Mr. Dickinson claims that by this method of dressing stones not less than three pounds more flour per bushel is obtained than is possible with the old dress, and of better quality, devoid of grit. The saving in labor, time of the mill, cost of picks, and quantity and quality of flour in the aggregate must be a very large item, sufficient in itself to constitute a difference between a successful and unsuccessful business. Without dispensing with the services of the operative millers, it will lighten their labors, and enable them to keep their burrs in good condition.

These claims are attested by numerous testimonials, from practical millers in various sections of the country. We have personally witnessed the operation of this invention, and have formed a most favorable opinion of its merits. The sales of this machine have been somewhat retarded by the reluctance of millers to impart their knowledge of its value to others, and their prejudices against any innovation upon established customs; but latterly the demand has so much increased that, together with the demand for carbon points, cutters, and tools for working stone and for other mechanical purposes, Mr. Dickinson has found it necessary to enlarge the facilities of his establishment, and proposes, we believe, to organize a stock company to develop the uses and extend the manufacture of the carbon points and cutters. Some of these tools will form the subject of a descriptive article in a future number.

Mr. Dickinson expresses confidence that when the diamond millstone dressing machines are more universally known, they will be generally adopted throughout the world. Many of them have already been in use six years, and have not cost over ten dollars for diamonds or repairs.

The prices of the machines vary in accordance with the size of the diamond set in the protector. Some mills having larger, harder, and more burrs than others, require larger diamonds.

Those desiring any further information relative to the uses of diamonds, will find Mr. J. Dickinson able and willing to impart it, at his office, 64 Nassau street, New York city. Any person addressing him by letter in regard to tools, should be particular to state the precise purpose for which they want them.

AMMONIACAL GAS-ENGINES.

[By. F. A. P. Barnard, L.L.D., Commissioner to the late French Exposition.]

If hot-air engines and inflammable gas engines fail as yet to furnish power comparable to that which steam affords, without a very disproportionate increase of bulk, and for high powers fail to furnish it at all, the same objection will not hold in regard to the new motors now beginning to make their appearance, in which the motive power is derived from ammoniacal gas. The gas, which is an incidental and abundant product in certain manufactures, especially that of coal gas, and which makes its appearance in the destructive distillation of all animal substances, is found in commerce chiefly in the form of the aqueous solution. It is the most soluble in water of all known gases, being absorbed, at the temperature of freezing, to the extent of more than a thousand volumes of gas to one of water; and at the temperature of 50° Fah., of more than eight hundred to one. What is most remarkable in regard to this property is, that, at low temperatures, the solution is sensibly instantaneous. This may be strikingly illustrated by transferring a bell-glass filled with the gas to a vessel containing water, and managing the transfer so that the water may not come into contact with the gas until after the mouth of the bell is fully submerged. The water will enter the bell with a violent rush, precisely as into a vacuum, and if the gas be quite free from mixture with any other gas insoluble in water, the bell will inevitably be broken. The presence of a bubble of air may break the force of the shock and save the bell.

This gas cannot, of course, be collected over water. In the experiment just described, the bell is filled by means of a pneumatic trough containing mercury. It is transferred by passing beneath it a shallow vessel, which takes up not only the bell-glass but also a sufficient quantity of mercury to keep the gas imprisoned until the arrangements for the experiment are completed.

The extreme solubility of ammoniacal gas is, therefore, a property of which advantage may be taken for creating a vacuum, exactly as the same object is accomplished by the condensation of steam. As, on the other hand, the pressure which it is capable of exerting at given temperatures is much higher than that which steam affords at the same temperatures; and as, conversely, this gas requires a temperature considerably lower to produce a given pressure than is required by steam, it seems to possess a combination of properties favorable to the production of an economical motive power.

Ammonia, like several other of the gases called permanent, may be liquefied by cold and pressure. At a temperature of— 38°·5 C., it becomes liquid at the pressure of the atmosphere. At the boiling point of water it requires more than sixty-one atmospheres of pressure to reduce it to liquefaction. The same effect is produced at the freezing point of water by a pressure of five atmospheres, at 21° C. (70° Fah.) by a pressure of nine, and at 38° C. (100° Fah.) by a pressure of fourteen.

If a refrigerator could be created having a constant temperature of 0° C., or lower, liquid ammonia would furnish a motive power of great energy, without the use of any artificial heat. The heat necessary to its evaporation might be supplied by placing the vessel containing it in a water bath, fed, at least during summer, from any natural stream. Such a condenser could not be economically maintained. A condenser at 21° C., however, and an artificial temperature in the boiler of 38° C., would furnish a differential pressure of five atmospheres, with a maximum pressure of fourteen. By carrying the heat as high as 50° C. (122° Fah.), a differential pressure of eleven atmospheres could be obtained, with an absolute pressure of twenty.

These pressures are too high to be desirable or safe. Moreover, condensation is more easily effected by solution than by simple refrigeration, and hence, in the ammoniacal gas engines thus far constructed, the motive power has been derived, not from the liquefied gas, but from the aqueous solution. The gas is expelled from the solution by elevation of temperature. At 50° C. (122° Fah.) the pressure of the liberated gas is equal to that of the atmosphere. At 80° C. (176° Fah.) it amounts to five atmospheres, and at 100° C. (212° Fah.) to seven and a half. At lower temperatures the gas is redissolved, and the pressure correspondingly reduced.

In the ammoniacal engine, therefore, the expulsion and resolution of the gas take the place of vaporization and condensation of vapor in the steam engine. The manner of operation of the two descriptions of machine is indeed so entirely similar, that but for the necessity of providing against the loss of the ammonia, they might be used interchangeably. The ammonia engine can always be worked as a steam engine, and the steam engine can be driven by ammonia, provided the ammonia be permitted to escape after use. The advantage of the one over the other results from the lower temperature required in the case of ammonia to produce a given pressure, or from the higher pressure obtainable at a given temperature. These circumstances are favorable to the economical action of the machine in two ways. In the first place, they considerably diminish the great waste of heat which always takes place in the furnace of every engine driven by heat; the waste—that is, which occurs through the chimney without contributing in any manner to the operation of the machine. This waste will be necessarily greater in proportion as the fire is more strongly urged; and it will be necessary to urge the fire in proportion as the temperature is higher at which the boiler, or vessel containing the elastic medium which furnishes the power, has to be maintained. In the second place, that great loss of power to which the steam engine is subject, in consequence of the high temperature at which the steam is discharged into the air, or into a condenser, is very materially diminished in the engine driven by ammoniacal gas.

For instance, steam formed at the temperature of 150° C. (302° Fah.) has a pressure of nearly five atmospheres (4·8). If worked expansively, its pressure will fall to one atmo sphere, and its temperature to 100° C. (212° Fah.) after an increase of volume as one to four. If, now, it is discharged into a condenser, there is an abrupt fall of temperature of 50°, 60°, or 70°, without any corresponding advantage. If it is discharged into the air, this heat is just as much thrown away. In point of fact, when steam of five atmospheres is discharged into the air at the pressure of one, considerably more than half the power which it is theoretically capable of exerting is lost; and when, at the same pressure, it is discharged into a condenser, more than one quarter of the power is in like manner thrown away. And as the expansion given to steam is usually less than is here supposed, the loss habitually suffered is materially greater.

The ammoniacal solution affords a pressure of five atmospheres at 80° C. (176° Fah.), and in dilating to four times its bulk, if it were a perfectly dry gas, its temperature would fall below 0° C. But as some vapor of water necessarily accompanies it, this is condensed as the temperature falls and its latent heat is liberated. The water formed by condensation dissolves also a portion of the gas, and this solution produces additional heat. In this manner an extreme depression of temperature is prevented, but it is practicable, at the same time, to maintain a lower temperature in the condenser than exists in that of the steam engine. It must be observed, however, that owing to the very low boiling point of the solution it is not generally practicable to reduce the pressure in the condenser below half an atmosphere.

The advantages here attributed to ammoniacal gas belong also, more or less, to the vapors of many liquids more volatile than water; as, for instance, ether and chloroform. Engines have therefore been constructed in which these vapors have been employed to produce motion by being used alone, or in combination with steam. The economy of using the heat of exhaust steam in vaporizing the more volatile liquid is obvious. But all these vapors are highly inflammable, and in mixture with atmospheric air they are explosive. The dangers attendant on their use are therefore very great. Ammonia is neither inflammable nor explosive, and if, by the rupture of a tube or other accident, the solution should be lost, the engine will still operate with water alone.

The action of ammonia upon brass is injurious; but it preserves iron from corrosion indefinitely. It contributes, therefore, materially to the durability of boilers. A steam engine may be converted into an ammonia engine by replacing with iron or steel the parts constructed of brass, and by modifying to some extent the apparatus of condensation.

CAPTAIN ERICSSON ON THE ROTATION OF THE EARTH.

Among the papers read at the meeting of the United States National Academy of Science, held at Northampton last month, was one by Captain Ericsson, which the author stated was an extract from an "Essay on Solar Heat" upon which he is engaged.

It appears that certain investigations relating to solar heat, undertaken chiefly with a view of ascertaining accurately how far the dynamic energy of the radiant heat of the sun can be made subservient in producing motive power, led him to consider, among other important practical manifestations of solar energy, the abrasion of the earth's surface caused by the flow of rain water, in its course to the sea. In other words, the effect produced on the rotation of the earth by the mere change of position of the enormous masses of matter detached by the flow of rain water, irrespective of any expenditure of force called for on account of friction in transit.

It is evident, he says, that the effects resulting from the change of position of the matter abraded, are twofold as regards the earth's axial rotation. In the first place, the matter is brought nearer to the earth's center, which approach tends to increase the rotary velocity of the earth, since the weight transferred moves in a less circle at the base than at the top of the hight from which it extends, consequently calling for the extinction of a certain amount of *vis viva*. The increase of rotary velocity imparted to the earth from this cause is, however, almost inappreciable. Secondly, the abraded matter, besides its change of position relative to the earth's *center*, will, in its course towards the sea, either approach the equator or recede from it. In the former case the change will cause a retardation, while in the latter it will augment the earth's rotary motion round the axis.

In order to arrive at some practical idea of the amount of retardation due to this cause, Captain Ericsson has chosen the Mississippi as his example. He has made choice of this river for the following reasons: It has been thoroughly surveyed, and it comprises in its field every variety of soil and climate, its source being among snows and lakes, frozen during a great portion of the year, while its outlet is near the tropics. How completely the Mississippi basin represents the average of the river systems of both hemispheres will be understood from this fact, that although the rain gages at its northern extremity show only thirteen inches for twelve months, those of the southern extremity reach sixty-six inches with every possible gradation of rain-fall in the intermediate space. In addition to this important circumstance, the basin covers 21° of latitude and 35° of longitude, or 1,460 miles by 1,730 miles. It has been shown by the official reports prepared by Humphreys and Abbott in 1861 that the average quantity of earthy matter carried into the Gulf of Mexico, partly suspended in the water and partly pushed along the bottom of the river by the current, amounts for each twelve months to 903,100,000,000 of pounds. This enormous weight of matter is contributed by numerous large branches, and upwards of one thousand small tributaries. The mean distance along the streams by which the sediment is carried, in its course to the sea exceeds 1,500 miles; but the true mean which determines the amount of force acting to check the earth's rotation is far less. Now the center of the Mississippi basin rotates in a circle of 15,-784,782 feet radius, and its velocity round the axis of the globe is 1147·90 feet per second. The mouth of the river, on the other hand, rotates in a circle of 18,246,102 feet radius, with a circumferential velocity of 1,326·89 feet per second. It will be seen, therefore, on comparing these velocities, that an increased circumferential velocity of very nearly 179 feet per second must be imparted to the sedimentary matter during its course from the center of the basin to the mouth of the river.

The question here presents itself, where is the motive energy to come from to impart the increased velocity acquired during the transit? The author states that the earth must supply the needed force. In other words, an amount of the earth's *vis viva* corresponding to the force required to generate the augmented speed will be extinguished. It has been stated above that the annual discharge of earthy matter at the mouth of the Mississippi is 903,100 millions of pounds. It has also been shown that there is an increase of velocity of 179 feet per second, a rate acquired by a fall through 500·6 feet. If, then, we multiply 903,100 millions by 500·6, we prove that the amount of energy to be given up by the earth in order to impart the stated increase of rotary velocity to the abraded matter exceeds four hundred and fifty-two trillions of foot pounds annually. But the formation of 30,000 square miles of delta, over which the Mississippi now runs, has required ages, during which the earth has been unceasingly deprived of *vis viva*.

The next point to be considered is whether there exists sufficient compensatory force to make good the immense amount of dynamic energy expended. The mean rate of discharge into the Gulf of Mexico exceeds 38,600,000 pounds per second; and, as has been already shown, there is an increase of circumferential velocity so considerable that a fall through 500·6 feet is necessary to generate the same. Therefore, the amount of *vis viva* of which the earth is deprived every second by the waters of the Mississippi and its tributaries, will be 19,323,000,000 foot-pounds, or 35,133,000-horse power. What provision do we discover for making good this stupendous drag on the earth's rotation? The water precipitated on the Mississippi basin come chiefly from the Gulf of Mexico, raised by the heat of the sun. The gulf being situated *south* of the outlet of the river, the aqueous particles possess, at the commencement of the ascent, a greater circumferential velocity than the basin, and hence tend to impart motion to the atmosphere during their northerly course. On purely dynamic considerations, that motion and the motion of the aqueous particles ought to restore to the earth the loss of *vis viva* sustained, provided solar influence be not present. But solar influence is present; the atmospheric currents do not move altogether in accordance with static laws, but are controlled and perturbed by the heat of the sun—an *outside* force competent to disturb and destroy terrestrial equilibrium. Hence it is found that in place of an easterly motion of the atmosphere tending to restore, by its friction against the surface of the basin, the loss under consideration, the sun is frequently expending a vast amount of mechanical energy productive of currents which, by friction in a contrary direction, augment the loss. Captain Ericsson observes that it would be futile to attempt a demonstration to prove that, owing to solar influence, the friction and other resistance called forth by the currents of air and vapor is inadequate to restore the loss of *vis viva* sustained by the earth in consequence of the increase of rotary velocity which it must impart to the water of rivers running towards the equator. Nor would it be less futile to attempt a demonstration showing that the friction and resistance produced by such currents passing over the Mississippi basin from west to east is sufficient to restore the expended force of 35,000,000 of horse-power exerted in an opposite direction.

As an example of rivers running in an opposite direction, the author makes choice of the Lena, which falls into the Arctic Ocean. In this case he shows that the force exerted in the direction of the earth's rotation very nearly balances the retardation caused by the Mississippi. But the waters of the Lena, unlike the southern river, do not directly enter into a heated caldron, to be at once converted into vapor. The previously chilled masses of the Lena flow into the great polar refrigerator, and from thence are transferred to the evaporator in the equatorial regions. This transfer cannot be effected without a considerable retreat from the earth's axis—so considerable, indeed, that before the required evaporation takes place the waters are further from that axis than their source at the foot of the Jablonoi Mountains. There the imparted *vis viva* is more than neutralized. The author then proceeded to consider that portion of the subject which relates to the recovery of *vis viva* resulting from the lowering of the earth's surface by the abrasion caused by rain, and showed that the approach of the abraded matter towards the center of the earth scarcely recovers 1-41,000,000th part of the energy parted with during the change of position in the direction of the equator. Captain Ericsson also urged as a cause of retardation the erection of towns and other edifices on the earth. He considers that the change of position of the enormous masses of stone and earth in the form of bricks, together with the coal and other minerals from below the surface of the earth to some hight above it, cannot but be the cause of considerable retardation.

He observed, in conclusion, that "no reasonable doubt can be entertained that the earth sustains a loss of *vis viva* of 39,894,658 foot-pounds every second. Multiply this sum by 86,400 seconds, we learn that every succeeding day marks a diminution of the earth's *vis viva* of 3,446,898,451,200 foot-pounds, in consequence of the change of position of the abraded matter carried towards the equator."

POTASH FROM A NEW SOURCE.---THE STASSFURT MINES.

The alkaline salt potash is so important in agriculture and the arts, that we think a full explanation of the method of obtaining it in large quantities from a new source will be interesting to the readers of the *Journal*. Potash, as is well known, was formerly the cheapest of the alkalies, but it is now the dearest; and in every possible case its place has been filled by one of the other alkalies, usually soda. The principal, and, for a long time, the only source of potash, has been the ashes of plants; but within a short time, potash salts have been discovered in vast amounts at the salt mines of Stassfurt, Prussia. Their value was not at first recognized, but did not long escape the notice of the very eminent chemist, Henrich Rose, who pointed out their importance. At the present time they are extensively worked. They are found overlying the salt beds in layers of various thicknesses, and are associated with salts of lime and magnesia. The principal forms in which they occur are known as mineral species under the names of polyhalite, sylvite, carnallite and kainite; accompanying them are found rock-salt, anhydrite, kieserite, tachydrite, and boracite. Polyhalite is a hydrated sulphate of potash, lime, and magnesia; sylvite is chloride of potassium; carnallite, a double chloride of magnesium and potassium; and kainite, a compound of hydrated chloride of potassium and sulphate of magnesia. Of the associated minerals, it need hardly be said that anhydrite is the anhydrous form of sulphate of lime; kieserite is a hydrated sulphate of magnesia; tachydrite, a double chloride of calcium and magnesium; and boracite, a borate of magnesia

Carnallite is the material worked for the extraction of potash. It is found mixed with rock-salt, kieserite, and small quantities of the other species mentioned above. As the mineral comes from the mine, it contains about one-sixth its weight of the potassium salt (the chloride) the rest being rock-salt and the chloride of magnesium, which is combined with the potassium salt as carnallite. In the process used to get the chloride of potassium in a reasonable degree of purity, advantage is taken of the different degrees of solubility of the various substances with which it is associated. The chlorides of potassium and magnesium are much more soluble than the chloride of sodium; so by treating the salt mass with an insufficient quantity of hot water, the two first-named salts are dissolved, while the most of the common salt is left behind undissolved. Chloride of magnesium is very soluble in cold water, and common salt is equally soluble in hot and cold water, so that both these remain in solution, while the potassium salt crystallizes out in a state of tolerable purity, about 80 or 90 per cent of chloride.

This product is good enough for commercial purposes and is used for making other salts. By further concentration of the mother liquor, the original salt, carnallite, deposits, and can be again worked over, while chloride of magnesium only is left in the solution. From the chloride of potassium the sulphate can be prepared by treatment with sulphuric acid; and from the sulphate the carbonated and caustic alkali, by Leblanc's process. This method, however, requires the use of a material (the acid), which is obtainable at the mines only at a considerable expense. It was therefore desirable to employ, if possible, the natural sulphate of magnesia, which is very plentiful at Stassfurt. After a great deal of experimenting, this was finally accomplished in a very ingenious manner by the formation of a double sulphate of potash and magnesia. This is done by simply adding sulphate of magnesia to the solution of chloride of potassium, a double decomposition taking place, with the production of sulphate of potash and chloride of magnesium. But the sulphate of magnesia, as mined, is mixed with common salt, from which it must first be freed.

The mixture of rock-salt and sulphate of magnesia is placed in water. The magnesia sulphate is but slightly soluble in the brine which is soon formed and collects at the bottom of the vessel, from which it is removed and used to form the double salt above mentioned. By careful treatment of the double salt, a part of the sulphate of magnesia may be got rid of, and from the residue carbonate of potash produced by Leblanc's process. Another mode of treating this double salt is by a solution of chloride of potassium, and then, by a series of crystallizations, are obtained pure sulphate of potash, the double sulphate again, and a double chloride of potassium and magnesium (carnallite.) The sulphate of potash is of course fit for the market, but the other salts are again worked over, in the ways previously described.

As already stated, the deposits at Stassfurt are of enormous extent, and from them potash and its salts are now produced in such great quantities that their cost has been very materially lessened, so that even in agriculture they can be advantageously used. The processes employed for their extraction seem simple, and indeed are not very complex, yet are of a very interesting character, must be carried on with care and judgment, and require skill in manipulation. Separations of the kind we have been describing, are only possible on a large scale. One of the most important points connected with them is the manner in which the various mother liquors are brought into use. For instance, if the raw mass of rock-salt, chloride of potassium, and magnesia salts, instead of being treated with pure water, is acted upon by a mother liquor, already saturated with the two former, it is evident that almost all of the magnesia compounds will be dissolved, leaving the alkaline chlorides behind. Again, in the process given above, by which pure sulphate of potash is obtained, it will be noticed that at the same time other salts are formed, only to be worked over again. The final mother liquors contain very little besides magnesia salts, and are utilized to some extent as a source of magnesia.—*Boston Journal of Chemistry*.

Separating Animal from Vegetable Fiber.

In mixed fabrics or fabrics composed partly of animal and partly of vegetable fibers, the separation of animal fibers, such as, for example, wool, hair, or silk, from the vegetable fibers, such as cotton, flax, or jute, is a process necessary for certain purposes. The plan hitherto adopted for the purpose of separating these fibers has been to treat the material to be operated upon with acids. This is, however, objectionable, as the animal fiber is by their action rotted, and thereby loses its milling and felting properties. In a recent patent, Mr. James Stuart, of 40 Ropemakers' Fields, Limehouse, dispenses with these acids, and substitutes neutral substances. In this way rags, carpet cuttings, old carpet, and other waste material of mixed fibers may be utilized to a greater extent than has hitherto been found practicable, and, as the separated animal fiber retains in most cases its color, it can oftentimes be worked up again into articles for use without the necessity of its being re-dyed.

His invention consists in subjecting rags, carpet cuttings, old carpet, or other material of animal and vegetable fiber intermixed to the action of chlorides of the metals or sulphates of the oxides of the metals, preferring, however, to use as the active agent the chloride of aluminum. In thus treating the material, certain chemical reactions take place whereby the vegetable fiber is decomposed and the animal fiber is recovered uninjured either in substance or in color. It is then in a fit state to be re-manufactured without re-carding, spinning, dyeing, or other operations that have hitherto been necessitated.

In practice, Mr. Stuart first makes a solution of ingredients in the following proportions: In 100 gallons of hot water dissolve 100 lbs. of the suphate of alumina of commerce; then add 50 lbs. of chloride of sodium: when this last-named ingredient is added, a reaction takes place: sulphate of soda is formed, and also chloride of aluminum. With the solution thus made the material to be treated is saturated. It is then drained so as to allow the excess of the solution to pass therefrom; or the material may be slightly wrung or pressed for the same purpose. The material is next dried and afterwards exposed to a steady temperature of 200° Fah. During the time of this exposure, the chloride of aluminum decomposes, and the resulting volatile products, as they pass off, act upon the vegetable fiber, rotting them, but leaving the animal fiber uninjured. The material treated is then scribbled, and the vegetable matter separates in the form of dust. This treatment refers more particularly to rags of light mixed fabrics.

When treating heavier or denser material, such as carpet cuttings or old carpet, the solution of chloride of aluminum is of greater strength. In 100 gallons of water dissolve 150 lbs. in weight of sulphate of alumina and 75 lbs. of chloride of sodium, and then proceed in the manner before described.

In some cases, it is found more convenient to treat the material by boiling than by heating in drying rooms. Mr. Stuart then proceeds in the following manner: He makes a solution of sulphate of alumina by dissolving 100 lbs. of that substance in 100 gallons of water, and with this solution he saturates the material. It is then drained, and afterwards placed in a boiling saturated solution of common salt. In this solution the material is kept boiling until the vegetable fiber is decomposed or rotted; the material is then well washed and dried, and scribbled or carded.—*Mechanics' Magazine*.

The Danford Steam Generator.

The Joliet, Ill., *Republican*, in speaking of the above generator, says:

Had it been in use at the Indianapolis State Fair, the columns of the press all over the country would have been filled with pleasanter matter for perusal than the heart-rending tales of that sad disaster.

Our investigations of it were of such a satisfactory character that we have already purchased a generator and engine, and are this week placing it in our establishment to run our presses, and we do not hesitate to recommend it to every one who uses steam power as being absolutely safe.

The novelty of the Danford Steam Generator consists in its being a hollow wrought iron cylinder of 5-8th inch thickness, the side and heads welded together. This is placed in a jacket or furnace lined with fire brick; the back wall of the furnace is so constructed as to throw the heat and smoke around the cylinder or generator, which is made by a simple process to revolve, creating a draft, helping to consume the gases and smoke, and what is more important, equalizes the heat on the generator, making the iron to last much longer. We have been shown iron subject to this test for twelve months, after which it was softer and better than the day it was put in. The fire to heat the generator and make the steam is placed in the furnace, immediately under it, playing on the bottom of the circle as it revolves. By putting a three-fourth inch water pipe through the generator from end to end, plugging up the end from the engine and perforating it with 30 or 40 small holes the size of a pin head, you have the machine ready for use. To make steam by this invention is so simple, and still so effective, that it wins you as a friend at once. To make a fire in the furnace and heat the empty generator is but the work of a very few moments, after which you work a temporary handle attached to the pump, and by a few strokes you raise the pressure to 100 pounds, after which you are ready to operate with your engine, which makes the necessary steam to run it and keep up the reserve at every revolution by throwing a sufficient amount of water through the holes in the water pipe in the condition of spray, which is instantly flashed into steam, thereby keeping a regular pressure on the generator.

The generator or cylinder never contains any water to be suddenly expanded into a large body of steam, and is, therefore, to our judgment and others' experience, absolutely non-explosive, and as the steam made is superheated, almost any desired pressure can be obtained and used with safety. To our knowledge steam by this machine has been made and used up to 300 pounds pressure to the square inch without fear or danger.

We are glad to learn from Mr. George P. Jones, Secretary of the Company at Chicago, Ill., that this improvement, patented in this country and in Europe through the Scientific American Patent Agency, "is now a practical success."

Something New in Working Plaster of Paris.

We find the following in the *Druggists' Circular*:

"It is a well-known fact that powdered gypsum, when freed by calcination of its water of crystallization, regains to a great extent its original hardness when incorporated with water enough to form a stiff paste. In order to attain this end, there is at least thirty-three per cent of water required, wherefrom twenty-two per cent is withheld as water of crystallization. The rest evaporates, and thus brings about the porosity of the hardened gypsum. In working up a small quantity of gypsum, one has only a few minutes' time for using the paste for molding or puttying, as it soon becomes hard. With larger quantities, in which case the making of the paste requires a longer time, the mass hardens, sometimes, during the operation of dressing. According to Mr. Puscher, of Nuremburg, this inconvenience may be got rid of by mixing with the dry powdered gypsum from two to four per cent of finely pulverized althea-root, (marsh mallow) and kneading the intimate mixture to a paste with forty per cent of water. In consequence of the great amount of pectin which is contained in the althea-root, and which in fact amounts to about fifty per cent, a mass similar to fat clay is obtained. This mixture begins to harden only after a lapse of one hour's time. Moreover, when dry it may be filed, cut, twined, bored, and thus become of use in the making of domino-stones, dies, brooches, snuff-boxes, and a variety of other things of a similar character. Eight per cent of althea-root, when mixed with pulverized gypsum, retards the hardening for a still longer time, but increases the tenacity of the mass. The latter may be rolled out on window-glass into thin sheets, which never crack in drying, may be easily detached from the glass, and take on a polish readily upon rubbing them. This material, if incorporated with mineral or other paints, and properly kneaded, gives very fine imitations of marble. They bear coloring also when dry, and can then be made water-proof by polishing and varnishing. The artisan, in the practice of his trade, will probably find it to his advantage to make use of this prepared gypsum in place of that usually employed by him; the manufacturer of frames need have no fear that his wares will crack if he uses a mixture of the above-indicated composition; moreover, the chemist and chemical manufacturer will find that the same does excellent service in luting vessels of every kind. The exact proportion of water to be made use of cannot be given exactly, as it varies within a few per cent, according to the fineness and purity of the gypsum employed. The above-mentioned althea-root need not be of the very best quality, the ordinary kind serving the purpose perhaps quite as well."