Cements of Rubber and Gutta Percha.*

The number of rubber cements in use all over the world is something remarkable. Almost all of them have as the base either gutta percha or India rubber, and some cheap solvent. Gutta percha tissue, to be sure, is used as a cement without the addition of any solvent, its sticking properties being brought out by the application of heat. This may be noticed in the application of the bindings that go around the bottoms of trousers and the stamp marks in hats, and other work of a similar nature. In making a cement, one should know pretty thoroughly what is to be expected of it before they could advise upon it. For instance, an ordinary rubber cement will hold on a host of different surfaces and with the best of success, except where there is continued dampness. For holding to damp walls, or surfaces where there is a constant presence of moisture, there is nothing equal to Jeffry's marine glue, the formula for which has been published and republished all over the world. It consists of; India rubber, 1 part; asphaltum, 2 parts; coal tar, 12 parts.

The rubber, after having been massed, is dissolved in the undistilled coal tar, and the asphaltum is then added. This glue, as its name indicates, is oftentimes used for mending articles at sea, or patches, for instance, that are to be laid on surfaces that are to be under water, and it has been found to be a most excellent thing. Of glass cements there are a great many, the rubber as a rule being dissolved in some very volatile solvent and some hard drying gum is added. . . .

A gutta percha cement for leather is obtained by mixing the following. It is used hot; gutta percha, 100 parts; black pitch or asphaltum, 100 parts; oil of turpentine, 15 parts. An elastic gutta percha cement, especially useful for attaching the soles of boots and shoes, as on account of its great elasticity it is not liable to break or crack when bent. To make it adhere tightly the surface of the leather is slightly roughened. It is prepared as follows: by dissolving 10 parts of gutta percha in 100 parts of benzin. The clear solution from this is then poured into another bottle containing 100 parts of linseed oil varnish, and well shaken together.

Davy's universal cement is made by melting 4 parts of common pitch with 4 parts of gutta percha in an iron vessel, and mixing well. It must be kept fluid, under water, or in a dry, hard state.

A very adhesive cement, especially adapted for leather driving belts, is made by taking bisulphide of carbon, 10 parts, oil of turpentine, 1 part, and dissolvin this sufficient gutta percha to form a paste. The manner of using this cement is to remove any grease that may be present in the leather by placing on the leather a piece of rag and then rubbing it over with a hot iron. The rag thus absorbs the grease, and the two pieces are then roughened and the cement lightly spread on. The two pieces are then joined, and subjected till dry to a slight pressure.

A solution of gutta percha for shoemakers is made by taking pieces of waste gutta percha, first prepared by soaking in boiling water till soft. It is then cut into small pieces and placed in a vessel and covered with coal tar oil. It is then tightly corked to prevent evaporation, and allowed to stand for twenty-four hours. It is then melted by standing in hot water till perfectly fluid, and well stirred. Before using it must be warmed as before by standing in hot water.

A cement for uniting India rubber is composed as follows: 100 parts of finely chopped rubber, 15 parts of resin, 10 parts of shellac; these are dissolved in bisulphide of carbon.

Another India rubber cement is made of: 15 grains of India rubber, 2 ounces of chloroform, 4 drachms of mastic; first mix the India rubber and chloroform together, and when dissolved the mastic is added in powder; it is then allowed to stand by for a week or two before using.

Cement for sticking on leather patches and for attaching rubber soles to boots and shoes is prepared from virgin or native India rubber, by cutting it into small pieces or else shredding it up; a bottle is filled with this to about one-tenth of its capacity, benzin is then poured on till about three parts full, but be certain that the benzin is free from oil; it is then kept till thoroughly dissolved and of a thick consistency; if it turns out too thick or thin, suitable quantities must be added of either material to make as required.

An elastic cement is made by mixing together, and allowing to dissolve, the following: 4 ounces of bisulphide of carbon, 1 ounce of fine India rubber, 2 drachms of isinglass, ½ ounce of gutta percha; this cement is used for cementing leather and rubber, and when to be used, the leather is roughened and a thin coat of the cement is applied. It is allowed to completely dry, then the two surfaces to be joined are warmed and then placed together and allowed to dry.

Cement used for repairing holes in rubber boots and shoes is made of the following solution: *a*. Caoutchouc 10 parts, chloroform 280 parts; this is simply prepared by allowing the caoutchouc to dissolve in the chloroform. *b*. Caoutchouc 10 parts, resin 4 parts, gum turpentine 40 parts; for this solution the caoutchouc is shaved into small pieces and melted up with the resin, the turpentine is then added and all is then dissolved in the oil of turpentine; the two solutions are then mixed together to repair the shoe with this cement. First wash the hole over with it; then a piece of linen dipped in it is placed over it; as soon as the linen adheres to the sole, the cement is then applied as thickly as required.

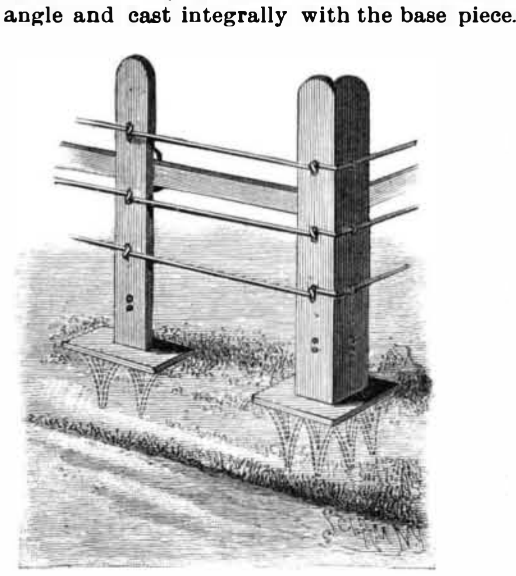
* *The India Rubber World.*

POST FOR WIRE FENCES.

The engraving shows an improved fence post recently patented by Mr. Henry Adams Peabody, of Santa Ana, California.

Two forms of this post are made, one for the division of the panels in a straight fence, and the other for turning angles. The single post consists of a bar of iron cast integrally with the base piece, and perforated with a series of pairs of holes, each pair of holes being designed for receiving the tie wire which binds the fence wire to the post, the wire being passed through the post in the form of a staple, and twisted or bent to retain it in the post. The base piece is provided with triangular projections which extend downward into the earth and form efficient anchors for holding the post in an upright position. The back of the post is furnished with an angled arm for receiving a wooden rail whenever it is desired to use a rail in connection with the wire in the construction of the fence.

The corner post is formed practically of two posts similar to that already described, arranged at the required angle and cast integrally with the base piece.



PEABODY'S FENCE POST.

In this case the base plate is furnished with a greater number of anchoring points for insertion in the ground. A fence constructed according to this improvement may be used anywhere, but it is especially designed for use upon farms, ranches, etc.

"Experimental Science"—What is Thought of It.

The *American Engineer*, referring to Hopkins' "Experimental Science" in flattering terms, and naming the subjects treated under the twenty-three chapters which the work contains, concludes by saying: "Each of these chapters contains beautiful engravings of devices and apparatus, methods and means, that illustrate the instructions. Like the celebrated Faraday, the instruction is conveyed and the experiments described without recourse to mathematics. The majority of students have little taste for the intricacies of numbers and the higher formulæ of mathematics. Most of the apparatus illustrated and described can be constructed and used by any one having ordinary mechanical skill. The work bears the stamp of a thorough scientist, a writer who writes nothing but with certainty of action and result, and of a teacher who imparts scientific information in an attractive and fascinating manner. Like all productions from the publishers of the SCIENTIFIC AMERICAN, this admirable work contains engravings and typography of the highest order. It should find a place in every technical institute and in every engineer's library."

The Consumption of Salt.

According to some statistics recently published in France, the annual consumption of salt per head in England exceeds that of any other country in Europe. For while in France the amount is estimated at about 30 pounds, Italy 20, Russia 18, Austria 16, Prussia 14, Spain 12, Switzerland 8, the Englishman requires no less than 40 pounds. The *Hospital Gazette* thinks that perhaps this is the secret of British thirst. If so, it offers an easy solution to the drink question, which the temperance party should not be slow in adopting.—*N. Y. Med. Rec.*

[The large consumption of salt in England is due to the extensive manufacture of soda, bleaching powders, etc., which are made from salt.—ED. S. A.]

Loss in Keeping Manure.

In order to make some observations bearing directly on the changes which take place in the amount of fertilizing elements between fresh manure and well rotted old manure, this trial was made.

From the top of a pile of fresh manure from the cow stable one-half cord was taken, weighed, sampled for analysis, and piled into a close conical heap January 4, 1889. This was the mixed excrement from cows as thrown out of the stable twice daily, and cut corn stover which was being fed freely and the waste used for bedding and to absorb the urine.

At the same time a half cord of an old compost, of which muck was the leading ingredient, was treated in the same way, *i. e.*, was weighed, sampled, and piled in the same manner close by the pile from the stable.

Both piles were reweighed April 13, and returned to the same places, and as carefully piled as before. This was equal to a complete forking over, the piles having been handled twice with a fork in the operation.

On January 21, 1890, both piles were weighed, measured, and again sampled for analysis. The results were:

	Manure. Lb.	Compost. Lb.
January 4, 1889	3,298	2,376
April 13, 1889	2,276	2,130
January 21, 1890	1,148	1,810
Per cent of lost weight in one year	65'19	29·61
Per cent of lost bulk in one year	50·00	28·6

The weights, when drawn out January 4, were for half cord fresh manure, 3,298 pounds; and for one-half cord compost, 2,376 pounds. By April 13 these piles had decreased in weight to 2,376 pounds and 2,130 pounds respectively.

On January 21, 1890, the manure had shrunk from one-half to one-fourth cord, and weighed only 1,148 pounds; the compost had diminished two-sevenths of its bulk to five-fourteenths of a cord, and weighed 1,810 pounds. To compare these losses of weight and bulk in one year:

	Manure. Per ct.	Compost. Per ct.
Loss of weight in one year	65·19	29·61
Loss of bulk in one year	50·00	28·6

Below is given the composition as found on analysis of the above named samples, the first analyses being by Mr. Ladd and the later ones by Mr. Whalen:

	Manure		Compost	
	Fresh. Jan. 4, 1889.	One Year Old. Jan. 21, 1890.	Jan. 4, 1889.	Jan. 21, 1890.
Per cent of water	84·42	75·118	68·195	61·12
Analysis of the dry matter of each sample.				
Total dry matter	513·17	285·65	755·69	698·3
Nitrogen, per cent	1·96	2·06	2·13	1·81
Potash (K_2O)	4·08	2·88	....	trace
Phosphoric acid (P_2O_5)	0·13	0·28	....	0·30

Calculating the total amounts of these fertilizing elements in the manure and compost at the times noted above gives the following:

	Lb.	Lb.	Lb.	Lb.
Nitrogen	10·06	5·884	16·096	12·64
Potash	20·94	8·227	.....	trace
Phosphoric acid	0·67	0·80	.....	2·095

These figures show a loss from the weathering in every particular, except the phosphoric acid, of which a somewhat larger amount was obtained from the later analysis, but the apparent gain is so small that it could easily have occurred within duplicate determinations on so small an amount.

In calculating the actual money loss, Prof. Roberts' estimate on the value of the fertilizing elements has been adopted.*

FRESH STABLE MANURE.

Nitrogen	10·06 lb. at	$0.17,	$1.71
Potash	20·94 lb. at	4,	.838
Phosphoric acid	0·67 lb. at	7,	.047
Value of one-half cord			$2595

SAME AFTER WEATHERING ONE YEAR AND 17 DAYS.

Nitrogen	5·884 lb. at	$0.17,	$1.00
Potash	8·227 lb. at	4,	.329
Phosphoric acid	0·80 lb. at	7,	.056
Value of above reduced by weathering to one-fourth cord			$1.385

Lost on one-half cord, $1.21, or per ton, $0.734.
Per cent of loss, 46·6.

This lost portion was, of course, the easiest soluble, and hence most available and valuable part of the manure.

As no ash determinations were made on the compost at the first analysis, the full value cannot be calculated.

Nitrogen in compost	16·096 at	$0.17,	$2.736
Nitrogen in compost after weathering one year	12·64 at	17,	2.149
Lost from close pile by one year and 17 days' weathering			$0·587

Per cent. of loss from a rather stable fertilizer, 21.45.

It will be remembered that the season of 1889 in this locality was exceptionally cloudy and wet.† Great losses of nitrogen from manures are generally associated with drying and burning out. Hence we must consider these results to be under, rather than over, what may be expected in average years. Hence this condition helps this experiment to show more plainly that stable manure should not be piled up uncared for for any length of time.—*Bulletin N. Y. Ag. Station, Geneva.*

* Cornell University Agricultural Experiment Station, xlii., Art. i.

† Eighth Annual Report, N. Y. State Agricultural Experiment Station, article "Meteorology for 1889."