is strongly and perseveringly rubbed with sand, the cracks disappear, and the wire becomes smooth and polished; for the grains of sand, acting like burnishers, restore the original tenacity of the metal, very little of its substance being rubbed off meanwhile.

Crucibles may also be rubbed with sand and treated like wires, and they will become as good as new again. This is a more simple method than the amalgam process described above; but we give both methods for the sake of variety. The sand used for rubbing should be well worn—rounded.

Illinois Central Railroad.—From the report of the President of this great work it seems that the total expenditures have been $33,221,720, of which $4,996,213 was for interest. Of this sum $15,654,980 was paid by stockholders; the remainder having been borrowed on various kinds of bonds, of which $1,746,500 have been cancelled. The income of the road has just reached a point at which it will pay the interest on the bonds, so that the suicidal policy of hiring money to pay the interest will be discontinued. The company have sold 1,260,273 acres of land at an average of $12.67 per acre, and they have 1,334.727 acres on hand. They hold $12,598,083 of land notes, and it is estimated that these, with the proceeds of the unsold lands, will be far more than sufficient to pay off all the indebtedness and all the stock, leaving the company in possession of their road, which, including its branches, is 707 miles long, entirely free of cost.

The oil wells of the Birman Empire yield annually 400,000 barrels of oil.