patented in 1877, by Mr. F. Van Dorn, of Basking Ridge, N. J.

In Fig. 7 we represent an electric cotton picker, patented by Mr. Robert F. Cooke, of Brooklyn, N. Y., in 1870. In this machine two endless rubber belts, arranged vertically on opposite sides of the machine, are excited electrically by friction, the cotton plant being agitated by a reel, or otherwise, when the ripe cotton, being disengaged from the bolls, is attracted by the electrified belt, by which it is carried upward. It is disengaged at the top, and falls into a receptacle placed between the two belts.

Fig. 8 shows a hand cotton picker, patented in 1867, by Mr. Joseph E. Carver, of Bridgewater, Mass. This invention consists in a reciprocating tongue provided with teeth and fitted to an oblong box carrying a sack at its rear end. The box is provided with an elastic plate having spines, and when the tongue is reciprocated by the handle it takes the cotton from the boll, and, by moving it forward by a succession of steps, carries it into the box, from which it finally drops into the sack.

In Figs. 9 and 10 is shown a hand cotton picker, which is remarkable for its simplicity and cheapness. It consists of gloves provided with wire hooks inclining backward toward the wrist, and a brush worn upon the waistband over the bag or other receptacle intended to receive the cotton.

The ripe cotton is readily removed from the bolls by means of the wire hooks, and it is removed from the hooks by passing them over the brush. Figure 10 is an enlarged view of one of the fingers of the glove. This invention was patented in 1876, by Mr. R. A. Cutliff, of Shreveport, La.

A form of hand cotton picker, employing an endless chain carrying barbs, is shown in Figures 11 and 12, Figure 12 being a detail view of the stripper. In this device the endless toothed chain is driven by a sprocket wheel, and in turn drives a pair of winged wheels or strippers which remove from the chain the cotton picked from the bolls by the teeth, and allow it to fall into the bag attached to the under side of the apparatus. This invention was patented in 1866, by Mr. George A. Howe, of Brooklyn, N. Y.

Figure 13 represents a pneumatic picker applied by hand, the hose being connected with a fixed exhaust fan or pump. This is one of several similar inventions patented by Mr. John Griffin, of Louisville, Ky. The patent was issued in 1866.

The hand picker shown in Figures 14, 15, and 16 consists of a rotating spindle, having a crank by means of which it may be turned. The spindle is moistened continuously, so that when thrust into a cotton boll the cotton will adhere and wind upon the spindle as the latter is revolved. When the spindle is full it is placed over a basket, and a board—called by the inventor a "shedding board"—is moved outward along the four guide pins, and pushes off the ball of cotton.

In the engraving Fig. 14 is an end elevation, Fig. 15 a plan view, and Fig. 16 is a face view, showing the shedding board with handles in the ends. This invention was patented in 1879, by Mr. T. W. Ham, of Frosa, Texas.

For those of our readers who may be interested in this problem, and yet unfamiliar with the conditions under which a mechanical cotton picker must be operated, a few words with reference to the growth of cotton and the manner of its cultivation may not be out of place.

As the high bush or "tree" cotton which produces the long staple "sea-islands" cotton furnishes but a small part of the crop, we may assume that the picking machine will be primarily designed for the upland cotton fields. In these the cotton bush grows from two to four feet high, the more common height being under three feet. The branches spread like those of an apple tree in miniature, and the cotton bolls are distributed about the limbs somewhat as apples are on a sparsely-bearing tree. The green bolls, which are an inch or so in diameter, expand and burst at maturity, exposing the snowy fiber for which the plant is cultivated, the bolls on the lower branches usually maturing first. The bolls are supported by foot stalks from two to four inches long, and for the most part grow near the outer ends of the limbs. A pull of about one ounce suffices to draw the lint from the ripe pods. In gathering the lint it is needful to keep it free from leaves, stems, or fragments of the shell of the pods, all of which goes by the name of "trash," and impairs the value of the fiber.

The plants are set in rows, from two to seven feet apart, according to the quality of the soil, and are thinned out in the rows so that the plants are from two to four feet apart. In the extreme south the bolls begin to burst as early as the first of July; further north, the picking begins a month or two later. The picking continues at intervals or continuously according to the thrift and energy of the farmer until winter sets in or the crop is all gathered.

The more serious obstacles to mechanical picking arise from the irregular height and spacing of the plants; the irregularity in the maturing of the bolls; the necessity of avoiding injury to the plants in the earlier gatherings; the difficulty of withdrawing the ripe lint without admixture with husks, stems, and broken leaves.

The problem is a complicated one, yet it small aloud for solution and promises a liberal reward to any who shall solve it wholly or in part. If comparatively simple and inexpensive, the successful machine will bring a speedy fortune to the inventor, prosperity to thousands of small planters, occupation for multitudes of mills, and cheaper clothing for half the world.

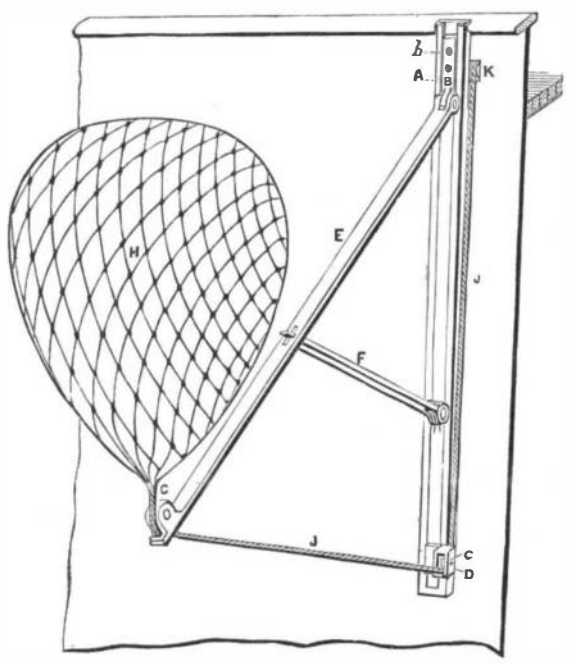
An Electrical Sheathing for Ships.

It has long been known that zinc, when in contact with iron, only preserved it from corrosion. A year ago Mr. J. J. Atkinson and Mr. C. F. Henwood, of London, taking advantage of this fact, patented a system of sheathing by means of a solder chemically combining atoms of zinc and tin. About three months ago a steam yacht was subjected to the process. The zinc sheets were attached to the iron by a dynamo machine, at spots about 9 inches apart, the connection being easily made by the melted solder. The iron below was left quite naked, so that there might be nothing to intercept the galvanic action. After a cruise of about 5,000 miles the vessel is reported as perfectly clean, while the iron below the zinc was absolutely without a trace of corrosion. The attachments formed by the solder were also so strong that in no place were they affected by an accident which the vessel met with. Experiments have proved that the wear of the zinc amounts to between 2 ounces and 3 ounces per square foot per annum, so that 20 ounces of zinc should last at that rate from six to nine years. The solder is the last to wear away, it being a much less negative metal than the zinc.

PREVENTING SHIPS FROM SINKING.

A recent modification of the application of the air bag method of preventing ships from sinking, or assisting in that when an accident causes a serious leak, is illustrated by the annexed engraving, as designed by R. G. Sayers, of London, England.

If the ship has sprung a leak or been otherwise damaged, and is expected to go down, each of the flexible bags is



filled with air as quickly as possible, the wing, E, and stay, F, being fixed in the position shown in the engraving; the bar, B, is lowered into the grooves provided for that purpose in the fixed bar, A, and is secured to the ship's sides by two or more bolts, *b*. The end of the rope, J, having been passed through the hole in the ship's side and over the pulley, K, to one of the ordinary winches or windlasses, or to a winch provided for the purpose, the bag is thrown overboard and hauled down into the water into the position shown. These operations, it is said, may be performed in eighteen minutes from the time of the disaster, therefore no vessel need sink at sea in future. The wing, E, and stay, F, serve to prevent the bag from chafing against the ship's side in case of a rough sea. Each bag with its apparatus being independent of the others, several of them can be filled and hauled down at the same time, according to the number of hands employed.

Longevity in Europe.

M. De Solaville analyzes in the *Revue Scientifique* the results of recent European censuses by ages, and the register of deaths also by ages. If we strike a mean of the census from 1869 to 1872, we find that Europe (exclusive of Russia, Turkey, and some small Southern states) possessed in 1870 a mean population of 242,940,376, classed as follows from the point of view of advanced ages: 17,313,715 of more than 60 years, 79,859 of more than 90, and 3,108 of more than 100 years; *i. e.*, 1 inhabitant in 12 of more than 60, 1 in 2,669 of more than 90, and 1 in 62,503 of more than 100. Women, M. Solaville finds, are more numerous in extreme old age than men, and the difference increases with the age. Thus at 60 years the advantage is with the women in the proportion of 7 per cent, at 90 and above it rises to 45, and with centenarians to 60 per 100. It is in France that we find the greatest relative number of inhabitants at the age of 60 and upwards; but it is not so for centenarians, of which France has less than all the other states of Europe except Belgium, Denmark, and Switzerland. From a calculation of deaths by ages the result is reached that, to the total deaths, those at the age of 90 and upward bore the following proportions to the countries named, and arranged according to the decreasing order of importance: Great Britain, 9·73; Sweden, 7·39; France, 6·58; Belgium, 6·07; Switzerland, 6·00; Holland, 4·47; Italy, 3·76; Bavaria, 3·42; Prussia, 3·06; Austria, 2·61. The result is in accordance with that we know of the mean age of the deceased in the same countries.

How Postage Stamps are Made

The number of ordinary postage stamps issued in 1881 was 954,128,440, and value $24,040,643. The method of printing postage stamps is as follows: The printing is done from steel plates, on which two hundred stamps are engraved, and the paper used is of a peculiar texture, somewhat resembling that employed for bank notes. Two men cover the plates with the colored inks and pass them to a man and a girl, who print them with large rolling hand presses. Three of these little squads are employed all the time, although ten presses can be put in operation, if necessary. The colors used in the inks are ultramarine blue, Prussian blue, chrome yellow and Prussian blue (green), vermilion, and carmine. After the sheets of paper on which the two hundred stamps are engraved have been dried, they are sent into another room and gummed. The gum used is made of the powder of dried potatoes and other vegetables mixed with water. Gum arabic is not desirable, because it cracks the paper badly. The sheets are gummed separately, they are placed back upward upon a flat wooden support, the edges being protected by a metallic frame, and the gum is applied with a wide brush. After having been again dried, this time on little racks, which are fanned by steam power for about an hour, they are put in between sheets of pasteboard, and pressed between hydraulic presses, capable of applying a weight of two thousand tons. The sheets are next cut in halves; each sheet, of course, when cut, contains a hundred stamps. This is done by a girl with a large pair of shears, cutting by hand being preferred to that of machinery, which method would destroy too many stamps. They are then passed to the perforating machine. The perforations between the stamps are effected by passing the sheets between two cylinders provided with a series of raised bands which are adjusted to a distance apart equal to that required between the rows of perforations. Each ring on the upper cylinder has a series of cylindrical projections which fit corresponding depressions in the bands of the lower cylinder; by these the perforations are punched out, and by a simple contrivance the sheet is detached from the cylinders in which it has been conducted by an endless band. The rows running longitudinally of the paper are first made, and then by a similar machine the transverse ones. This perforating machine was invented and patented by a Mr. Arthur, in 1852, and was purchased by the government for $20,000. The sheets are next dressed once more, and then packed and labeled and stowed away in another room, preparatory to being put up in mail bags for dispatching to fulfill orders. If a single stamp is torn, or in any way mutilated, the whole sheet of one hundred is burned. Five hundred thousand are burned every week from this cause. The sheets are counted no less than eleven times during the process of manufacturing, and so great is the care taken in counting, that not a single sheet has been lost during the past twenty years.

The postage stamp would seem to be only a humdrum sort of article, which fulfills a very useful, but withal extremely prosaic, purpose. Yet we learn from the Chicago *Inter-Ocean* that it can be made a delicate and subtle medium of delightful flirtation or romantic love, when skillfully manipulated by the sender of a letter and intelligently interpreted by the receiver, who by one swift glance at the stamp may instantly learn, from the manner of its affixture, whether to expect bliss or misery from the contents of the inclosed missive. The explanation of the whole matter, as given by the *Inter-Ocean*, is as follows: "Some ingenious persons have given a meaning to the location of a postage stamp on a letter. For example, they say that when a stamp is inverted on the right hand upper corner it means the person written to is to write no more. If the stamp be placed on the left hand upper corner and inverted, then the writer declares his affection for the receiver of the letter. When the stamp is in the center at the top, it signifies an affirmative answer to a question, or the question, as the case may be; and when it is at the bottom, or opposite this, it is a negative. Should the stamp be on the right hand corner, at a right angle, it asks the question if the receiver of the letter loves the sender; while in the left hand corner means that the writer hates the other. There is a shade of difference between desiring one's acquaintance and friendship, for example: The stamp at the upper corner on the right expresses the former, and on the lower left hand corner means the latter. The learned in this language request their correspondents to accept their love by placing the stamp on a line with the surname, and the response is made, if the party addressed be engaged, by placing the stamp in the same place but reversing it. The writer may wish to say farewell to his sweetheart, or *vice versa*, and does so by placing the stamp straight up and down in the left hand corner. And so on to the end of the chapter." There are in the world about six thousand varieties of stamps. The museum at Berlin contains between four and five thousand specimens, half of which are from Europe, and the rest are from Asia, Africa, America, and Australia. Among the many kinds of decoration which have been used on stamps are coat-of-arms, stars, eagles, lions, the effigies of five emperors, eighteen kings, three queens, one grand duke, several titled rulers of less rank, and many presidents.