

disks armed with teeth, either of wire or cut out of the material like those of a saw, revolve through the interstices of a wire sieve too fine to allow the passage of the seeds. These teeth catch the fibers of the cotton, as it fed upon the sieve, and pull them through, leaving the seeds behind. For the long staple cotton this machine is not well fitted, and a different gin is used for separating the fiber from the seeds. The method is simple. The cotton is fed between yielding rollers, in front of which a rapidly vibrating arm plays vertically, knocking the seeds out while the cotton is drawn through. It has been tested on the ordinary cotton also, with beneficial results. Separated from the seeds, the cotton is pressed into bales for convenience of transportation, and sent to the factory.

The first machine to which the material is subjected is technically termed the "devil" or the "willow." It is a cone-shaped cylinder, suspended horizontally, and armed on its outer surface with stout steel pegs, or teeth, placed circumferentially. This cone is surrounded with a case, the inside of which conforms to the exterior of the cone, and is similarly armed with pegs. Those on the cone pass between the rows of those on the inside of the case. The cone is driven with great rapidity, and the cotton, direct from the bale, is fed into the small end through a hopper on the upper portion of the case. The centrifugal motion, caused by the revolutions of the cone, throws the cotton around its circumference and discharges it at the largest end, torn into a light, fleecy substance, very unlike its condition in the bale.

In this form it is fed into a "picker." Placed in carefully measured quantities on an endless apron, it passes between fluted steel rollers, when a "beater" of two steel arms on a rapidly revolving shaft, breaks it down and beats it into fine fleecy masses. These fall on cylindrical sieves of wire, by the rotation of which they are carried in an even web, like the cotton battings sold at the stores as wadding for garments, to another series of rollers and beaters, until this process has been repeated three times—on the same machine, and constituting one operation—when the "lap", or web of cotton passes between heavy iron rollers and is wound on a core of wood furnished with journals at the ends. The main object of these preparatory processes is to thoroughly clean the cotton. It has not as yet been either carded or spun. Those unacquainted with the manufacture of this material suppose that carding is the first process and that it is immediately succeeded by spinning. On the contrary, there are various stages to be reached before the carded cotton is ready to be spun into thread or yarn.

These preliminary processes, although apparently crude, are very important. The cotton is full of dust and dirt, gathered from the time of the first formation of the boll up to the period of its arrival at the factory. All this must be removed, and the bottom of the willowing machine is a net of strong wires through which the dirt finds its way, while the rotating sieves of the "picker" allow large quantities to escape. The rooms where this work is done are consequently dirty and unwholesome. The amount of cotton fed into the picker at once, and the degree of evenness with which it is spread upon the endless apron, affect the condition and value of the material through every after process up to the finished yarn or cloth.

DISINFECTANTS—A VALUABLE REPORT.

Dr. Letheby, Health Officer of the city of London, has recently made the following report:—

- The several disinfectants which I have largely tested are the following:—
1. Chlorine gas.
2. Chloride of lime.
3. Carbolate of lime.
4. Carbolic acid.
5. Chloride of zinc (Sir William Burnett's fluid).
6. Chloride of iron.
7. Permanganate of potash (Condy's liquid).
8. Animal charcoal.
Each of these disinfectants has its own particular value, and may be used on certain occasions in preference to any of the others: thus
1. Chlorine gas, being a very diffusive body, is best suited for the disinfection of places which cannot easily be reached by other disinfectants. I have used it largely for the disinfection of the vaults of churches, where the atmosphere has been so charged with offensive and dangerous organic vapors, let loose from the contents of the decaying coffins, that the workmen could not enter the vaults with safety. In this manner all the vaults of the city churches have been disinfected, and the contents of them put in order and covered with fresh mold. I have found also that chlorine is best suited for the disinfection of rooms where, as is the case with the poor generally, the occupant cannot be removed for a thorough cleansing; and I have employed it with great advantage in places where persons have been sick with fever, scarlet fever, small-pox, and cholera. The process which I adopt is the following:—About a teaspoonful of the black oxide of manganese is put into a teacup, and there is poured over it, little by little, as occasion requires, about half a teaspoonful of strong muriatic acid (sp. gr. 1.2). In this manner the chlorine is gradually evolved, and the action is increased, when necessary, by stirring the mixture, or by putting the teacup upon a hot brick. As chlorine is heavier than sufficient air, it best diffuses through the room by putting the mixture upon a high shelf. The quantity of chlorine thus diffused should never be sufficient to cause irritation to the lungs of those who occupy the room, and yet it should be sufficient to be distinctly recognizable by its odor. If it be properly managed, the chlorine may be thus diffused through the atmosphere of the room, even during its occupation by the sick.
2. Chloride of lime, has been very largely used in the city during the recent epidemic of cholera. The inspectors have sprinkled it upon the floors of the houses occupied by the poor, and have scattered it about the cellars and yards. In some cases it has been used with water for washing the paint work and the floors of rooms. Altogether indeed, with an average staff of 45 men, we have used rather more than seven tons of chloride of lime in this manner in disinfecting every week about 2000 of the worst class of houses in the city, and the results have been most satisfactory.
3. Carbolate of lime, which is a mixture or rather a chemical compound of carbolic acid and lime, has been used in many cases where the smell of chloride of lime or its bleaching action has been objected to. It has been used by dusting it by means of a duster over the floors of rooms and cellars; but as the disinfecting power of this substance is destroyed by chloride of lime, it is of great importance that they should not be used together. The carbolate of lime which we have employed contains 20 per cent of carbolic acid: it is essentially that this should be its minimum strength, or its power is not sufficiently efficacious. The strength of it may be ascertained by treating 100 grains of it with sufficient muriatic acid to dissolve through its own bulk of water to dissolve the lime, when the carbolic acid is set free, and floats upon the liquid; this, when collected, should weigh 20 grains at least. The advantage of carbolate of lime is its continuous action; for the carbolic acid of the air slowly lets loose the carbolic acid, which diffuses itself through the atmosphere in sufficient quantity to act as a disinfectant, and it does not destroy the color of clothing.
4. Carbolic acid has been used as the sole agent of disinfection for privies, drains and sinks, and for the sewers and the public roads. In the former case it has been used in its concentrated state by pouring it at once into the privy or drain, but in the latter case it has been diluted with about 2000 times its bulk of water and sprinkled by means of the water carts upon the public way. In this manner about 1000 gallons of carbolic acid have been used in the city thoroughfares; and the acid getting into sewers, we have observed that the usual decomposition of sewage has been arrested, and instead of a putrefactive change with the evolution of very offensive gases, the sewers have been changed to a slight extent with carbonic acid and marsh gas. As there are many coal-tar acids now used for carbolic acid, it is of importance that the adulteration should be recognized. This may be done by observing the strength of the soda solution which will dissolve the tar acid. All the inferior acids are insoluble in a weak solution of caustic soda.
5. Chloride of zinc (Sir William Burnett's fluid, or, as it is sometimes called, Drew's disinfectant), is well suited for the disinfection of the discharges from sick persons, but it is not applicable to any other purpose. The liquid should be of a proper strength, as having a specific gravity of 1.94, water being 1.000, and it should contain about from 50 to 54 per cent of solid chloride

of zinc. A tablespoonful of this liquid is sufficient to disinfect each discharge from the body.

6. Chloride of iron is applicable in exactly the same manner as chloride of zinc, and is only suited for the disinfection of the discharges from the body. It should be of a specific gravity of 1.470, and should contain about 40 per cent of metallic chloride.

7. Permanganate of potash is only suited for the disinfection of drinking water; for not being a volatile disinfectant, and being very slow in its action and requiring much of it for any practical purpose, it is not available as a common disinfectant; besides which it attacks all kinds of organic matter and will therefore destroy clothing and be neutralized by every species of organic substance. As a disinfectant of water, however, in localities where good filters of animal charcoal cannot be obtained, it may be usefully employed to disinfect water by adding it thereto until the water retains a very pale but decidedly pink tint. The permanganate which is sold generally has a specific gravity of 1.955, and contains about 6 per cent of permanganate of potash. It will take more than a pint of this liquid to disinfect a pint of the water discharged from a cholera patient, and even then the disinfection is very uncertain.

8. Animal Charcoal. I may state, that for the disinfection of water and the removal of dangerous organic impurity, I have ascertained by experiment that the best treatment is first to filter the water through animal charcoal, and then to boil it for a few minutes. It may then be safely drunk. The disinfection of bedding and all articles of clothing is best effected by exposing them in an oven to a heat of from 260° to 300° Fahrenheit. The exposure should be sufficiently long to insure the thorough heating of every part of the material to that temperature. When such a process can not be used, the clothing should be put into boiling water, and kept there until the water cools to the common temperature.

I refrain from entering into any explanation of the mode of action of these several disinfectants; for whether the agent of disease is a living germ, capable of reproducing itself in the human body under certain conditions, as most likely it is, or whether it is an unorganized, or even as Dr. Richardson supposes, a crystalline compound, the practical results are the same, and are unquestionable; and, in conclusion, I would say, by way of summary, that for the disinfection of sick rooms, chlorine and chloride of lime are the best agents; for the disinfection of drains, middens, and sewers, carbolate of lime, and carbolic acid are the best; for the discharges from the body, carbolic acid, chloride of zinc, or chloride of iron are the best; for clothing the best disinfectant is heat, above 260° if a dry heat, and 212° if a wet heat; and for drinking water, filtration through animal charcoal and boiling temperature. I may mention that the best disinfectant for stables and slaughter-houses is a mixed chloride and hypochlorite of zinc, and it has the advantage of mixing freely with the liquid matters of the slaughter-house, and not fainting the meat with any unpleasant odors. We have used it very largely for this purpose, and it is so applicable to the disinfection of houses in place of chloride of lime: which it much resembles in its chemical nature and mode of action.

PATENT OFFICE DECISIONS—COMBINATION TOOL PATENT.

An application was made by B. Boardman for a patent for a Combination Tool, which was rejected. The examiner giving as a reason that the tool was simply an aggregation of four distinct tools, answering four different purposes; some widely dissimilar, and others analogous, but no single tool operating with the others to effect a common purpose. The examiner took exception to the claim, and in conclusion, I would say, by way of summary, that for the disinfection of sick rooms, chlorine and chloride of lime are the best agents; for the disinfection of drains, middens, and sewers, carbolate of lime, and carbolic acid are the best; for the discharges from the body, carbolic acid, chloride of zinc, or chloride of iron are the best; for clothing the best disinfectant is heat, above 260° if a dry heat, and 212° if a wet heat; and for drinking water, filtration through animal charcoal and boiling temperature.

An appeal was taken from this decision to the Board of Appeals, and Judge Foote, examiner-in-chief, rendered an adverse opinion, quoting the decision of Judge Story in the case of Pitt vs. Whitman (2 Story, page 621), in which he said: "There is, in my opinion, no distinction in maintaining the validity of a patent for a machine, or for a process, or for a method, or for a combination of different machines, and for distinct improvements in each." The same principle was affirmed by Mr. Justice McLean, in Roster vs. Ball (4 McLean, Rep. 180): "The same patent may include a patent for a combination, and an invention of some of the parts of which the combination consists."

Since the decision of those two cases, it has been a very common practice to include in the same patent a claim for the combination and for the parts of which it is composed. And suits upon such patents have been carried through every stage of litigation, and been sustained by the highest courts, without objection from that cause, and the law must now be regarded as entirely settled on that subject.

We apprehend, therefore, that the examiner has not investigated this case with reference to the principles that properly govern it, and we overrule his decision, with a view to its re-examination.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE. This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a private nature, or for personal attacks. Several distinct inquiries, however, when paid for as advertisements, will be inserted under the head of "Business and Personal."

- C. N., of N. Y.—You appear to need a little glycerin in your paste to prevent its drying too quick and too hard.
M., of Texas.—If as you say, you are not a \$20,000 reb, you can apply for a patent on taking the usual oath of citizenship.
L. A., of N. J.—For facts in relation to peat, beyond those we have stated in these columns, we refer you to Rev. J. M. Morris, New Haven, Ct., author of a treatise on that fuel.
O. M. S., of R. I.—The principal inquiry of A. K. P. was, whether in carrying an iron ball of 1000 pounds weight to the top of a mountain four miles high, the loss in weight was actual or apparent. The influence of density in the atmosphere was thrown in as an after-thought. In the case under consideration the loss on this account amounts to less than two ounces, but for the mass of seasoned pine, that you refer to, it would be greater, the difference of weight in any case varying with the bulk.
G. S. B., of—, in answer to a correspondent who wants to keep coal fires in stoves over night, suggests that he cover the fire with fire bricks fitted to the size of the stove. On removing the bricks in the morning, a clean fire will be found, much easier revived than when ashes are used as covering.
A., of N. Y.—Meerschmum signifies sea foam. It is a mineral of soft earthy texture resembling chalk. It is found in Spain and several countries at the head of the Mediterranean.
J. W. S., of Mo.—You ask "what advantages has soapy water over clear water in the water finish employed by lathersmen?" We reply that the combination of an alkali with grease or carbon in a fatty form, known as soap, has a levigating and lubricating quality, the reason for which you can find in any chemical work. 2d. Wrought iron may be soldered to cast-iron by soft solder, the surfaces having been cleaned with muriate of zinc; but what is the benefit? The soft solder has not the quality of tenacity sufficient to produce a union of the same qualities in iron. Brazing is the proper way of uniting the two qualities of iron. 3d. Wrought iron is case hardened by the use of prussiate of potash in powder. It converts the surface of the iron into steel.
D. F. C., of Mich.—The gluten on envelopes and internal revenue stamps is made either of dextrine—starch treated with acid—or is simply gum arabic dissolved in water. Common mucilage is made of this latter gum or animal gluten.
P. B. R., of N. H.—The clicking heard in steam pipes, when the steam is first let on, is occasioned by the condensed steam or water acting in a vacuum. When steam is first let on the temperature of the cold pipes condenses a portion of it, and thus instantly creates a partial vacuum, into which the water is forced on the same principle as in the water ram. The force of these blows is sometimes sufficient to start the joints.
N. T. P., of O.—No sufficient reasons of the differences among substances as to their power of conducting electricity, are known. In the present state of knowledge, many of the properties of matter must be accepted as ultimate facts, about the cause of which we are unable to reason.
W. S., of Pa.—The falling rain acts as a purifier of the atmosphere by dissolving and carrying down carbonic acid, smoke, and other contaminations. Snow acts in the same way but with very much less effect. The snow which falls at the latter part of a protracted storm, when melted, is water almost chemically pure.
G. B., of Ind., supposes a cylinder or cone of matter lighter than water, perfectly smooth, set upright on the bottom of a vessel containing water, the water covering the cone or cylinder and the water having no access to its base. Query: Will the cone or cylinder rise? We answer: It will not.
O. G. W., of R. I.—The season of shortest days is not the coldest, because the earth is still retaining a considerable part of its summer heat. The earth does not get thoroughly cooled down till late in January. The warmest season would be in June, except for the fact that the earth has not quite recovered from his winter chill.

F. S., asks:—Could not the desideratum of accuracy in telegraphic dispatches spoken of by your contributor H, in your issue of Dec. 8th, be obtained by connecting the ground line of the transmitting apparatus with the receiving instrument at the same office; so that the electric current, after actuating the receiving apparatus at the terminus of the line would, on its return, operate that of the transmitting office; thus presenting, as it were, an echo for the inspection of the operator; enabling him to repeat the signal if he perceives that the circuit has not been completed.

C. C., of N. Y.—You can obtain a good portable steam engine of the Wood & Mann Steam Engine Company, Utica, N. Y.

L. R. R., of Ill., sends us a communication suggesting various new theories concerning fountains and rivers. But the theories are not sufficiently plausible for publication in a practical paper like the SCIENTIFIC AMERICAN. We quote as a fair specimen of the whole, the following sentence:—"And I am further of the opinion that all the fresh water which we receive at the surface has once been vaporized by the internal heat, and owes its purity and freshness to this cause; and furthermore that it is the steam generated at certain depths which forces certain veins of water above the level of the ocean, and that when these jets of water find a basin in which to rest it becomes a spring or lake, and when it does not, it appears in the form of an artesian spring."

R. C. M., of Ill., suggests that damage may come to the Chicago tunnel (see page 404, Vol. XV.) when the water is let in, on account of the pressure due to the head of water, about 70 feet. If the external pressure in any part is less than the internal, the brickwork will give way. But we take it that the engineers properly provided against such an accident.

B. of Va., wants information on the utilization of the refuse of distilleries: an important subject.

J. T., of N. B.—You can procure silicate of potash from Lulme & Co., of La Fayette place, this city. A simple way of making it is to boil pulverized quartz or fine sand in a strong solution of caustic potash. There should be an excess of the quartz, and the boiling should be continued for several hours. The operation is performed in an iron kettle.

W. B. R., of — Condensed milk is simply milk out of which 50 per cent or more of water has been evaporated. The process of evaporation is commonly carried on by means of a vacuum pan. There are a considerable number of patents, taken out by Borden, Lyman, Alden, Percy, and others, which cover details more or less essential to the best success. Milk boiled down in the open air does not taste like fresh milk.

C. F. M., of C. W.—The effect of burnished gilding may be got on paper maché or japanned work by the use of lacquered silver foil and other foils which are made to imitate gold.

J. S., of Iowa.—If you place a solution of salt and gum arabic in a porous cup made of paper, leather, unglazed earthen, etc., and float the cup on water, the salt passes through into the water while the gum remains. In the same way you may separate any kind of saline substance from a gummy or mucilaginous solution. The salines are called crystalloids, and the gummy matters (glue, albumen, gum arabic, etc.) are called colloids. The process of separation was formerly known under the name of osmosis; lately the name dialysis has been more used. \* \* \* Our correspondent says he made over a thousand gallons of sorghosyrup last fall, and a neighbor, three thousand gallons. But they still want a cheap process to produce it of better quality.

SUNDRY ANSWERS.—G. J. N.—We believe that no premium has been offered.—H. H. P.—Glass balls for pump valves have been used.

—G. W. H.—In interferences both parties may testify. No limit as to time.—W. B. S.—If the matter is important, send a fee for search and repeat the enquiry. Our impression is that such an item was published.—A. F. C.—No difference in the quantity of water raised through a suction pipe 12 or 24 feet, but a smaller power is required, the longer the pipe. Consult any book on natural philosophy.—W. T.—Water wheels made as you propose are quite old.—S. D.—We cannot furnish the brandy receipts.

Business and Personal.

The charge for insertion under this head is 50 cents a line.

- D. D. S. inquires for a substitute for rubber that can be hardened or vulcanized in some way so as to answer for dental plates. Reply through this column, and give address.
G. H. A. You can apply the power of your wheels as you you propose with success.
Manufacturer, Box 3,294, Boston, Mass., wants a small bolt machine, and a quick method of case-hardening iron.

THE MARKETS.

The usual dullness, incident to this season, now rules the mercantile world. The close of the year is generally set apart by the business community for squaring accounts and straightening up the loose ends of their affairs, and no relief from this monotony need be reasonably expected till after the holidays, or, indeed, until the action of Congress upon a variety of questions which vitally affect commerce and manufactures shall have assumed some definite form. The decline, during the past two weeks, in gold, has sensibly affected the values of many descriptions of merchandise, and prices are somewhat unsettled. The coal season has been prematurely closed, and many producers will end the year with a preponderance on the wrong side of the balance sheet. Competent judges estimate the quantity of surplus coal now on hand above the actual wants, at about one million tons. The severe winter weather of the past two weeks has caused some activity in the retail trade, and low prices have brought many new buyers into the market. Consumers may rely upon it, that coal will be no cheaper, but the prospect at present looks to a speedy advance. The cotton demand has been very fickle, and prices have fluctuated in sympathy with the gold quotations. At this date the demand is moderate, and prices are rather more steady. The wool prospects are growing brighter. Trade is slow, and but a small advance is quoted. Yet an improved feeling is manifest, and these prices are readily obtained. The manufacturers are only moderately supplied, the demand for spring and summer fabrics is beginning to be felt, and a speedy revival of the wool trade is looked upon as certain. Business in all descriptions of hemp is limited. Manilla remains dull but steady; other kinds are inactive and nominal. In the metal market we note: Iron shows a decline in every variety. Pig is extremely dull, with a moderate supply. Glengarnock rules lower, and American is entirely neglected. There continues a very small demand for lead, business in pig being confined to small lots of foreign. Bar, sheet, and pipe steady, and show no improvement in price. Prices for spelter are merely nominal, and little demand is manifest. Pig tin is quiet, and we hear of very little business; prices, however, are steady and firm. The demand for plates is also very light. Consequent upon the decline in the gold premium, the price of American ingot copper has ruled lower, and the market has again become quite dull. Petroleum is but little in demand, for either crude or bonded, and prices rule in favor of the purchaser; though holders do not seem desirous of pressing sales. Nails are quiet and steady. Paints are very dull. The demand for hemlock sole leather is less active, but prices are firm. Indigo continues in limited request. The lumbermarket is dull and heavy, the offerings of spruce are free and find not a large number of purchasers. From the yards there is a fair demand, at steady rates. The stock of lath on hand is large, and prices are in the buyers' favor.