in a strong, substantial manner; and with this attachment the machine will work stuff tapering six inches or more in a length of ten feet. The bed plate directly under the upper cutter head is a false plate so that it can be easily removed and dressed over in case it becomes worn out of true.

This machine has received first prizes wherever exhibited for competition.

These machines are now running in many of the first class mills in all parts of the country, and the one above mentioned just put up in Steinway & Sons' manufactory will repay a visit to see.

For further particulars address S. A. Woods, sole manufacturer of Woodbury's patent planer and matcher, 91 Liberty street, New York, and 67 Sudbury street, Boston. [See advertisement in another column].

MANUFACTURE OF COTTON SEED, COTTON SEED CAKES, AND MEAL.

BY C. WIDEMANN, CHEMIST, PARIS, FRANCE.

No. II.

It was at first proposed—and it has been tried by many—to work cotton seed along with linseed, so as to obtain an oil, which, in being boiled with oxidizing agents, would replace for painting purposes the linseed oil, and, being cheaper, would be used extensively. This has been dropped at the present time but will no doubt be taken up again.

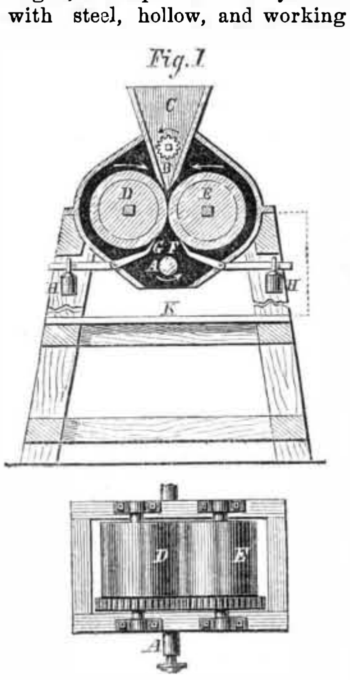
It is very difficult to ascertain the exact yield of oil produced, and this yield varies a great deal according as the seed is of better or poorer quality and richness, according to the weather of the season in which it has been sown, dry weather giving a smaller seed but richer in oil. From my own experience I shall take the following figures:

For 2,000 pounds cotton seed, or 1 tun, cotton from the last ginning, 21 pounds; husks, 979 pounds; meal, yielding from 32 to 36 gallons of oil. 270 pounds; cakes, at 7½ pounds per gallon, 730 pounds. Total, 2,000 pounds.

Let us take now the seed at the entrance of the oil mill. As it arrives in the bags it ought to be immediately unpacked and aired by shoveling it from one place to another, and this should be done very frequently as the fermentation sets in very rapidly. This is known by putting the hand in the seed; if heat is felt the seed has to be worked as quick as possible, and in every case removed and cooled by airing. It therefore requires a large store room to manage it properly. The average weight of one bag is 92 pounds, and the average work done by a good pressman and a Taylor's press, for ten hours' work, is 250 bags or 11½ tuns. Generally oil mills work night and day, as there is a great advantage in not letting the presses and mill cool down.

The cotton seed to be freed from the foreign matters it may contain, is passed in through a screen; a large cylinder made of wire cloth, the holes being sufficient to let the seed escape and retain the foreign substances. It is next carried to the top of the building where it passes through the gins. After this it goes through the huller. The huller generally used is of two sizes; the large size is sufficient for the supply of two presses of three sets for night and day labor. The smallest size is sufficient for one day's work with two presses. From the huller the kernels and husks are passed again through a screen, and then through a blower, which separates entirely the husks from the kernels. The kernels are then carried to the grinding mill and are passed through crushing rollers which I shall now describe. This machine, Fig. 1, is composed of two cylinders in cast iron, D E, covered with steel, hollow, and working at equal speed, with a distance between them which can be regulated at will. One of these cylinders receives motion and transmits it to the other by a pinion. A hopper of wood, C, is kept full of seed, and feeds the rollers by means of a little fluted wooden roller, B, the acceleration of which is regulated at will.

Fig. 1

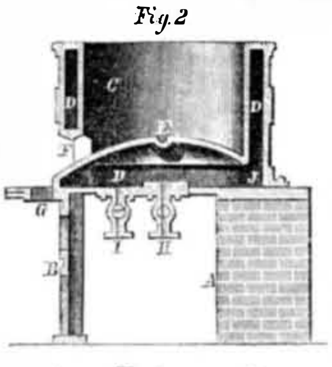


A machine of this description, the cylinders 26 inches in length and 6 inches in diameter, with a speed of 40 to 50 revolutions per minute, crushes per day 12½ bushels of seed and supplies two pairs of mill stones. It is worked by one horse power. I say mill stones, because the seed was formerly passed under double upright millstones so as to grind the kernel thoroughly; but this has been abandoned by most manufacturers as a good crusher answers the purpose sufficiently well, especially if the distance of the two rollers is well regulated. The crushing is then perfect and the meal comes out sufficiently fine. This is tested by grinding it between the teeth. If fine enough it must be perfectly free from perceptible grains. It is next placed in the heaters, and upon this operation depends both the yield of oil and its quality. In Marseilles, where labor is cheap, the meal is first pressed cold, as the oil obtained thus is very fine, possessing a very sweet taste, like olive oil, and may be used like the latter for the table. Oil designed for the table ought to be expressed cold. After the cakes are reground, the meal is heated and repressed. The second yield of oil is of inferior quality to the first yield.

In this country, where labor is high, manufacturers prefer to obtain at first as much oil as they can with the least handling possible. As I said, the meal is placed in the heaters after grinding; these heaters are constructed in different ways. I have seen some made of a large table heated by steam, with iron rings four inches high placed concentric to each other, and a stirrer in the center worked by power from the steam shaft above. Only a small portion of meal is heated at a time, I should say enough to fill a press bag; but I am not satisfied with these heaters as they present too large a cooling surface to the air.

The best heaters are those attached to the presses, and they heat for the 15 boxes of the three sets of presses. They are made of cast iron. The whole apparatus, Fig. 2, is supported by brick work, A, and by a cast iron support on the other side of the frame, B. C is a cast iron basin with a convex bottom, at the middle of which is a receiving hole, E, to receive the stirrer, K. D is a steam jacket. This basin and steam jacket are cast in one piece and fixed on the platform, T, by means of bolts. The steam is admitted to the steam jacket through H, the condensation water escaping through the pipe, I. A sufficient quantity of meal being introduced into C, the stirrer is set in motion and the steam let in; and when the temperature of 82° to 88° Centigrade, or 180° to 190° Fahrenheit is obtained, the gate, F, is opened, a bag placed at the entrance, G, and the meal is then let into the bag.

Fig. 2



The bags are made of a certain kind of woolen duck, manufactured expressly for that purpose. The best woolen yarn is used for their manufacture, and only two parties make them in this country. The cloth is about 32 to 34 inches wide, and is sold by the pound at a price running from $1·10 to $1·40. The weight of a yard of the cloth generally used is from 1 pound to 1 pound 4 ounces, and it can be used as well for linseed as for cotton seed. The bags are made in the mills by the pressmen themselves, and sewed on a wooden pattern to fit the squeezers. The old bags are sold at 6 to 8 cents per pound when they are quite out of order, as they can be repaired and are repaired with the same yarn they are made of by the pressmen, or women engaged for that purpose. A great saving could be made in cloth if parties would manufacture them as nearly as other bags, instead of in the coarse way they are now made in the mills.

The bag being properly filled, that is to say, not quite to the top, it must be thrown in double to close it in the squeezer, the meal being well distributed all along it. The squeezer is then introduced in the box of the hydraulic press, Fig. 3. The squeezers, Fig. 4, are made of horse hair cord and covered with leather, to which a handle is riveted. The rivets ought to be of iron, as copper is very soon oxidized by the action of acid fats. These squeezers are quite expensive, and are sold from $26 to $28 a piece. They last one year and a half to two years. They are easily repaired, but have to be kept in good order and cleaned as soon as the dust, or meal, and other impurities have begun to adhere, by hammering them with wooden hammers. I shall not describe the presses as they are nearly like all other hydraulic presses, differing only in some improvements of the packing of the plungers, in the adaptation of check valves, etc. The pressure must be one and one half tuns to obtain a good cake, or 85 pounds per square inch. The cake must not be more than half an inch thick or very little over, and should weigh from 7 to 7½ pounds. The presses, when charged, are left for twenty minutes and then the squeezers are taken out.

Fig. 3

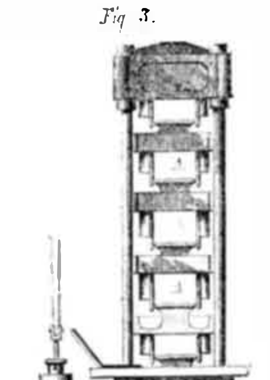
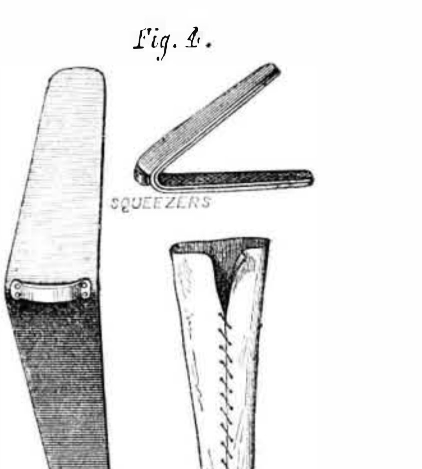
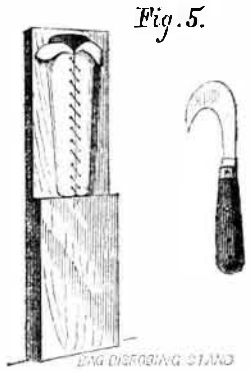


Fig. 4.



The cake is taken out of the bag by setting the bottom of the bag against a board and turning it inside out. The cake is carried to a special room, where a man with a kind of half circular knife, Fig. 5, trims the edges and cuts the top and bottom. Sometimes the cuttings are reground and repressed, as these parts have never been as well pressed as the middle part. The trimmed cakes are then placed on frames upon their edges, and left to dry; care being taken not to have them put too close to each other, so that the air may have free circulation all around them. Cakes would soon decay through the action of the moisture remaining in them. It is very important the meal should retain its temperature, and some works to that end have had iron pipes passing behind and between the sets, so as to heat the whole structure. It is always observed that the set near the heater yields a larger quantity of oil than the last set. This is a consequence of the heat communicated to the press from the heater.

Fig. 5.



Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Safety Lamp for Miners.

MESSRS. EDITORS:—The SCIENTIFIC AMERICAN of September 25, 1869, contains an article on the Avondale disaster, and a notice of a lamp recommended by W. H. Bessemer. I inclose a drawing of a lamp made by me as far back as 1829 on the same principle as that recommended by Mr. Bessemer. From my knowledge of miners I have always considered that there could be no safety while they had the control of the

lamps. I therefore made one like the drawing, part of which I still have. The globe containing the condensed air is 10 inches in diameter, the lamp 6 inches, with a joint made tight by leather (better rubber), and locked; the lamp was made to burn the oils common in those days, and would throw the light a great distance, so that it might be placed in safety and yet give a better light to the miner than the Davy. At the top was a piece of wire gauze for the exit of the products of combustion; the whole was made of copper.

The miners of those days thought themselves quite safe with the Davy, and all I got was the name of a schemer, and sundry lectures on my folly, when, soon after, leaving England, I had other things to attend to.

I could never get anybody to see any good in my invention. Perhaps I have been too far ahead of time, as many explosions have been required to prove the Davy not altogether safe.

FREDERICK LEAR.

Willsborough, Mo.

The Wandering Jew, or Cow Killer.

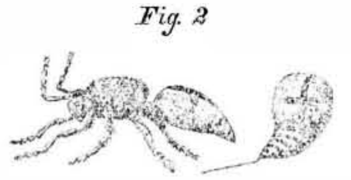
MESSRS. EDITORS:—My attention has been arrested by the article bearing the above title, on page 43, current volume of your journal. Both names are new to me, having never heard them applied to an insect, which, by the description is clearly that of the large red stinging ant, a species of *Mutilla*, a genus among the order of *Hymenoptera*.

Thomas Say describes six species found within the United States, while thirty-eight species are noticed in Rees' Cyclopedia. They are solitary in their habits. The females are always found on the ground, abounding mostly in hot, sandy situations. The males resemble other sand wasps, being pro vided with wings. The females are destitute of wings and ocelli, but are provided with a powerful sting; and woe to him who may have a demonstration of it on his own person. They are not very common, but I have occasionally met with them on the ground. They are quick in their motions and hide beneath a stone or clod of earth, so that you know not where to look for them.

The following, Fig. 2, is a sketch of a specimen I captured upwards of fifteen years ago near Mount Joy, Lancaster County, Pa. Fig. 3 is one I captured at Cape May, July 1858; Fig. 1 being the head and antennæ

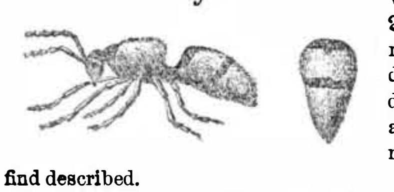
Fig. 1

Fig. 2



Mutilla coccinea: scarlet, abdomen is marked with a black belt. It inhabits North America. The wings are black, but i n general it is an apterous insect.—(*Rees.*)

Fig. 3



This accords well with my Fig. 3. Fig. 2, thorax and anterior portion of the abdomen scarlet, with a distinct black cross and the posterior segments black, I cannot find described.

The *M. Bifasciata* of New York State, is black; head and thorax red, abdomen with two red bands; the wings are violet black.—(*Rees.*)

The *M. Vigilans* of Pennsylvania: ♂ black, large abdominal segment, excepting its posterior and anterior margin, rufous.—(*Say.*)

A Mexican species, *M. Erythryna* (*Klug*) is scarlet red, beneath black, wings blackish.

One of this family, I suppose, is the insect that your correspondent calls the "Wandering Jew," from the outline given by him. I, as an humble entomologist, felt like gratifying his wish to know something more about its true character.

Lancaster, Pa. P. STAUFFER.

Vindication of the Judges on Steam Engines at the Late Fair of the American Institute.

MESSRS. EDITORS:—Certain criticisms in your last number, upon the action of the judges on engines at the late Fair of the American Institute, being so evidently based upon information derived from interested and unreliable sources, we have deemed it proper for us to state certain facts in regard to the trial and its results, that your readers may be able to judge whether our decision was "stultifying and ridiculous," or whether it was not eminently just and proper under the circumstances. These facts can be verified by the official report upon file at the rooms of the Institute.

1st. There was no test made by coal, nor was there any original intention on the part of the judges, or others, of making such a test, for the reason that the amount of coal burned during the trial could not be ascertained with any reasonable amount of accuracy. There were forty-five square feet of grate surface, and the entire quantity of coal burned during an eight hours' trial, would cover this surface to a depth of less than one foot. As for leveling off a glowing fire of that size to a "line of bricks," the idea is too absurd to be entertained by any one familiar with firing; and that "this was done with great care by all parties interested" is not true.

2d. It being established beyond question that a given quantity of steam will be produced by a proportionate weight of coal, which will always be the same under the same circumstances; the weight of water evaporated being an exact measurement of the steam produced and the coal burned: therefore, *by consent of all parties interested*, the cost of the power was determined by the water used, "measured by a meter open to the inspection of all."

3d. Experiments made with this meter at different velocities of discharge, show a different *rate* of variation with each considerable change in speed, but at the speed used during the trial, and which was practically the same for each of the principal engines, both the rate was *constant and the measurement practically correct*—the possible variation being within a small fraction of one per cent. As a *comparative* measure under such circumstances it was more reliable than any other means of determining the evaporation except by actual weighing of the water.

4th. The difference in the management of the fires on the two days when the Babcock & Wilcox, and the Corliss engines were tested, which was noticed at the time and which has since been fully stated and explained to the judges by by the agent of the boiler used, was sufficient to account for any reported difference in the amount of coal burned, and for the observed difference in the quality of the steam. It would therefore have been imperative upon the judges to have ruled out the coal, had it not been previously excluded by mutual consent.

5th. The cost of the power in coal, allowing the usual estimate of *nine pounds of water to each pound of coal was, for indicated power*, for the Babcock & Wilcox engine, 2·831 pounds per hour per horse power, and 2·895 pounds for the Corliss engine, a difference of 2·21 per cent in favor of the Babcock & Wilcox; for *net effective power*, 8·248 pounds for Babcock & Wilcox, and 3·209 for Corliss, a difference of 1·2 per cent in favor of the Corliss engine.

6th. The difference between "indicated" and "net effective" power is due to the power required to drive the engines alone, which was much more for the Babcock & Wilcox than for the Corliss engine; but this was not so much due to the difference in the construction of the engines, as to the fact that the foundations of the Babcock & Wilcox engine were impaired by the overflow from a neighboring drain, thus throwing the engine out of line; and also to a heavier fly-wheel having been placed upon this engine.

7th. The *quality* of the steam was *not* the same for the different days—it being very evident that the steam supplied to the Corliss engine was considerably drier than that furnished to either of the other engines. This was particularly observed by at least one of the judges. The amount of loss from this source was calculated from the quantity of steam shown by the indicator diagrams, as compared to the total weight of water supplied to the boiler, and this calculation shows that the Corliss engine had an accidental advantage in this respect, as compared to the Babcock & Wilcox, of about *thirteen per cent* (90·99 to 79·47). Had allowance been made for this *fact*, the economy of the Babcock & Wilcox engine as compared to the Corliss, would have been *fifteen per cent* on indicated power

8th. The indicator diagrams taken at the trial show the most rapid opening and closing of the valves, the greatest range of cut-off, and the nearest approximation to boiler pressure (5·542 lbs. to 9·567 lbs.), in the Babcock & Wilcox engine, notwithstanding it took its steam through twenty-two feet more of piping.

9th. The "clearance" in the Babcock & Wilcox engine was 1½ per cent, and that of the Corliss was 3·1 per cent of space swept through by piston. The former is the least amount ever brought to our knowledge.

10th. The style of valves used in the two engines is distinct, and the flat slide employed in the Babcock & Wilcox engine is not only preferable to the curved slides of the Corliss, but the constant throw of the same is conducive to equal wear and continued tightness while the varying throw of the Corliss valve has the opposite effect.

11th. The regulation of speed was practically equal in the two engines, being excellent in both cases.

With these facts before them the judges had no difficulty in deciding which was the *best engine*, and they plainly indicated that opinion by awarding the first premium to the Babcock & Wilcox engine "for the *most perfect automatic expansion valve gearing*;" supposing, in their simplicity, that the engineering world at least, would know that this embodied all the difference in the principle of construction of the engines in competition. But they also felt the force of the argument that the trial having been made under certain rules, and the Corliss engine having shown the best results by the strict rendering of those rules, though that result was purely accidental; it, therefore, should have a first premium for those results. In giving this premium, however, it was expressly stated that it was "for best results on net effective power shown at the trial, being from one to two per cent better than any other in competition;" and they added thereto, "for superiority of workmanship, and general arrangement of valves and valve gearing;" it being a very good arrangement as compared to other engines, but not the "most perfect."

Trusting that these statements will correct all misunderstandings which have arisen in regard to this matter, we are

Respectfully yours,

THOMAS S. SLOAN,
HAMILTON E. TOWLE, } Judges.
ROBT. WEIR,

New York, Jan. 29, 1870.

Steam Boiler Explosion.

MESSRS. EDITORS:—About ten days ago, the boiler of a donkey engine, on board the steamer *Parthenia*, exploded, while lying at the dock, in Hartford, Conn.

The damage done was considerable. A large portion of the upper deck was blown off, the cabin demolished, etc.

Only one person was on board, a young man. The fire in the boiler was started by him, as the owners say, against orders.

The penalty of disobedience falls severely on him; as he is badly hurt, and is now confined at the hospital. He had the presence of mind to put out the fire, which was scattered in all directions, before help arrived.

The boiler was an upright, turbular shell, about two feet in diameter, five or six feet high.

In conversation with the engineer of the steamer, only a few days before the disaster took place, he expressed his doubts of the safety of this same boiler. He called my attention to its construction.

The head was set in, an iron band shrunk around the outside, the tubes doing the work of holding the head against the pressure. There were no rivets or bolts in the head. This head was blown out, taking tubes along with it, I suppose, as I saw none after the explosion.

Although it was a "*high pressure*" boiler, the engineer said he would not dare stay near it with the steam gage indicating thirty pounds.

It was a "cheap" boiler when bought; but has proved a costly one in the end. The papers say the damage amounts to two thousand dollars.

Is there any mystery about that explosion? A small boiler like that, if properly constructed, would bear a pressure of one hundred pounds with perfect safety. I have seen similar boilers, with riveted heads, tested at one hundred and fifty pounds, with cold water. * * *

Hartford, Conn.

THE FRENCH SYSTEM OF STORM MAPS.

From the February Number of "Old and New."

Behind, or rather beside, the Pantheon in Paris, at the corner of a street that runs towards the Observatory, at the far end of the Gardens of the Luxembourg, and in the ground floor and corner room, as if it were an American apothecary shop or grocery store, the traveler, curious in such things, will find a woman sitting at the receipt of custom, taking down subscriptions for the daily bulletin of the meteorological observations carried on at the Observatory. I have recently learned, however, that the task of making these observations is now transferred to the new observatory, of which M. St. Claire Deville is the learned and distinguished superintendent.

When we crossed the ocean in October, 1866, from New York to Brest, in the *Ville de Paris*, we knew that the passage would be stormy, for the time of sailing fell on the bad day of the weekly storm system of that year. And so it turned out. We got engaged in the southern rim of a tremendous "northeaster" just departing, like ourselves, from the States for England, and we sailed nine days in its company, sometimes gaining on it, sometimes beaten back by it, until one night, not having seen the sun for six days, we lay to in front of a lighthouse, not knowing where we were, only that we certainly were not where we should have been—off Ushant. When morning broke, the shore appeared. It was the coast of Cornwall. We turned therefore at a right angle, and steamed across the mouth of the English Channel, and arrived at Brest one day later than we should have been had we made Ushant light.

This lost day permitted our disagreeable companion, the northeaster, who seemed utterly indifferent to our society, to go ahead; and then the sun came forth, and the beautiful and curious cliffs and monuments of Brittany, and the rare scenery of the port of Brest, remunerated us for the delay.

Had we been on a voyage from Labrador to Norway, we should have been on the northern rim of the storm instead of the southern; and it would have been a southwester, instead of a northeaster, and have driven us forward, all the way, *pêle mêle.*

I was so curious to follow the subsequent course of this erratic monster, that on my arrival in Paris, I subscribed to the Meteorological Bulletin, and got the back numbers for two weeks.

Looking on the chart for the day before we saw the English light—there, sure enough, was the front rim of our storm drawn in curved lines from north to south, and bellying eastward, over the northwest corner of Europe. The next day's chart showed it further advanced and raging into the North Sea; and each successive daily chart marked its position further and further east-southeast, until its form was broken up and lost between the Black and Caspian Seas.

The winter I spent in part at Pau in the Pyrenees, and every morning I had at my breakfast table the mapped climate of all Europe of the day but one before. And every week I had a new storm to follow, from its first appearance on the west coast of Ireland, to its disappearance three or four days later in the Levant, or across the Ural mountains.

Sometimes there appeared signs of a disturbance in this regular march, which I could not comprehend, and then the order would be resumed and regularity maintained as before.

In St. Petersburg a similar storm map has been published for some years, even better adapted for the student than the French. In England there was until recently a distribution of storm information, in advance of time, to all the seaports of England, by telegraph from Greenwich; but the labor and expense were supposed to be inadequate to the results; the designer of the system, on whom it chiefly depended, became engaged in other scientific pursuits; and the daring fishermen and economical merchants of England were impatient of control. So it has ceased.

Along the stormy and dangerous coasts of the United States such a system would be of incalculable value, and ought to have been established by Government long ago. One wealthy merchant of Boston or New York, however, could by himself keep up an establishment of the kind they have at Paris, until it became self-supporting—and not have to wait long for that to happen. The Bulletin of Paris is a quarto sheet of four pages, on the first, second, and third of which are tables of the state of the barometer, thermometer, and sky, the rain-fall and wind-force, at all the places from which telegraphic dispatches had arrived that day, and lagging dispatches of the day before.

The third page, kept permanently furnished with a map of Europe, printed in blue, shows on this map, but in strong black lines, the curves of barometric pressure, geographically drawn through or near the places from which the telegram of the day has come. These telegrams are studied in the evening, and thrown into curves, printed over night, and distributed in the morning. In Paris, a man can see at a glance the condition of the atmosphere as it was all over Europe the day before.

The lines of barometric pressure are all concentric in a greater or less degree, because they show the sides of the great waves of air which are rolling forward over the surface of the earth, and pressing unequally on the innumerable barometers of Europe. Each curve is marked 700, 705, 710, 715, etc., meaning millimeters of mercury. In America we should mark them tenths and hundredths of an inch. Arrows also appear on the map, showing the direction and force of the winds.

BALLOONS.—This subject has been so thoroughly discussed in our columns that we feel obliged to drop it for the present.