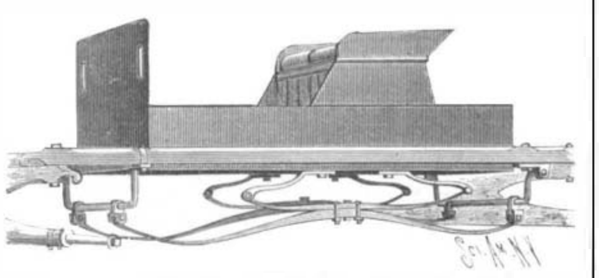
SIDE SPRING FOR VEHICLES.

The body of the vehicle is attached to jacks consisting of steel bars, serving to some extent as springs, and being jointed to the ends of short half elliptic springs, which are clipped at the center of their backs to the backs of longer similar springs, which have one end connected by shackles with a cranked bar suspended from under the front ends of the side bars. The other ends of the large springs are connected with a cranked bar suspended from the rear ends of the side bars in pivot bearings, thereby enabling the rod to swing sufficiently to accommodate the lengthening and shortening of the springs. The upper springs are connected to the others at about the same distance nearer the hind ends, as the weight of the riders is nearer these ends when seated in the carriage, thus permitting the springs to be more flexi-



SHINNICK'S SIDE SPRING FOR VEHICLES.

ble in front than rear in the proportion that the load is lighter.

This spring is applied to a rigid side bar frame without a reach. The strain on the upper sections of the springs is relieved, when forced down by the load, by the elastic action of the jacks, which work freely in the eyes by which they are connected to the springs. The lower sections of the springs, taking their share of the load, have free range for expansion and contraction by reason of the pivotal arrangement of the rear bar. The forward cranked bar, being rigidly connected to the side bars, makes less joints for wear and prevents the swing of the body forward and backward that would otherwise occur. The whole makes a spring that equally distributes the strains over all parts, thereby reducing the chances of fracture.

This invention has been patented by Mr. William Shinnick, of Shelbyville, Kentucky.

Quicksilver Mining in California.

The quicksilver industry on the Pacific Coast cannot be said to be in a flourishing condition. The long prevailing depression in prices has had the effect of closing down many producing mines, and only the larger ones can now afford to work, and they are not making much money for their owners.

There are altogether about 1,200 men directly employed in the quicksilver mines and furnaces of California, in addition to whom a large number are occupied as wood choppers, teamsters, etc., working on contract. The leading nationalities of the miners and furnace men may be stated in the following order: Mexicans, Cornishmen, Swedes, and Chinese, with comparatively few Americans. The Mexican miners, as in so many other instances, have developed a special fitness for this class of work, and their intelligence in finding ore amounts almost to an instinct. For the regular underground work of a mine, such as drilling, blasting, timbering, etc., the Cornishmen and Americans probably take the lead.

Miners at day work are paid from $2 to $3 per shift of ten hours, and on contract work from $2.50 to $3 per shift of eight hours. The wages of furnace men are $2 to $2.50 per shifts of ten or twelve hours. The New Idria mine gives employment to about 120 men. There the wages of white miners average $2.25 cents per day, the men boarding themselves. Blacksmiths and other mechanics and overseers are paid $4 per day. The Great Eastern mine employs 35 men, half of whom are Chinese. At this mine white miners are paid $2.50 per day, boarding themselves, and the Chinese, $1.25. The Napa Consolidated employs from 60 to 70 men at about the same wages. At the Sulphur Banks, when at work, 90 men are employed, and the same wages are paid as at the Great Eastern. In all these mines mechanics and foreman are paid from $3.50 to $4 per day. The Great Western gives work to 25 men; white miners are paid $1.25 per day and board; Mexicans $2.50 and $3 per day and board. At New Almaden, where a force of 500 men is kept at work, the average daily wages are $2.50.

An estimate has recently been made from the working results of different mines, showing that for every flask of quicksilver produced nine days' actual labor (calculated as if done by on man) is required. This, at the low average of $2 per day, would make the amount paid for labor $18 for every flask manufactured, or between 23 and 24 cents a pound. This, at present prices of quicksilver, does not allow much margin for profit after accounting for the other expenses, such as supplies, fuel, powder, flasks, steel, transportation, etc.—*Mining and Sci. Press.*

FILTERING CISTERNS.

BY G. D. HISCOX.

For the instruction of a large and increasing population that are more or less dependent upon cistern water for culinary purposes, and also in many parts of the United States or in foreign countries where there is nothing but rain water available for human thirst, we have prepared a few illustrations of the most approved forms and materials for filtering rain water that is stored in cisterns, especially for drinking and cooking purposes.

Among the things to consider in determining whether cistern water is safe to drink, are the cleanly or dirty condition of the roof, and the materials it is made of; whether leaves from overhanging trees fall upon the roof and lodge in the gutters; whether birds foul the roof; whether it is made of wood, slate, or tin, or of materials inimical to health—as lead, copper, or covered with deleterious paints.

The water taken from a cistern fed from a roof encumbered with leaves from an oak tree has been found so strongly impregnated with tannic acid as to turn water black when boiled in an iron pot.

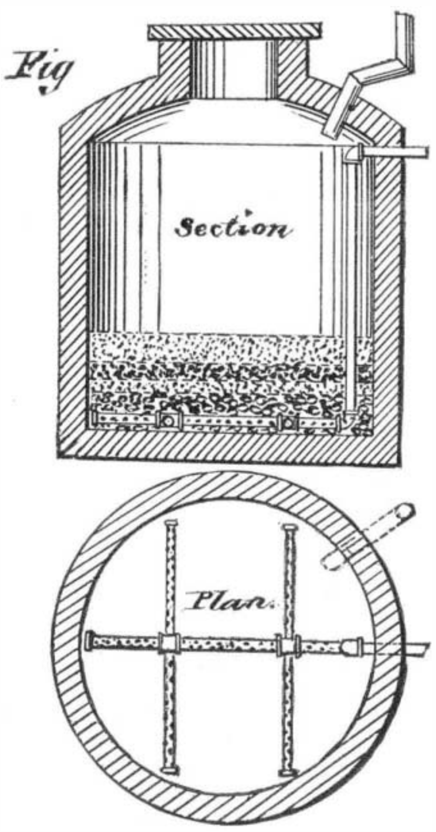
In order to obtain the best results from filtering cisterns, the roof and gutters should be kept free from leaves and dirt, and it is also advisable to arrange the leader with a switch valve, with the handle convenient for operating within the building, so that the first wash may carry away the dust, dirt, or other foul matter, and thus save only the best water.

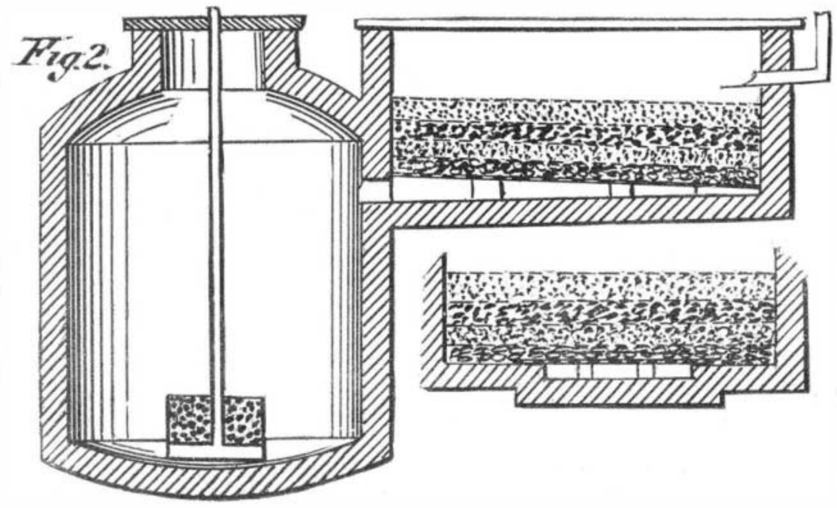
Caution should be exercised in locating cisterns that are intended to furnish drinking and potable water, that they be away from the influence of cesspools and privies, as clean water readily absorbs the odors, gases, and germs of foul air.

The materials selected for filter beds should be in accordance with the resources of the locality in which the filter is to be used, for the purpose of renewal.

We recommend such materials only as have proved reliable, leaving out all textile or organic substances, as we deem such unfit for this class of filtration.

Pulverized charcoal mixed with sand, or between layers of sand and gravel, so long used for filtering purposes, has a cleansing or antiseptic power, probably derived from the



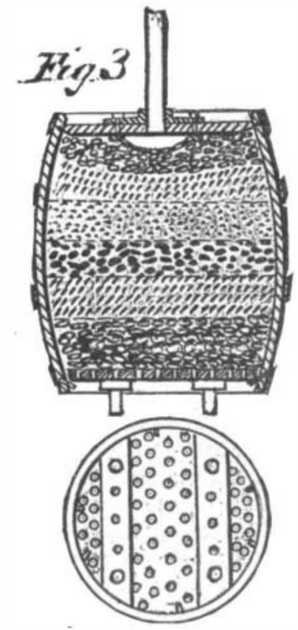


contact of a large carbon surface. Pulverized coke has been used, and is considered a fair filtrant, but less effective than charcoal. Bone charcoal has also been recommended as being highly antiseptic, besides having a strong absorbent power, due to the variety of its chemical components. It can be obtained from the dealers in New York.

Spongy iron, or pulverized hematite mixed with sawdust and roasted; pulverized magnetic iron ore and clean scales from a blacksmith's anvil, pulverized and mixed with clean, sharp sand, have been much used and experimented with in Europe with great success, in not only making fetid water sweet, but it is also claimed that the iron mixtures destroy bacteria and their germs.

A combination of the two extremes, a large carbon surface in charcoal and the pungent oxidizing qualities of the spongy iron, or its equivalents, will no doubt become the acme of a filter.

From experiments made with the filters of public water



works in Europe, for the quantity of water that a filter will yield per square foot of surface, it has been ascertained that, with a filter composed of 10 parts fine, sharp sand, 1 part coarse sand, 15 parts spongy iron mixed with one-third its bulk of fine gravel, laid upon a strainer of perforated galvanized iron—a bed of brick laid close—or a stratum of gravel covering a perforated iron pipe, a yield of one gallon of clear, pure water for each foot in depth per hour for each square foot of surface; four feet being the greatest depth with a yield of four gallons per foot per hour—illustrating the probable fact that the velocity of the water corresponds with the depth of the filtering material for equal purity.

Figure 1 illustrates a method of preparing an ordinary house cistern for filtering. The pipe and fittings should be of galvanized iron; black or plain iron is better, as long as it lasts, as it rusts fast; in either case it is better to waste the water first drawn, for the water absorbs both the zinc and the iron when standing over night. The zinc is not healthy, and the taste of the iron is unpleasant.

The perforations should equal three or four times the area of the suction pipe, which in ordinary cisterns may be $1\frac{1}{4}$ inch pipe, while the branches may be $\frac{3}{4}$ inch pipe. The holes, if $\frac{1}{8}$ inch, should number at least 200, distributed along the lower half of the pipes. Smaller holes are preferable; of $\frac{1}{16}$ inch holes 800 will be required.

For the filtering material we recommend a layer of fine gravel or pebbles for the bottom, 3 or 4 inches in depth, or heaped up over the perforated pipes; upon this a layer of sharp, clean sand, 9 inches in depth, upon this a stratum of pulverized charcoal, not dust, but granulated to size of peas or beans, or any of the material above mentioned, 4 inches deep; and upon this a stratum of fine, clean sand from 6 to 2 inches in depth, making a total depth of from 16 to 20 inches.

Such a filter should be cleaned at least twice in a year by pumping out all the water, taking out the mud or settlings, and one-half the depth of the top layer, and replacing with fresh sand.

The double filter cistern, Fig. 2, has much to recommend it, having a large receiving basin which in itself is a filter placed in a position for easy cleaning. The recess at the bottom may be covered with a perforated plate of galvanized sheet iron, upon which may be laid a filter bed of gravel, sand, charcoal, spongy iron, and sand in the proportions as stated above. This enables the frequent cleaning by removing the top layer of the filter bed without disturbing the water supply. The cover should fit tight enough to keep out insects and vermin.

A double bottomed basin perforated and filled with clear, sharp sand and charcoal should be attached to the bottom of the pump pipe as shown in Fig. 3.

This enables the small filter to be drawn up and cleaned, without the necessity of emptying the cistern or interrupting the water supply.

The half barrel or keg filter, as illustrated in Fig. 3, is a convenient form of cistern filter where filtered water is required from cisterns already filled.

This is also a convenient form for readily cleaning or changing the filter without the necessity of discharging the water from the cistern.

This filter can be made from an oak keg or half barrel, such as is used for liquors or beer. Take out one of the