MINER'S LAMP.

A miner's lamp has been invented by Mr. Charles A. Lee, of Silver City, Grant Co., New Mexico, which may be attached to any wooden structure in the mine, to a crevice in the rock, or to the earthen wall, and when attached to the hat or clothing of the miner will not swing nor turn out of proper position. The body of the lamp fits in a ring provided with a handle upon one side and a steel point upon the opposite side, and between the two is a hook by which the lamp may be fastened to the clothing or hat of the miner, or hung upon any projection. A wick adjuster is bent so as to be securely held when inserted in the loop which projects

LEE'S MINER'S LAMP.

from the side of the lamp body. The handle part of the attachment serves as a convenient means of handling the lamp generally, and, in connection with the point, furnishes a broad base for the lamp to rest upon.

Experiments with Steam Whistles.

Messrs. Lloyd & Symes, of Boston, writing to the editor of the *Railroad Gazette*, describe certain interesting experiments which they have carried out. They were made on a locomotive, and with steam varying from 60 pounds to 135 pounds pressure, and most of them with a whistle having a bell $4\frac{15}{16}$ inches diameter, $3\frac{3}{4}$ inches long from lip to head—inside—and an annular steam opening of one-sixteenth inch wide. This whistle, at 60 pounds pressure, gave the sound of E natural, at 80 pounds of F sharp, at 90 pounds of G, at 110 pounds of A, and at 125 pounds to 130 pounds of C sharp in alt. The distance between the steam opening and the edge of the whistle was $1\frac{1}{2}$ inches; when this was raised to 2 inches the power of the sound was sensibly lessened, but its pitch was altered relatively but half a tone. When, on the contrary, it was diminished to 1 inch and to seven-eighths inch, the whistle would sound nothing but its supertones, or "squeal" as the boys call it.

The bell in these experiments was made of cast brass of medium, not a hard character, and the lip or edge carefully chamfered down to a thin edge, set so as to stand exactly over the steam opening. The quality of its sound was very clear, penetrating, and even "reedy," owing to its thin, elastic shape. The power may be estimated by the fact that on a clear, still night it has been heard at Mansfield from Attleboro, a distance of over six miles. They afterward repeated the experiment with a bell of the same dimensions, but made of brass tubing, annealed, hammered, and then heated again, with somewhat the same results, the intensity of the sound and the pitch being somewhat heightened. The next experiment was made with an iron whistle of the same size, which was unsuccessful, the traveling quality of the sound being greatly reduced.

The last trial was made with a whistle $6\frac{1}{4}$ inches diameter, $3\frac{1}{2}$ inches long, and set over an annular opening $5\frac{7}{8}$ inches diameter, blown at a pressure of 150 pounds. The sound given by this whistle was greatly inferior to that of the first one, lacking power and resonance of tone, which they attribute to the size of the bell, which was so much larger than the diameter of the steam opening as to make of it what Professor Henry calls a "resounding cavity." As confirmation of this, they add that they took a bell of the size first named, and cut into it three longitudinal and three perpendicular slits 3 inches long, which had some effect on the character but none on the power of the sound. With regard to the penetration of the sound obtained from the whistle in distinction to other sounds or noises made at the same time, the greatest effect was obtained by "dragging" the whistle, as it is termed; that is, gradually opening and closing the valve, by which means a gradation of five semitones can be obtained, the ear seeming to have peculiar appreciation of this change of relation—as in an organ the effect of power is gained more from the crescendo of the swell than from the full organ itself.

Composition of Different Amalgams.

Arrington amalgam: silver, 40 per cent; tin, 60 per cent. Diamond amalgam: silver, 31·76; tin, 66·74; gold, 1·50. Hood's amalgam: silver, 34·64; tin, 60·37; gold, 2·70; iron, 2·90. Johnsohn & Lund's amalgam: silver, 38·27; tin, 59·58; platinum, 1·34; gold, 0·81. Lawrence's amalgam: silver, 47·87; tin, 33·68; copper, 14·91; gold, 3·54. Moffitt's amalgam: silver, 35·17; tin, 62·01; gold, 2·82. Townsend's amalgam: silver, 40·21; tin, 47·54; copper, 10·65; gold, 1·6. Townsend's improved amalgam: silver, 39·00; tin, 55·65; gold, 5·31. Walker's amalgam: silver, 34·89; tin, 60·01; platinum, 0·96; gold, 4·14.—*Monatsschrift des Vereins deutscher Zahnkuenstler.*

Poisonous Wood.

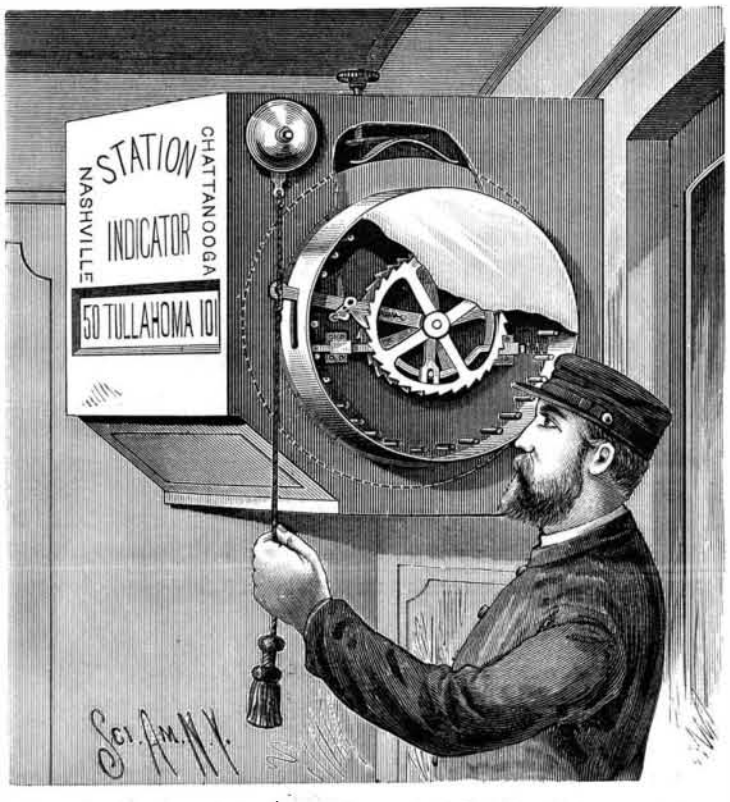
The use of a wood from Panama called cokobola in the manufacturing interests in Bridgeport, is attracting the attention of the Connecticut State Board of Health. The wood is cheap, takes a brilliant polish, is easily worked, and is used extensively for knife handles and ornamentation. Workers in the material are poisoned somewhat after the manner of sumac, although some are free from any defect. Swelling of the face, closing of the eyes, appearances of being burned on the hands, are the usual symptoms. Some are attacked with distress in the stomach, with loss of appetite. One person, who was a confirmed smoker, after being poisoned, has been unable to smoke or even stay in a room where there is any tobacco smoke. Children playing in the sawdust of this wood, which had been dumped, were badly poisoned about their feet. At a large factory on Elm Street, where this wood is extensively worked, chickens in the adjoining yards are said to have all died from eating the dust that settles on the grass.

IMPROVED STATION INDICATOR

A simple and effective device for announcing to passengers on cars and boats the name of the next station or landing, is shown in the annexed engraving. It consists simply of a box containing a revolving drum made of light material, and having printed upon or attached to its face the names of the several stations of the route, arranged in the order in which they occur. There is in the front of the box a window through which the names may be read as they are brought into position by the pawl and ratchet mechanism at the end of the box.

Upon the shaft of the drum are secured two ratchet wheels whose teeth stand in opposite directions, and the pawl lever is provided with two pawls, one for each ratchet wheel. These pawls are attached to a common pivot and are actuated by a single spring. Either pawl may easily be made to act on its own ratchet.

The pawl lever is connected with a registering bolt which is moved whenever the indicator is operated, and projects between pins at the end of the drum limiting the motion of the drum to one step.



PHILLIPS' STATION INDICATOR.

The pawl lever is connected by a cord with the handle by which the indicator is operated. The lever is also connected with a gong, so that whenever the indicator is operated attention will be attracted to it by the striking of the gong.

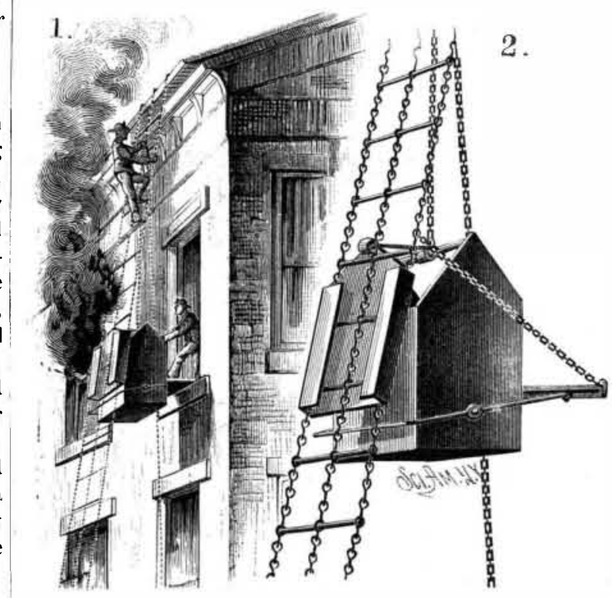
A brake spring is applied to the top of the drum to prevent it from moving too freely. The direction of the rotation of the drum is changed by shifting the pawls at the end of the route. The names of the terminal stations are inscribed at the ends of the box.

This invention has been patented by Mr. I. N. Phillips, of 5 and 7 N. College Street, Nashville, Tenn.

FIRE ESCAPE.

The invention herewith illustrated refers to that class of fire escapes in which a car is guided on stretched cables and suspended by a rope passing over a pulley and down to a windlass. Two or more chains are united by rounds, forming a ladder. One end of the ladder is secured to the roof of the building, or is passed over the roof of the building and held securely on the ground, and the other end is secured to a winch on the ground, by means of which the ladder can be drawn as taut as may be necessary. After the ladder has been drawn taut, a person ascends it and hangs the hook of a pulley on the ladder above the window from which people are to be rescued.

Through the pulley runs a chain, one end of which is



CHRISTIE'S FIRE ESCAPE.

wound about a windlass on the ground, the other end being attached to the car or box. The car is made of sheet iron or wire netting, and on the side toward the house is provided with a downwardly swinging platform, which is held from swinging down too far by chains. A frame pivoted to the ends of the car holds the platform in place after use. A cross bar unites the top of the car with the top of a guide plate whose edges are bent over the side chains of the ladder, thus forming grooves which permit the plate to slide freely up and down the ladder. The chain ladder can be readily moved to any desired window.

Further information can be obtained by addressing the inventor, Mr. Richard Christie, Truro, Nova Scotia.

What Tongue Did Christ Speak?

Some students of this question, which the revision of the Old Testament has beset with renewed interest, are of the opinion that the population of Palestine at the time of Christ's mission was Greek. The Rev. Alexander Roberts, D.D., recently published a book on the Old Testament revision, in which he gives some reasons for this conclusion. For centuries preceding the coming of Christ the Greek language permeated the countries bordering on the Mediterranean. The old Hebrew, in which the law had been written, had become a dead language, and only the learned men of that period were able to read the Pentateuch. The pure Hebrew race in Palestine spoke Aramaic, which was unlike the Hebrew of Moses and Isaiah. The Greek language and Aramaic were, then, the tongues spoken in that country at the time of the coming of our Lord. Hence Dr. Roberts argues that while teaching the people Christ would address them in a language that they understood. Even if he knew the Scriptures in the original Hebrew, he would no more be likely to use them in that way than a modern preacher who knows the New Testament in the original Greek would give his text in that.

The evidence that the common people understood Greek our authority considers conclusive. As examples of facts which led him to this opinion he quotes the epistles which were written in Greek by some of the apostles to the Hebrew Christians. Paul's epistles to the Greeks were, of course, written in Greek. "But," asks Dr. Roberts, "why should Peter, who was a strict Hebrew, write his epistles in Greek unless the Hebrews understood Greek? Why was the Epistle to the Hebrews ascribed to Paul written in Greek?" The apostles appear to have spoken in Aramaic and in Greek, as the occasion seemed to demand. Christ did not address himself merely to a province, but to the world, and his utterances were, therefore, in the language that was best understood. Greek was the language of civilization; moreover, "it was the civilization of that era which accepted him, while the Hebrews rejected him."

THE H. W. Johns Manufacturing Co., New York, have been awarded the silver medal over all competitors at the Amsterdam Exposition for their asbestos materials, liquid paints, roofing, boiler coverings, steam packings, millboard, etc., etc. A substantial victory for American goods

Chemically Pure.

A writer in the *Chemiker Zeitung* discusses the question of what is understood by chemically pure (C. P.) as follows:

In the smaller chemical manufacturing industries the following degrees of purity are recognized: 1. Technical (commercial). 2. Pure, purified, purum. 3. Chemically pure, purissimum. These terms are used to distinguish different grades of the same article, without, however, referring to any absolute standard of purity. In explanation of this he mentions a few examples:

By technically pure goods are understood such as are obtained by the customary manufacturing methods without any further purification, and are pure enough for most technical purposes; adulterations are, of course, not permissible. Technical (or, as we say in this country, the commercial) caustic ammonia made from gas water must not contain any sulphur, while chlorine contained in the water used is permissible, and so is a trace of tarry matter. Red lead made from ordinary soft lead is *commercially pure*, but if it is mixed with brick dust it is not pure. Chili saltpeter as imported from South America with 95 to 98 per cent of real soda saltpeter is commercially pure.

Under pure, purified, *purum*, we understand such goods as contain no gross impurity. They are generally made from the commercial article. Recrystallized Chili saltpeter is called *pure*, although a slight turbidity is produced in the solution by silver nitrate as well as barium chloride, indicating chlorides and sulphates. Commercial zinc free from arsenic is called *purum*.

The goods designated as chemically pure, *purissimum*, are the purest that are made in that particular factory and kept on sale, although it very rarely happens that they are chemically pure in the strictest sense of the word. Chemically pure ammonia must neither contain chlorine and chlorides, nor yet decolorize the solution of potassium permanganate. The solution of chemically pure soda saltpeter must not give any reaction with silver nitrate or barium chloride. Chemically pure nitric acid must stand the same test. Chemically pure zinc is obtained by distilling what is called pure zinc.

Products that are in fact absolutely pure cannot be afforded at the ordinary price. When such are required, a special bargain must be made. The best way to do when very pure reagents are needed for special purposes is to prepare them yourself. In most cases you can use those of well known makers that are marked C. P. It may happen that in special cases some particular impurity would be objectionable, and in such cases it would be advisable to state this in ordering.

Kahlbaum's Berlin style is highly commendable, of stating on the price list what are the chief impurities.

In this country we may classify many chemical products as follows: Medicinally pure, chemically pure, photographically pure.

For example, potassium bromide for medicinal purposes may contain 1 or 2 per cent of the chloride, and as much carbonate. For chemical purposes the carbonate must be removed and all but a trace of chloride, while in photography even a trace of chloride may prove objectionable. A curious case once fell under our observation, where a quantity of uranium oxide, purchased for chemically pure from a well known manufacturer, was found to contain so much of another and more valuable substance, that the adulterant was of more value than the principal substance.

In all cases where the presence of any particular contamination would be very objectionable, the user should always test for it himself and not trust to another, unless, as sometimes happens, he is not skillful enough to do so.

Black Walnut.

Black walnut can be grown from the nut, producing a butt fourteen inches in diameter in as many years from the the seed, as far north as Massachusetts. No tree valuable for its timber in cabinet uses, unless the black birch be so considered, can attain to that useful growth in that period of time in our northern climate. Maples require twenty years before they become good timber trees; beeches and birches, fifteen years to attain to a diameter large enough to yield nine-inch boards; hickory should have a growth of thirty years; and cherry at least as much.

The cultivation of the black walnut might be made a source of profit, if only as an auxiliary to the ordinary farm products. It requires no particular care, makes an elegant tree even in its youth, and later offers an agreeable shade. The *Sewing Machine Journal* says:

"One hundred acres of land, seeded to walnut trees, if they even reach maturity in fifteen years, would be more remunerative than many of the crops produced by fifteen of incessant toil. Besides, these trees might be planted and would thrive on spots which are really valueless for agricultural purposes, and while in the course of growth would serve as valuable aids to agriculture as wind breaks and in other respects."

CALIFORNIA'S vineyards are rivaling her mines as a source of profit.

AUTOMATIC FREIGHT CAR BRAKE.

Among recent inventions is that of an automatic freight car brake, patented by Mr. William A. Wilde, of Chicago, Ill., which obtains its power by the compression of the draw bar spring. This spring is inclosed in the cast iron box, E (Fig.

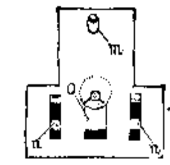


Fig. 2.—LOCK PLATE D.

1), which is provided with a hole in the center of the forward end and with a long slot in the side. On each side of the rear end of the draw bar is a wedge, shown at K. The plate, D (Fig. 2), has a vertical movement within guides fastened to the sides of the cast iron box and to the floor timbers of the

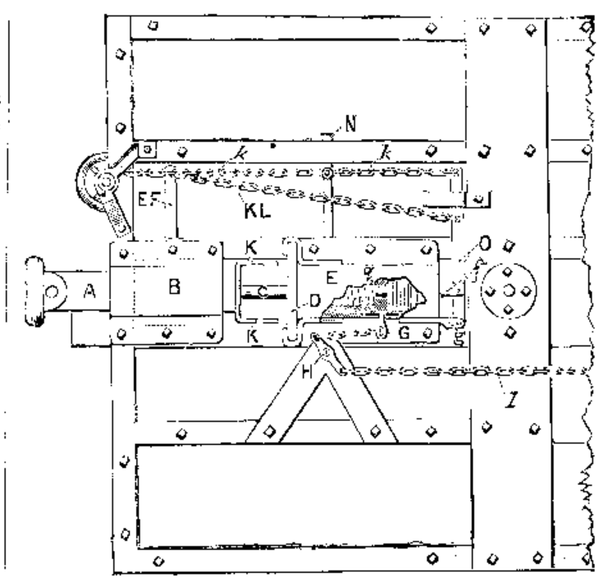


Fig. 1.—PLAN SHOWING BOTTOM OF CAR INVERTED.

car, and is perforated by the rectangular slots, *o n*, near its lower extremity, and with the slot, *m*, near its upper. The draw bar bolt, *c*, passes through the draw bar spring and the slot, *o*, in the plate, and connects the draw bar, A, with the follower *q*, which is connected by the pin, G, passing

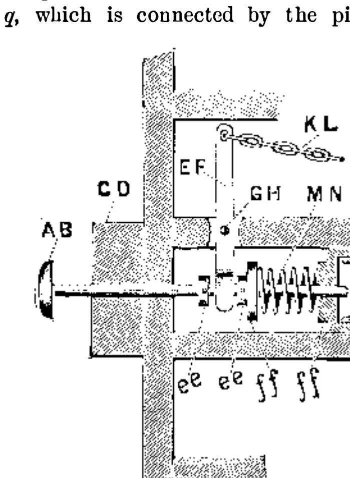


Fig. 3.—REVERSING APPARATUS.

through the slot in the box with the brake chain by means of the lever, H. The bolt, C, Fig. 4, is reduced about one-half its diameter along a small portion of its length, thus forming a recess or neck, as shown at X. The lever, O (Fig. 1), has its fulcrum at *g*, and is provided with a projecting branch, *f*.

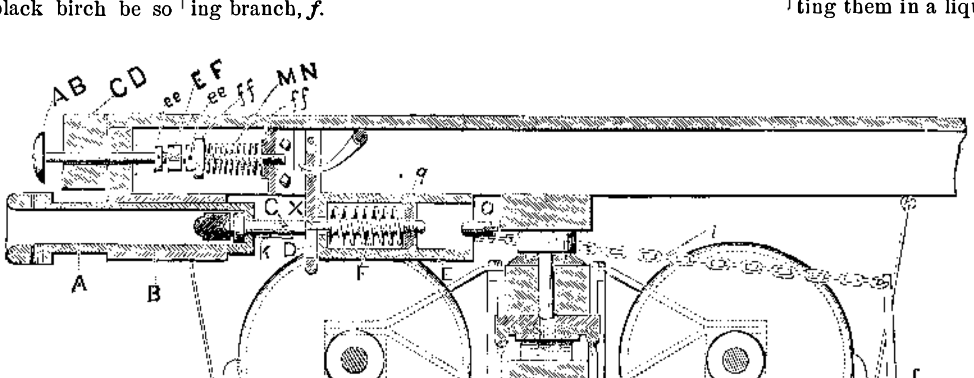


Fig. 4.—VERTICAL SECTION WITH DRAW BAR PULLED OUT.

The operation of the mechanism above described is as follows: When the locomotive moves it pulls the draw bar out and with it the rod, C (Fig. 4), and follower, *q*, thereby compressing the spring, F. This action brings the neck of the rod within the slot, *o*, of the plate, causing the latter to drop of its own weight to find a support in the small end of the slot, thus holding the spring compressed and releasing the brakes, owing to the loosening of the chain, *l* (Fig. 1); by the forward movement of the pin, G. To put on the brakes it is simply necessary for the engineer to put the brake on the locomotive, when the draw bar will be forced in, causing the wedges, K, to enter the slots, *n*, by which the plate is raised and the spring released and the brakes set.

In backing, the reverse bar, A B (Fig. 3), is forced in and carries with it the bifurcated lever, E F, which in turn draws the chain, K L, forward and with it the lever, O (Fig. 1), which forces forward, the follower, *q*, thus loosening the brakes. For use around yards there is provided a device which, by winding up the regular hand brake, first lifts the plate, D, and then draws forward the lever, O, thus throwing the brake off.

Among other advantages the inventor claims that the brake is extremely simple and cheap to construct; that there will be no flat wheels and consequently no returning; that there will be no strain upon the locomotive, as a slight pressure sets the brakes on the first car and they in turn set all the rest; foreign cars do not interfere with its operation; that it will take up its own slack as the shoes wear away; that it steadies the motion of the train; that it will stop runaway cars, as they cannot go far without touching and setting the brakes; that as all brakes are set instantaneously, the train can be stopped as quickly as the locomotive; that when at rest all brakes are set and no effect will be produced by the wind; the engineer can regulate the speed of stopping by drawing ahead as soon as the brakes are set, thereby releasing as many of the forward brakes as he may desire.

Reserve Power a Necessity.

It is not wise to work constantly up to the highest rate of which we are capable. If the engineer of the railroad were to keep the speed of his train up to the highest rate he could attain with his engine, it would soon be used up. If a horse is driven at the top of his speed for any length of time, he is ruined. It is well to try the power, occasionally, of a horse or engine, by putting on all the motion they will bear, but not continuously. All machinists construct their machines so that there will be a reserve force. If the power required is four horse, then they make a six horse power. In this case it works easily and lasts long. A man who has strength enough to do twelve honest hours of labor in twenty-four, and no more, should do but nine or ten hours' work.

The reserve power keeps the body in repair. It rounds out the frame to full proportions. It keeps the mind cheerful, hopeful, happy. The person with no reserve force is always incapable of taking on any more responsibility than he already has. A little exertion puts him out of breath. He cannot increase his work for an hour without danger of explosion. Such are generally pale, dyspeptic, bloodless, nervous, irritable, despondent, gloomy. We all pity them. The great source of power in the individual is the blood. It runs the machinery of life, and upon it depends our health and strength.

A mill on a stream where water is scanty can be worked but a portion of the time. So a man with little good blood can do but little work. The reserve power must be stored up in this fluid. When the reserve power of an individual runs low, it is an indication that a change is necessary, and that it is best to stop expending and go to accumulating, just as the miller does when water gets low in the pond. Such a course would save many a person from physical bankruptcy.—*Herald of Health.*

Liquid for Determining the Specific Gravity of Minerals.

Nearly all natural minerals are heavier than water, and therefore sink in it. But when they are placed in a heavy liquid which does not dissolve them, some sink and others float. If two minerals of unlike gravity occur in the same rock, they can be separated by pulverizing the rock and putting them in a liquid intermediate in weight between both.

A new liquid for this purpose has been devised by C. Rohrback, having a density of 3·57. It is an iodide of barium and mercury, and is prepared as follows: 100 parts of iodide of barium and about 130 parts of red iodide of mercury are mixed with about 20 c. c. of distilled water, shaken, and heated on an oil bath to 150° or 200° C. until dissolved, and then concentrated until it will float a crystal of topaz. After standing several days the clear liquid is decanted and filtered. It has a yellow color, boils at 145° C., and refracts light strongly. It can be used for separating axinite, kyanite, in part, epidote, heavy mica, some garnets, and nearly all hornblendes; also jade, olivine, orthite, nearly all members of the pyroxene group, saussurite, titanite, topaz, heavy tourmaline, vesuvianite, and basaltic rocks. In diluting it to obtain any special density, it is mixed with a dilute solution of the same, so as to avoid precipitation. After the separation the powdered minerals are washed with a few drops of iodide of potassium.—*Wiedermann's Annalen.*

SAN FRANCISCO is trying to prevent the landing of lepers from the Sandwich Islands.