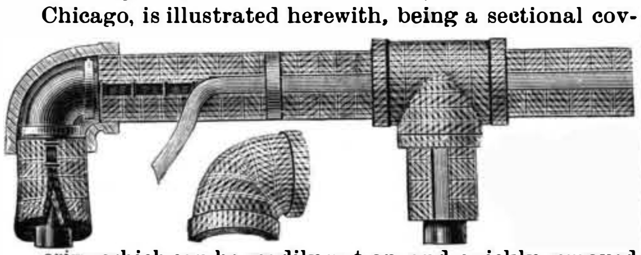
INSULATED COVERINGS FOR PIPES, BOILERS, ETC.

The saving effected by jacketing boilers and steam pipes with an insulating covering is a point very frequently neglected in establishments where the steam plant is only a small one, or of moderate size, although justly deemed an elementary consideration whenever the consumption of fuel is large. The careful insulation of pipes is also of vital importance in every case where it is desired to convey steam to a distance, either for purposes of power or heating, without regard to the direct cost of fuel. Engineers and inventors have, therefore, given much study and made many experiments, to the end of making the best possible and most easily applied coverings for pipes and boilers, to save fuel and insure a supply of hot and dry steam at a distance from the boiler. Such a covering, as manufactured by the Shields & Brown Co., of New York and Chicago, is illustrated herewith, being a sectional cov-

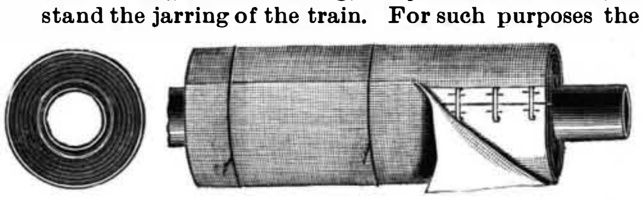


ering which can be readily put on and quickly removed and replaced by an ordinary workman, while it is adapted to every shape of steam surface and every bend and angle in a job of pipe fitting.

These coverings are made on the principle of employing two or more layers or sheets of felt, or other non-conducting material, held together longitudinally by being fastened or cemented on the edges where the sections are divided, confined air being contained in larger proportion throughout the covering by the use of corrugated sheets of felt.

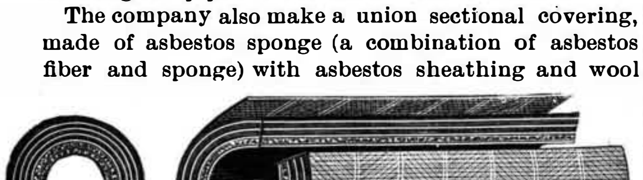
These coverings are made in sections three feet long, and are composed throughout of alternate layers of asbestos sheathing and corrugated soft-wool felt. The layers are secured together by being stitched longitudinally of the section with two rows of small wire staples, and then the sections are cut open between the two rows of staples. By this combination of asbestos, wool felt, and air in combined cells, a sectional covering is produced that is not only neat and attractive in appearance, but one which can be applied with the utmost facility by ordinary workmen, while it is unsurpassed as a non-conductor for steam-heating surfaces. The large amount of asbestos sheathing used in these goods makes them more durable than any other felt coverings, and their use has been approved by insurance underwriters in all the leading cities.

The adaptability of these coverings to special uses is perhaps best shown in their employment on recently introduced systems of steam heating on railroad trains. In such uses it is especially important to protect the exposed pipes running under or between the cars, while the covering must be strong, compact, and durable, to stand the jarring of the train. For such purposes the



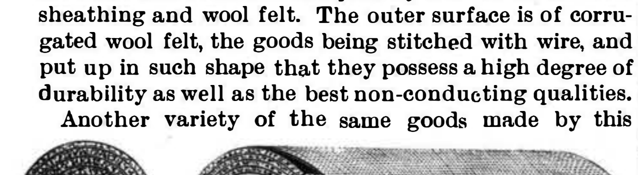
company make a covering of a heavy wrap of asbestos next the pipe, then three-quarters of an inch of wool felt, then a wrap of asbestos on the outside, and a canvas jacket over all. The different layers of felt and asbestos are held together by being stitched with wire, and are easily applied, taking but little time to put them on and make a neat and complete job. The company has recently made a large contract with one of the leading trans-continental lines for the supply of these coverings on pipes to be used on steam-heated trains.

The company also make a union sectional covering, made of asbestos sponge (a combination of asbestos fiber and sponge) with asbestos sheathing and wool



felt, and adapted to stand a steam pressure of 80 to 100 pounds. It is very light and porous on the inner side, next to the pipe, while the outer half of the covering is made more solid and compact by the use of asbestos sheathing and wool felt. The outer surface is of corrugated wool felt, the goods being stitched with wire, and put up in such shape that they possess a high degree of durability as well as the best non-conducting qualities.

Another variety of the same goods made by this



company is their indestructible sectional coverings, made entirely of asbestos and sponge, incased in a canvas jacket. They are very light in weight, while strong and flexible. They are made in sections three feet long, to fit all sizes of pipe, and a full line of fittings is also made of the same material. They are intended to cover pipes carrying the highest pressure of steam, being absolutely fireproof, and can be supplied with an asbestos waterproof jacket if desired.

All of the coverings of the Shields & Brown Co. are adapted to be fitted to pipes and boilers in such way as to provide an air chamber between the pipe or boiler and the covering if desired. For this purpose asbestos rope collars are supplied, to be placed on pipes at intervals of about a foot, small clamps being furnished with each collar, by which they are readily attached. By applying sectional coverings in this way, the covering is raised above the rivets and bolt heads, making the outside surface symmetrical, while affording a confined air space which makes the best of all insulators.

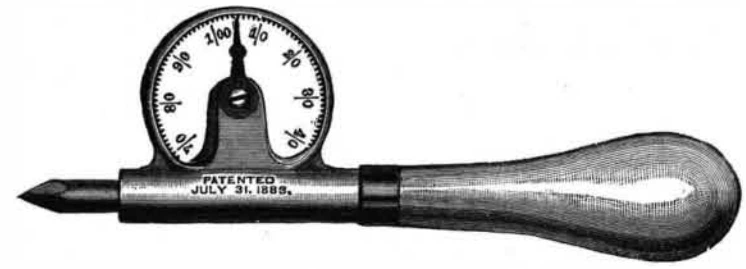
The Shields & Brown Co. also manufacture a special quality of covering largely used by gas companies for covering service pipes, as well as supplying complete coverings for all steam surfaces, in such shape that any ordinary mechanic can apply them. The offices of the company are at 143 Worth Street, New York, and 240 and 242 Randolph Street, Chicago, Ill.

Willow and Willow Wares.

The willow ware industry has been slowly increasing in our Eastern States of late years, but is as yet in its infancy. The immense unutilized areas of land along our many rivers, portions of the sea coast, and of some uplands and prairies not suitable for any other agricultural pursuit, invite capital and energy to invest in the production of osier, chiefly for the manufacture of basket ware. According to the census of 1880, there were in the country 304 willow ware establishments, with a capital of $1,852,917, engaging 3,119 hands, paying annually the sum of $657,405 for wages, and producing $1,992,851. The value of materials consumed was $867,031, of which, however, but a portion was produced here. The importation of both raw and manufactured material will be greatly reduced, and the demand for willow ware materially increased, if the profit to be derived from a systematic production of osier becomes once better generally understood.—*Insect Life.*

AN IMPROVED SPEED INDICATOR.

An extremely simple speed indicator, which can always be readily applied, is shown in the accompanying illustration. By simply pressing the point against the end of a shaft, the dial will indicate the speed at which the shaft is running, an extra-hardened point being made for use on dynamo machines that will indicate up to 5,000 revolutions per minute. It will indicate either a right or left hand motion, and is so simple in construction that it is not liable to get out of order. The index point can be put at zero with the finger, instead of turning the dial all around. The owners and manufacturers of this speed indicator are Messrs. Chandler & Farquhar, No. 179 Washington Street, Boston, Mass.



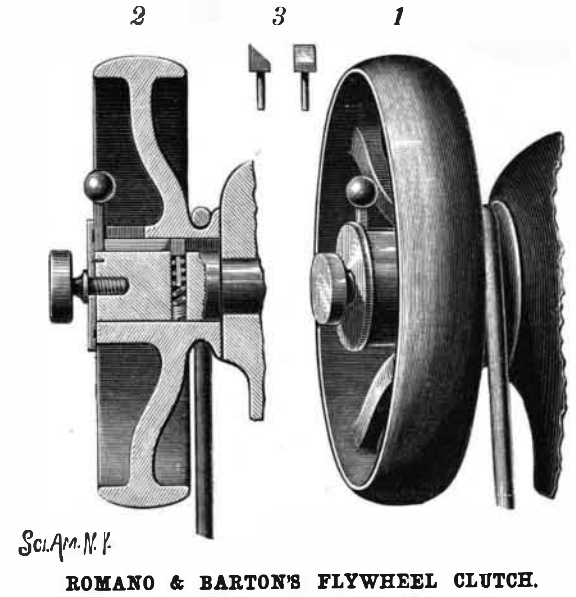
FOWLER'S SPEED INDICATOR.

A Successful Inventor.

We wish all American inventors could reap as bountiful a harvest of fortune as Hiram Maxim, of New York, who has received $850,000 for his last production, the quick-firing gun, in England. The first Maxim essay, the small one-barreled mitrailleur, has not been a success except in theory, the tremendous discharge of 1,000 shots per minute soon being too much for any single bore, however excellent of design or material. Maxim may be fairly accounted a prospective millionaire, having previously to his ordnance inventions received some $100,000 in the United States for his electric lighting patents. He is still a young man, and resides at Thurlow Lodge, which he has purchased, about twenty miles from London. The old mansion, surrounded by very fine grounds, is one of the historical English houses, having been the property and home of Lord Thurlow, the great English Chancellor.—*Army and Navy Jour.*

AN IMPROVED FLYWHEEL CLUTCHING DEVICE.

An automatic loose and fast attachment for sewing machines, whereby the flywheel may be made to revolve with the shaft in one direction and independently of it in the opposite direction, and may be virtually disconnected therefrom, to turn independently of the shaft in either direction, is illustrated herewith, and has been patented by Messrs. J. A. Romano and Ernest A. Barton, of Celaya, Guanajuato, Mexico. The portion of the driving shaft on which the flywheel is hung has a diametrical aperture, mostly rectangular, but circular at one end, in which is held a latch, shown in Fig. 3, surrounded by a spiral spring. The hub of the flywheel has a horizontal groove on its inner face, and an opening in its outer surface intersecting the groove, a locking bolt being held within the groove and opening, a horizontal member of the bolt sliding in the groove, while the vertical member is adapted to the opening. The lock bolt has, at the extremity of its horizontal member, an inclined or beveled surface adapted to engage the inclined surface of the latch head. When the flywheel is turned from right to left, the shaft is rotated, as the side wall of the groove in the flywheel then engages the perpendicular face of the latch head; but in turning the flywheel the other way the groove comes in contact with the beveled sur-

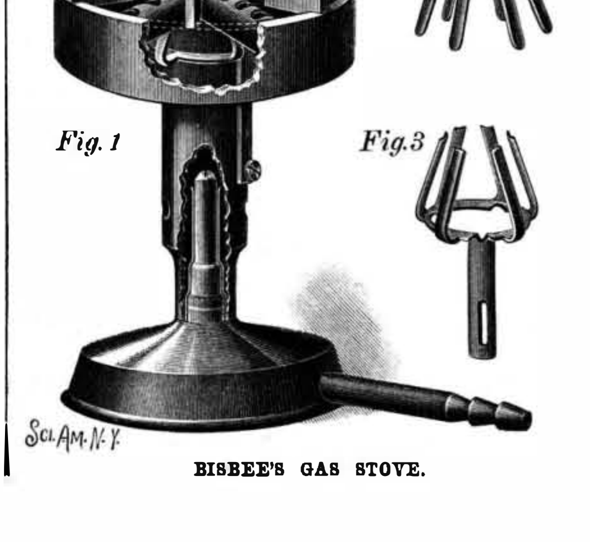


ROMANO & BARTON'S FLYWHEEL CLUTCH.

face of the latch head, pressing the latch downward against the spring into the shaft, so that the flywheel revolves free of the shaft. By passing the locking bolt to the inner extremity of its groove, the latch in the shaft will be held in its aperture to permit the flywheel to revolve freely in either direction without operating the machine.

AN IMPROVED GAS STOVE.

A gas stove which can be readily regulated to burn a small flow as well as a large, full flow of gas is illustrated herewith, and has been patented by Mr. Clarence L. Bisbee, of No. 198 Seventeenth Street, Brooklyn, N. Y. A cylindrical chamber, having draught openings in its lower portion, is made to fit upon the gas jet tube, and cast with this chamber, as one casting, are hollow arms, with a surrounding flange, and upright pieces rising from the upper edge of the flange, so that the whole stove is made in one piece. There are upper and lower openings in the hollow arms, the gas burning at all the upper openings when fully turned on, and when the gas is partly turned on it is burned at the inner openings only, being cut off from the outer openings by the air passing therethrough. The regulator, shown in Fig. 3, may be attached to the circular chamber by a slotted arm and set screw, and has upwardly projecting plates, slightly concaved, to fit against the inner edges of the upper apertures in the hollow arms, to impede the flow of gas to the outer ends of the arms, but will be burnt mainly, when turned down, at the angles of and between the arms, insuring a perfect combustion within a small limit. In Fig. 2 is shown another form of regulator, to be placed upon the cylindrical chamber, when the side plates project down into the openings of the hollow arms to effect the purpose of a regulator.



BISBEE'S GAS STOVE.

Wine from Berries and from Dried Grapes.*

There are numerous factories in Germany which, under the name of "artificial wine" (*kunstwein*), introduce beverages into the market which are intended to satisfy this want. But these factories of artificial wine have their very doubtful point, inasmuch as great quantities of their productions, when they get into the second or third hand, are sold as genuine wine.

In order to avoid paying a good price for an inferior article, the farmer may, with some attention and industry, prepare himself his own domestic beverage, and have thus a much better and cheaper article than he can buy in the factory under the name of artificial wine, or as wine, if he buys it from an agent

For the manufacture of a good domestic beverage, different sorts of fruits, the residuum of pressed grapes, wine lees, berry fruits (also some kernel fruits, as cherries and plums), and dried grapes may be used.

WINE FROM BERRIES.

Currants and gooseberries yield almost every year a good crop, and even on a small area of land they furnish so much fruit that, by adding the necessary water and sugar, a great quantity of wine can be produced. Whortleberries are very abundant in some districts.

The price of sugar being rather low, the expenses are but small. For one hectoliter (nearly 26½ gallons, wine measure) of good domestic beverage, sugar for only about 7 or 8 marks is wanted ($1.75 to $2).

The berries contain too little sugar and, with the exception of thoroughly ripe blackberries and sweet cherries, too much acidity. The acidity must, therefore, be attenuated and sugar added. If too little water is used, the wine becomes too sour.

At the exposition in Bruchsal, Baden, in April of this year, all the new sorts of prize wines and seven of twelve wines having received diplomas were attenuated with water in the proportions given below.

The wine becomes stronger or weaker, according to the quantity of sugar added. By adding too little sugar, the wine becomes weak and not durable.

The subjoined table shows the average contents of sugar and acid in the different sorts of fruit, and also the addition of water and sugar necessary for 10 liters of juice or 11 kilogrammes of fruit, in order to make either a weak kind of artificial beverage, a good table wine, or a liquor wine:

Fruits.	Contents in 100 parts of fruit.		Addition to 10 liters juice or 11 kilogrammes of fruit.				
				Sugar—kilogrammes.			
	Sugar.	Acidity.	Water—liters.	Domestic beverage.	Table wine.	Strong wine.	Liquor wine.
Currants..	6·4	2·1	30	4·2	5·8	7·4	1·3
Gooseberries	7·0	1·4	18	2·7	3·7	5·1	8·8
Blackberries..	4·0	0·2	..	0·8	1·2	1·6	3·0
Whortleberries	5·0	1·7	24	3 6	5·0	6 3	11 0
Raspberries........	3·9	1·4	18	3 0	4·1	5·2	9·1
Strawberries	6 3	0·9	8	1·6	2·3	3·0	5 5
Red bilberries.....	1·6	2·3	35	5·3	7 1	8·9	15 2
Agriot cherries....	7·5	1·3	16	2·4	3·4	4·5	8·1
Sweet cherries.....	10·0	0·4	..	0 2	0·6	1·0	2·4
Plums	6·1	0·8	6	1·3	2·0	2·6	4·8

From the stone fruits the stones are to be removed before weighing them and before fermentation takes places. Strawberries, gooseberries, blackberries, and agriot cherries are particularly qualified for strong and fine wines. For the purpose of mashing the berries and removing the stones the fruits may be grated through sieves, the holes of which are small enough not to allow the passing through of either berries or stones. Then the mashed fruits are to be pressed out or soaked in water, as will be described below. The latter proceeding is, of course, only possible with fruits which require a large quantity of water. During the process of mashing and pressing the fruits great care is necessary to prevent the dissolution of iron in the juice, as even very insignificant particles of it will give a bad taste to the wine and also a bad, muddy color.

Iron wine presses and the lower parts of the spindles are to be painted with iron varnish. In order to avoid the dissolution of iron, the soaking out of the residuum of grapes is to be preferred to the pressing. Sieves made of brass are preferable, but must be kept very clean. The riper the fruits, the better the wine will be. Rotten fruits must be removed as much as possible.

The fermentation will be the quicker, the nearer the degree of heat is to 30°; but the danger of the formation of acid of vinegar (acetic acid), lactic acid, slime, etc., increases with the heat. If the residuum is not kept in the liquid, it often grows very hot by contact with the air, and injurious decompositions are formed. The most favorable degree of heat for fermentation is from 15° to 20° C. (12° to 16° R.)

Berries picked in the hot part of the day are warm, and if gathered in large quantity in receptacles, they often become very hot. In these warm, partly already injured berries, an alteration can take place which is injurious to the wine produced therefrom. Such fruits which ripen in summer should, for this reason, be picked in the morning or evening or on a cool day. In no case should they remain for any length of time in large filled-up receptacles.

If the mash is too warm, it ought to be brought to the correct degree as soon as possible by adding cold water.

There are cases where great quantities of grape wine were spoiled only because the grapes, though of very good quality, had been harvested in the heat and had been transported a long distance.

In those years in which the grapes are harvested in very warm weather, there are always more poor wines than when the grapes are cool before they are put into the tubs. It has been observed that fermentation does not commence soon if the berries are picked soon after rain.

If the alcoholic fermentation at the correct degree of heat does not sufficiently commence within twenty-four hours, there is danger that other dissolutions will take place, mucilage or lactic acid formation, or, in case of slow fermentation, even vinegar formation. The fermentation can be produced by adding compressed artificial dry yeast or fluid corn yeast; 50 grammes of the former or about one-fourth liter of the latter to 1 hectoliter are in the first place added to one part of the mixture of sugar water and juice or mashed fruits. As soon as this is in good fermentation it is mixed with the rest of the mash. As a matter of course, only the very best and freshest yeast is to be used. Yeast of beer is of no use.

One of the greatest difficulties in preparing berry wines is caused by a too slow and often incomplete fermentation. This is produced either by the mash having been filled into a barrel smoked with sulphur, or by the formation of acid of vinegar at the beginning of the fermentation, or also by the berries not containing sufficient nutritious matter in proportion to the yeast necessary for the fermentation of the sugar.

Fermentation will be greatly accelerated by adding currants or raisins or cristated currants to the mixture of berries or their juice with sugar water. From 1 to 2 pounds of currants or raisins may be added to 10 liters or 11 kilogrammes of fruits. They must be quickly washed with cold water, then cut, added to the mixture of juice and sugar water, and left therein during fermentation. For 1 pound of raisins 1½ liters of water more may be added. The air is to be carefully excluded from the surface of fruits left standing after having been either lyed or washed, and also during and after the process of fermentation, else a part of the alcohol will turn into acetic acid, causing the wine to remain muddy and slimy and to receive a disagreeable taste. Besides this, wine containing much acetic acid does not agree with many persons. Generally, but especially with fleshy or slimy fruits, such as gooseberries, whortleberries, cherries, plums, etc., it is quite to the purpose to submit the mashed fruits, with an addition of a certain quantity of water and sugar, to the process of fermentation; but this requires great precaution, for as soon as the fermentation commences, the husks will get on the surface and thus form a loose mass into which the air will penetrate, and in a short time produce acid of vinegar.

For producing berry wines or red wine on a large scale, and when the wine ferments on the husks, the mash in a tub may be covered with a perforated tub bottom and burdened with weights or tightly fastened in order to prevent the husks from rising, and then the whole may be covered.

In preparing berry wine on a small scale, but yet up to 1 or 2 hectoliters, it is best to use vessels of stoneware for fermentation.*

On the lower part of these vessels there is a sink bottom, and the mashed fruits contained in it are again covered with a similar one, water is poured in the channel on the upper part of the vessel and the cover laid upon it. The border of the latter must reach into the water and entirely exclude the air.

As soon as the fermentation has commenced, the liquid is let off; it is then replaced by sugar water, poured off again after twelve hours; water is first poured on it and then poured off again after a lapse of time. This is repeated until the required quantity of water is spent.

If correctly executed, the husks are so thoroughly washed that it is altogether useless to press them. In the fluid collected in a tub or bottle the corresponding quantity of sugar not used yet is dissolved. Wines of blackberries, strawberries, sweet cherries, and other fruits for which little water is used may be left in these vessels until fermentation is completed. For the fermentation of fluids, fermentation vessels in glass may be used to advantage. Such air-tight vessels have been tried repeatedly last year, and they proved excellent.

Grape and berry wines remained in a warm room in partly filled vessels without being in any way injuriously affected by the air.

The family (home) beverage and the table wine must, as soon as fermentation ceases, be drawn off the lees and filled in a slightly sulphurated tub. The strong wines and liquor wines may be left on the lees until they are quite clear, and then they are likewise to be filled into a slightly sulphurated tub, but they are filled in bottles only when they do not thicken or ferment any more. For the preservation of wines in bottles intended to stand, bottles provided with patent wire locks are to be selected, or else after the tops of the corks are cut off, and when quite dry, the heads of the bottles must be dipped into hot paraffine.

Concerning cleanliness and the storing of the wine in barrels, the explanations given in respect to domestic beverage from dried grapes are to be observed.

DOMESTIC BEVERAGE FROM RAISINS.

One hundred kilogrammes of raisins are placed in a tub, and cold water enough is poured over them just to cover them. After the lapse of twenty-four hours the fluid is to be drawn off in a tub. The now sufficiently soaked raisins are then pounded or pressed through a sieve provided with such wide holes that whole berries cannot penetrate, water is then poured over them, and removed after twenty four hours. This is to be repeated until 4 or 6 hectoliters of fluid are collected in the tub, just according to the wished for strength of the domestic beverage. The fluid is then left to ferment. The most favorable degree of heat for this is from 15° to 20° C. (12° to 16° Reaumur); a much higher or lower degree is to be avoided. If fermentation does not begin within twenty-four hours, then 100 grammes of good, fresh, compressed yeast or one-fourth of a liter of good liquid grain yeast are to be added to the hectoliter. Yeast of beer is not fit for use, but from 1 to 10 liters of yeast from good wine may be added to 1 hectoliter, provided it be very fresh and the wine has not been drawn off from it too late, at least in the beginning of February.

Old, especially slimy, wine yeast is carefully to be avoided, as it would make the beverage slimy and not clear. As soon as fermentation ceases, the beverage is to be drawn off from the lees and put in a tub slightly sulphurated, one slice for 10 hectoliters. If the beverage is desired to be a little astringent, which would render it more refreshing, 100 grammes of vinous acid would have to be dissolved in a hectoliter. In the season of currants, to 100 kilogrammes of raisins about 10·15 kilogrammes, or to 1 hectoliter of domestic beverage before, at, or after the fermentation, 3 4 kilogrammes of mashed berries, or 3·4 liters of juice of currants, may be added. In a similar way sour grape wine or cider, or mashed ripe and green apples (fruit fallen off the trees), or their juice, may be used. The greatest cleanliness is to be observed in regard to all the vessels or receptacles into which currant wine or domestic beverage is put. The air is to be kept off carefully from the surface of the water on the raisins and from the fermenting and fermented fluid. The tub is to be covered with a lid, the bung hole is to be closed by a clean sand bag as long as fermentation lasts, and then by a well fitting bung. Store barrels must be kept full as much as possible, and must be bunged up with bungs of acacia or oak wood, reaching at least 15 centimeters into the cask. The wrapping of the bungs and corks in rags must be avoided. For barrels on tap (*kuhnenheiter*) fungus guards are to be used, or the bung, after each drawing off, must be firmly fastened again. All bungs must be kept free of mould, fungi, or other injurious mushrooms, which, especially after this, are apt to spread over the beverage or wine. For this purpose the bungs are now and then to be dipped into spirits of wine entirely free of bad liquor, or, better yet, into a mixture of one part of acid *calcarea sulphurica* (*saurer schwefelsaurer kalk*), which may be kept ready for use in the cellar in a glass cylinder with glass cork. E. JOHNSON, *U. S. Consul.*

Kehl, Baden, Germany, August 16, 1888.

* U. S. Consular Report, No. 46.

* One containing a liter costs 30 pfennigs at Flochstetter & Kunst's in Flohr, near Coblenz, Prussia, and in their branch business at Offenburg, Baden, each sink bottom of from 30 to 50 liters = 1 mark 20 pfennigs. Receptacles with this air-close may also be used for the preservation of sour cucumbers (pickles) and other preserves. Instead of water, a little oil is now poured into the channel.

The Fever Microbe.

An illustration of a strange fact is found in the experience with the Jamestown, now the training ship at Baltimore. On one of her trips yellow fever appeared on board, and several deaths followed. Subsequently the vessel was thoroughly renovated and extensively repaired. Her woodwork was steamed. Then she remained in northern harbors for several winters. She was finally ordered south again, and before she reached the fever district a case was developed and the man died. Above his hammock was found a quantity of filth. The woodwork was torn out, and the filth removed. But she is still a fever ship, and I would not like to go south in her. Then, again, is the case of the Portsmouth. She once had fever on board. Long afterward she was ordered to Norfolk for repairs. Naval Constructor Hichborn had charge of the work. A number of his workmen died, and he himself was taken down with typhoid fever, and his life was despaired of. It is true, that once a fever ship, always a fever ship.—*Washington Capital.*

Softening Water.

For all washing and cleansing operations, says a little pamphlet on "Softening Water, Making Soap, Wool Washing, and Bleaching," if good and economical results are to be obtained, it is indispensable, *first* to soften the water before using soap of any kind for scouring, fulling, or milling purposes. Softening water simply consists in removing the soluble lime salts with which all water (with the exception of pure rain water) is more or less impregnated from contact with the lime strata in the ground. If this is not done, the soluble lime forms an insoluble lime soap from the decomposition of the soap used for washing. This substance is a greasy, sticky, oily compound, perfectly insoluble, and more difficult to wash away afterward by any treatment. It is this that causes the yellow grayish deposit on the edges of collars and cuffs washed simply with hard water and soap, and the sticky, greasy deposit on wool when treated in a similar manner, and also on the sides and edges of all washing machines.

It is a most uneconomical proceeding to wash anything in water and soap alone, without previously softening the water. Not a particle of soap can become available for washing purposes until all the added lime in the water has combined with the amount of soap it requires to form the insoluble lime soap. As compared with the pure 98 per cent powdered caustic soda, such as the "Greenbank" brand, it requires *twelve* pounds of the very finest pure soap, or twenty to thirty pounds of ordinary soap, such as is usually sold to manufacturers, to do the same work that can be done with *one* pound of this soda. Or, as compared with refined carbonate of potash, which should always be used for softening water when wool or woolens are to be washed, for reasons which will be explained afterward, six pounds of best pure soap or ten to fifteen pounds of ordinary soap are necessary to do the same work that can be done with one pound of refined carbonate of potash. It is, therefore, pretty evident, for economy's sake, as well as in order to do good work, that all water used for washing or cleansing purposes should be softened previous to use.

SOFTENING WATER FOR COTTON OR LINEN MANUFACTURERS, DYERS, BLEACHERS, AND LARGE STEAM LAUNDRIES.

The exact quantity necessary can only be ascertained in each individual case by chemical analysis, but general directions can be given, which in most cases are sufficiently accurate. They are as follows:

Good Water.—Add one pound of 98 per cent powdered caustic soda to each 1,000 gallons of water.

Medium Water.—Add two pounds of the soda to the same quantity of water.

Hard Water.—Add from three to four pounds to the same quantity of water.

Water is generally hardest in limestone regions, and in these cases three to four pounds of caustic soda of a high degree of purity (98 per cent) will be necessary; elsewhere, in ordinary cases, two pounds of this highly concentrated soda is sufficient. Common caustic soda does not do at all well for softening water. Being in large, solid blocks in drums, it is both difficult and dangerous to handle. Besides this, three or four times the quantity of common caustic soda is necessary, as it contains so much salt, sulphate of soda, and other impurities that the water is often considerably hardened by its addition.

Method of Use.—The powdered 98 per cent caustic soda simply requires to be thrown into the water tank, when full, in the quantities given above. It dissolves almost instantly, and the whole tank only requires to be stirred once or twice to mix the powdered caustic soda through and throw down the lime. If the tank is then left for three or four hours undisturbed, the lime falls and settles at the bottom of the tank, and the clear, softened water can be drawn off by placing the exit tap rather above the bottom of the tank, thus leaving the sediment behind. This settling, however, is not absolutely necessary, except for fine work or dyers' use, as the lime, when once it becomes insoluble, is rendered harmless, and will not interfere with the soap or washing. If it can, however, be accomplished, it is better to settle out the lime. It is easy to calculate the contents of the tank in gallons in the following manner: Multiply the length, breadth, and depth of the tank together; this will give the capacity of the tank in cubic feet; each cubic foot of water is equal to 6¼ gallons; consequently, the cubical capacity of the tank requires to be multiplied by 6¼ to get the contents in gallons.

Example.—Suppose the tank measures $10 \times 8 \times 4$ feet deep; the cubical capacity is therefore 320 cubic feet; this multiplied by 6¼ gives 2,000 gallons as the contents of the tank. Suppose that it contains medium hard water that requires to be softened, then four pounds of powdered 98 per cent caustic soda will be required to be added to it for that purpose.

If desired, the powdered caustic soda may be added to the washing machine in the proportions given just before entering the goods to be washed, and *before* adding the soap. In this case, the machine must first be turned round once or twice to mix the water and caustic soda, and throw down the lime. If, however, it can be conveniently managed, it is decidedly recommended to soften the water previously in the stock tank, as it can be done more accurately, and to soften a large quantity of water at one operation is less trouble.

SOFTENING WATER FOR WASHING WOOL AND WOOLENS.

For softening water for washing wool and woolen goods, the refined carbonate of potash is much to be preferred to anything else. Soda in *any* form, when used with wool, has a tendency to make it hard and brittle, and give it a yellowish color. Potash renders wool soft and silky to the touch, and also has a slight bleaching action; therefore potash for softening water and potash soap only should invariably and without exception always be used for washing wool or woolens. This is no theory, but the practical experience of some hundreds of the largest wool washers and woolen and worsted manufacturers of England and America, besides being borne out by chemical investigation. Nature largely associates potash with wool in the yolk, or grease, with which it is found when growing on the sheep's back, and to the total exclusion of soda.

The teaching of nature in such matters is invariably correct, and therefore it is certain that potash, and potash soap only, and *not* soda in any form, should be used when treating wool. It is only necessary for a manufacturer to give this a practical trial to be thoroughly convinced of the superiority of potash for wool and woolen washing. The raw wool, when it is treated with potash and potash soap, is soft and silky to the touch, and the loss in weight is decidedly less than when soda or soft soap is used—one item alone which far more than counterbalances the slight extra cost of potash. Woolen goods milled or fulled with potash soap have quite a different handle from that of the same goods when finished with soda soap, and the colors of dyed goods will look brighter and altogether different. This matter cannot be too strongly insisted upon with woolen manufacturers. It is no theory, but the result of long practical experience of the subject.

What is the Best Way to Treat Men who, while Working in the Trench, are Overcome by Gas?

The above was one of the questions asked at the recent meeting of the American Gas Light Association at Toronto, and was answered as follows:

MR. CLARK.—I have a recipe which was given us by a prominent physician, and which seems to be a very good one. The rules are as follows:

Rules to be followed when men are overcome with gas:

1. Take the man at once into fresh air. *Don't* crowd around him.

2. Keep him on his back. *Don't* raise his head, nor turn him on his side.

3. Loosen his clothing at his neck and waist.

4. Give a little brandy and water—not more than four tablespoonfuls of brandy in all. Give the ammonia mixture (one part aromatic ammonia to sixteen parts water) in small quantities, at short intervals—a teaspoonful every two or three minutes.

5. Slap the face and chest with the wet end of a towel.

6. Apply warmth and friction if the body or limbs are cold.

7. If the breathing is feeble or irregular, artificial respiration should be used, and kept up until there is no doubt that it can no longer be of use.

8. Administer oxygen.

Some of these rules I have myself used, and I think very successfully.

MR. WHITE.—I have been told by a physician who has had considerable experience in the treatment of those overcome by gas that there is no more direct or certain way to overcome the effects of the gas, if the man is sensible enough to swallow, than to give him a tablespoonful of olive oil or of common sweet oil. If he can swallow it, give him a tablespoonful of oil, and then give him a little milk, or some brandy or whisky, or whatever stimulant may be at hand. Of course, you should loosen his garments and place the man in easy position to breathe freely, and, if you can, create a circulation of air by fanning, or by placing him in a draught. The handiest thing usually for gas men to get when a man is overcome in the trenches is to go to a neighboring drug or grocery store and get a bottle of sweet oil and some milk; and it is my experience that, whether the man is overcome with water gas or coal gas, nothing acts so quickly in restoring his breathing as sweet oil. It is not unpleasant for him to take, it lubricates his breathing apparatus, and the man will recover very much more quickly. It is founded upon many years' experience with men who have been overcome with gas, and I have used it myself when suffering from the same cause.

MR. SOMERVILLE.—I was once engaged in taking off the top of a station meter, inhaled too much gas, toppled over, and was carried out insensible. I understand that I was taken to the open air, my collar and waistcoat were loosened, and I soon recovered consciousness, but I did not get well until the contents of my stomach were out of me. The whole system seemed to be affected by the gas. A few weeks ago I had to take my foreman out of a hole. It was a very serious matter. He was a nice man, and I was sorry to see him tumble off like that. We dragged him out as quickly as we could, unbuttoned his vest, fanned him, and he soon recovered. That was with coal gas. Still he felt the effects the balance of the day. With water gas it is entirely different. Then it is a very serious matter indeed. We always take extra precautions in dealing with water gas. It does not seem to produce the same effects as coal gas. It seems to touch the blood, and it takes men some weeks to get over its effects. In fact, I know a man who has never gotten over it. If anything can be devised which will overcome the effects of the inhalation of water gas, it is very important we should know it. I have no doubt some one is asking this question in all sincerity, and if we can think of anything which would be an effectual remedy, it will be a good thing to come before the meeting.

MR. SCRIVER.—I believe that very recently an inspirator has been invented which fits over the nose and mouth, and enables the man to remain in an atmosphere where gas is escaping for a great length of time.

MR. HARBISON.—Two or three years ago I had some experience in this matter, and it was a little different from anything which has been stated here. I was not within reach of physicians at the time, and so could not avail myself of their services. Some workmen were laying a large main, connected with two six-inch pipes, and had to make a temporary connection over night in order to maintain the supply of gas in one section of the city. The gas escaped, and within ten minutes seven men became insensible in the ditch. We took the pressure off as soon as we could. We removed the men to open air, put water upon their faces and necks, got a mixture of whisky and water and gave them, and then as soon as they could swallow anything I gave them apples to eat, and the acid of the apples immediately started the gas out of the stomach. Just as soon as I could reach it I got some strong, hot coffee, without sugar, and gave them, and very soon they were ready to take their supper pails and walk home.

MR. WATSON.—I have had men in the same condition, but I administered vinegar to them, which, I suppose, acted in the same way as the apples. I gave them vinegar with eggs in it, breaking the egg in the vinegar and letting them drink it. I found it very effectual.

MR. KUEHN.—On two different occasions, when one of my men was overcome with gas, I called a physician, and he injected the carbonate of ammonia. The man was ill eight or ten days after it from the effects of it. He became so bad the second time, I did not put him back to that kind of work again.

Supreme Court Patent Decisions.

An interest in the net proceeds of collections for infringements of a patent does not necessarily involve an interest in the patent itself.

The infringer is liable for actual, not for possible, gains, for the fruits of the advantage which he derived from the use of the invention over that which he would have had in using other means then open to the public are adequate to enable him to obtain an equally beneficial result.

If there was no advantage in the use of the plaintiff's invention, there can be no decree for profits, and the plaintiff's only remedy is by action at law for damages.

If the defendants gained an advantage by using the plaintiff's invention, that advantage is the measure of the profits to be accounted for, even if from other causes the business in which that invention was employed by the defendants did not result in profit.

A court of equity will itself administer full relief by awarding as an equivalent or a substitute for legal damage a compensation computed and measured by the same rule that courts of equity apply in the case of a trustee who has wrongfully used the trust property to his own advantage.

A court in equity will require an infringer to account for the gains and profits which he has made from the use of a patented invention instead of limiting the recovery to the amount of royalties paid to the patentee by third persons.

International Lamp Competition.

At the recent petroleum exhibition, held in St. Petersburg, a competition was opened by the Russian government for the purpose of obtaining a cheap and serviceable lamp suitable for burning the heavy Russian naphtha oil for the poorer classes in that country. A prize of $1,600 was offered for the best lamp, and one of $559 for the second best. The competition was then a national one, but as the results obtained with the lamps sent in by the Russian inventors were not entirely satisfactory, the government considered themselves justified in not awarding the prizes. The competition, however, has now been thrown open to all comers, and lamps must be sent in not later than by the 13th January, 1889. There is thus afforded to American inventors an opportunity of trying what they can do in the matter.