NEW INVENTIONS.

In the concentration of certain liquors or extracts in vacuum pans, where very dense or thick extracts are required—such, for instance, as in the case of dyewood extracts—it is found that, owing to the low temperature that exists in the vacuum, it is impossible to remove sufficient of this moisture to secure the required concentration. Hence it is usual to destroy the vacuum at intervals by opening the valves and admitting air, and then allowing the mass to heat up to the temperature allowed by atmospheric pressure, after which the exhaustion is again effected, which insures an increased disengagement of the moisture from the mass, now heated much beyond the vacuum temperature, so that a more dense concentration is thus effected. As this system, however, requires repeated and alternate stages of heating and exhausting, its action is slow, and the repeated abrupt renewals of the vacuum are manifestly wasteful of power. Mr. Jacob G. Reed, of New York city, has patented certain means whereby the vacuum or partial vacuum in the pan may be kept constant, or nearly so, while at the same time an influx of hot dry air is discharged in regulated jets up through the mass of fluid, so that the moisture is absorbed or evaporated from all parts of the mass, and the mass kept at the same time in constant motion during the influx and exhaustion, insuring uniform liquidity and the reduction of the mass to the desired density in a constant, rapid, and economical manner.

Mr. George W. Thorp, of Wellington, Kan., has patented an improved holdback, in which the tongue cap is provided with screw holes in its lower part and the separable holdback stop with a screw thread upon the end of its upright arm, to screw into one of the screw holes of the cap, and a hole in the end of its inclined arm, through which a screw passes into a hole in the cap or into the tongue, so that the stop can be adjusted forward or back as the size of the horses may require.

An improved ore-washing apparatus has been patented by Mr. James H. Totman, of Plattsburg, N. Y. The object of this invention is to provide a simple and effective device for keeping the journal bearings in ore-jigs and other machines free from dust, sand, and other substances that otherwise get in them and cut the journals and bearings. It consists of a double ring or annular box closed at the bottom and open at the top of the annular space between its sides, and having a lateral opening from said space for the introduction of water therein, it being designed to set said water box about a journal or journal bearing, and to force a constant stream of water through the lateral opening, so that said water shall flow out of the annular space in the box against the journal or bearing, and thereby keep off all dust, sand, etc., which might otherwise lodge on or in it.

An improved device for feeding fine fuel to furnaces, forges, etc., has been patented by Mr. Augustus Greiner, of Somerset, Ohio. It consists of an air-tight coal dust vessel provided at one end with an inlet adapted to be connected with an air or steam supply, and at the other end with an outlet adapted to be connected directly with the furnace.

A Long-Lived Community.

Some curious statistics of local longevity are furnished the Providence (R. I.) *Journal* by a correspondent at Thompson Center, Windham County, Conn. At the beginning of April—the letter is dated the 11th—the resident population of the school district—excluding transient "help"—was 331. Of these 5 were over 90 years of age, 14 were between 80 and 90, and 28 between 70 and 80. The average of the first five (all men) is 93 years. The average of the next 14 (4 men and 10 women) is 82 years. The third group (8 men and 20 women) average 75½ years of age.

Percentage of population			over 90 years	1·51
do.	do.	do.	between 80 and 90	4·23
do.	do.	do.	over 80	5·74
do.	do.	do.	between 70 and 80	8·46
do.	do.	do.	over 70	14·2

The first houses beyond the district limits, in three directions, are occupied by aged women, two of them of 87 years, the other 83 years old.

Evidently the district is a healthy one. It is pretty evident also that, like so many New England districts, it is a good one to go away from. So large a proportion of aged inhabitants indicates the early migration of most of the youth of the community to more active though possibly less healthy towns.

Mountain Mahogany.

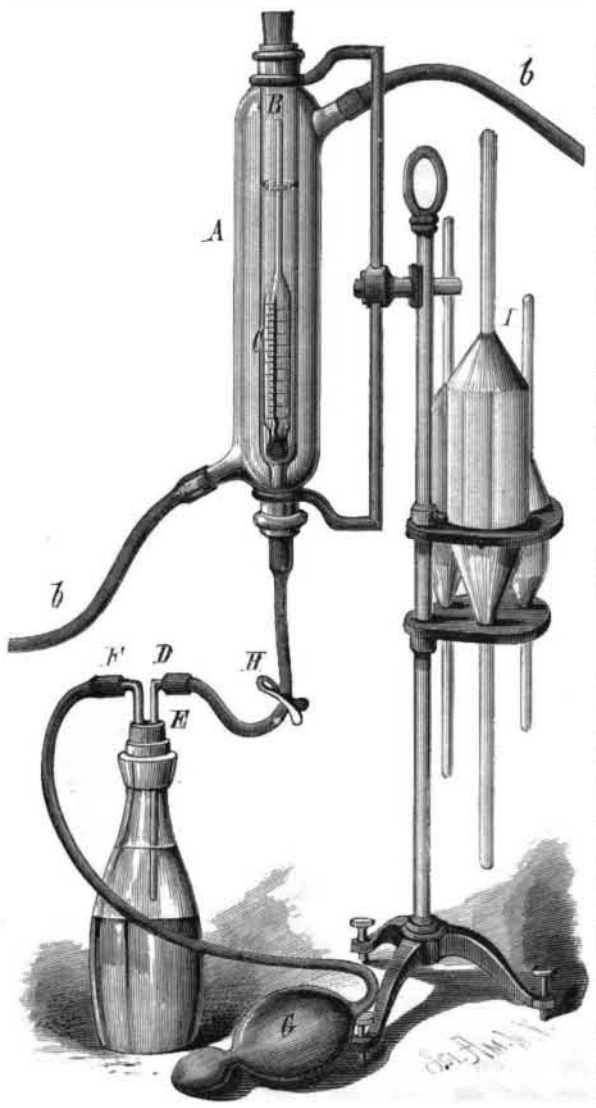
This wood is indigenous to Nevada. The trees do not grow large; one with a trunk a foot in diameter is much above the average. When dry the wood is about as hard as boxwood, and of a very fine grain. It is of a rich red color and very heavy. When well seasoned it would be a fine material for the wood carver. In the early days it was used in making boxes for shafting, and in a few instances for shoes and dies in a quartz battery. Used as a fuel it creates intense heat, it burns with a blaze as long as ordinary wood would last, and is then found (almost unchanged in form) converted to a charcoal that lasts about twice as long as that of ordinary wood.

L'Electricité states that M. Dohrn has introduced the telephone in connection with his scientific explorations of the bed of the Bay of Naples. By its use the diver and the boatmen overhead are able to communicate with each other quickly and intelligibly.

ARAOMETRIC METHOD FOR THE ESTIMATION OF FAT IN MILK.*

The principle of this method does not occur in any of those in use. It is as follows: A known quantity of milk, caustic potash solution, and ether are shaken together; the fat, as is known, dissolves completely in the ether, which, after standing for a short time, rises to the surface. A small portion of the ether, which is always constant, remains dissolved in the alkaline solution, but does not contain any fat, as the ether in the water does not dissolve the slightest trace of fat. The remaining portion of ether forms with the fat a solution whose concentration varies as the amount of fat present in the milk. The concentration of this ethereal solution of fat can be ascertained by the estimation of its specific gravity with as certain and accurate results as those obtained by estimating the amount of alcohol in an aqueous solution with the alcoholometer, as the difference between the specific gravity of fat and ether is as great as between that of water and alcohol.

Apparatus and Materials.—(1.) Apparatus for the determination of specific gravities, with three pipettes for measuring the milk, caustic potash solution, and ether respectively, and several bottles in which to agitate the mixtures. (2.) Caustic potash solution, of sp. gr 1·26 to 1·27, prepared by dissolving 400 grms. fused caustic potash in a half liter of, water, which after cooling is made up to one liter; or by dissolving 400 grms. caustic potash in 870 grms. water. (3.) Ether saturated with water. This is obtained by shaking commercial ether with one-tenth to two-tenths of its volume



Dr. Soxhlet's Apparatus for the Estimation of Fat in Milk.

of water at the ordinary temperature. (4.) Commercial ether. (5.) A large vessel of at least 4 liters capacity, filled with water at a temperature of 17° to 18° C. When several estimations are to be made at the same time the vessel must be larger. When the temperature of the room is warmer, the temperature of the water should at first be 17°, when cooler, 18° C.

Manner of Procedure – The milk being thoroughly mixed, and at a temperature of 17·5° C., 200 c.c. are measured by the largest pipette and discharged into one of the bottles for agitating, which should have a capacity of 300 c.c. In the same manner 10 c.c. of the potash solution are measured, discharged into the bottle containing the milk, and mixed; 60 c.c. ether saturated with water are then added. The ether, when measured, must be between 16·5° and 18·5° C. The bottle is now closed with a cork or India-rubber stopper, shaken violently for half a minute, placed in the water at 17·5° C., and shaken every alternate half minute for a quarter of an hour. After standing a quarter of an hour longer, a clear layer of the ethereal solution of fat forms in the conical part of the bottle, the collection and purification of which is accelerated by giving to the contents of the bottle a gentle circular movement. It is indifferent whether the entire solution of fat, or only a portion, has collected, if there be sufficient to cause the aräometer to float. The ethereal solution must be perfectly clear. With milk containing a large amount of fat (4½ to 5 per cent) the separation takes longer than a quarter of an hour; sometimes, but exceptionally, from one to two hours. In such cases, if the vessel containing the water is large enough, it is judicious to lay the well-closed bottle in a horizontal position in the water; the way for the ascending drops is thus considerably shortened, and the collection of ether hastened. When the bottle can again be placed in an upright position, the purification may be assisted by the gentle circular movement.

In order that the following manipulations may be understood the apparatus for the estimation of the specific gravity of the ethereal solution will be described.

The stand has a holder fitted with a movable screw for holding the cooling tube, A, to the tubes of which are attached two short India-rubber tubes. The holder of the tube, A, turns on its axle so that A can be placed in a horizontal position. In the center of A is fastened a smaller tube, B, whose diameter must be 2 mm. greater than that of the float of the aräometer. At the lower end of B are fastened three small pieces of glass, to prevent the aräometer from adhering to the sides, while the upper end is closed by a cork. The scale of the aräometer, C, is divided into degrees from 66 to 40, corresponding to the specific gravities from 0·766 to 0·743 at 17·5° C.; these, again, are further divided by smaller and finer lines into halves. In the float of the aräometer is fastened a small thermometer, so graduated that 0·1° C. may be read off. The drawn-out end of the tube, B, which passes through the cork in the bottom of A, is connected by means of an India-rubber tube to the glass tubes D, which passes through the cork, E, of the agitating bottle. The glass tube, F, to which is attached the small hand bellows, G, also passes through the cork. The stand also holds the three pipettes, I, for measuring the milk, caustic potash solution, and ether.

The apparatus is now used as follows: The India-rubber tube connected to the lower tube of A is placed in the vessel containing the water at 17° to 18° C. A is now filled with water by suction at B, and closed by connecting both ends with a glass tube. The stopper of the agitating bottle is now replaced by the cork, E, and the tube, D, so inserted as to dip nearly to the bottom of the clear ethereal solution. The cork at the top of A and the clamp, H, being opened, a quantity of ether, sufficient to cause the aräometer to float, is forced by means of a gentle pressure at G into the tube, B. The clamp is now closed, and the cork inserted in B, in order to prevent any evaporation of ether.

After waiting from one to two minutes till compensation of temperature has taken place, the aräometer is brought as nearly as possible into the center of the tube, and the position of the scale read off. That part of the scale is read off which coincides with the middle part of the deepest curved line on the surface of the liquid (meniscus). As the specific gravity is diminished by a higher and increased by a lower temperature, the temperature during the estimation of the specific gravity of the ethereal solution must be noticed. Therefore, shortly before or after ascertaining the position of the aräometer, the temperature of the liquid is obtained to within 0·1° C. from the thermometer in the aräometer. If the temperature be exactly 17·5° C., the specific gravity will, of course, require no further correction; in other cases, however, the specific gravity obtained by the aräometer can be easily calculated to that at the standard temperature, 17·5° C. For each degree Celsius over 17·5° C., one degree is added to, and for each degree under 17·5° C., one degree is subtracted from, the statement of the aräometer; *e. g.*, 58·9 degrees at 16·8° C., at standard temperature become 58·2; 47·6 degrees at 18·4° C., at standard temperature become 48 5. The temperature of the water in A may fluctuate between 16·5° and 18·5° C. The specific gravity of the ethereal solution at 17·5° C. being found, the amount of fat in weight per cent is obtained directly from table I.

After finishing the determination, in order to prepare the apparatus for a second, the cork of B, and the clamp, H, are opened to permit the ether to flow back into the agitating bottle. B is now filled from the bottle with commercial ether, which is allowed to flow back again. The tube, B, India rubber tube, etc., are now thoroughly dried by forcing a current of air through the apparatus by means of a hand bellows, G. As the aräometer is apt to be injured by coming in contact with B, it is advisable, before forcing the air through, to turn the tubes A and C to a horizontal position.

The estimation of the specific gravity, including the preparation of the apparatus for another estimation, scarcely takes five minutes. From the description of the manner of cleaning the apparatus, it will be seen that there is little risk of the aräometer being injured, as it is never taken out of the tube, B. Allowing half an hour for the mixing and separation of the ethereal solution, an estimation of fat may be made in from forty to forty-five minutes; but five estimations can be made as easily in an hour, when they are carried on at the same time. The method, therefore, not only allows several estimations to be made at the same time, but is also very expeditious.

*By Dr. F. Soxhlet in *Chemical News*.

Steam Sledge for Arctic Use.

A dispatch from Washington relative to the outfit of the relief steamer Mary and Helen, states that Chief Engineer George Sewell, of the Navy, now on duty at New York, has, upon official request, forwarded to the Navy Department designs for a steam sledge which is intended to be self-propelling and capable of towing a number of sledges.