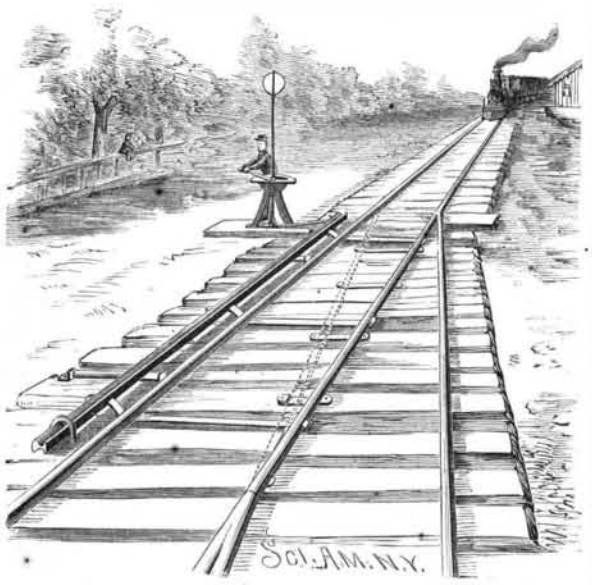
FROGLESS SWITCH.

In the switch herewith illustrated the switching rail is so secured that its butt end rests against the meeting ends of the inner rails of the main track and switch. These rails are so joined together that the end is the same size as that of a single rail. The point of the switch rail is beveled off from each side, so that it will



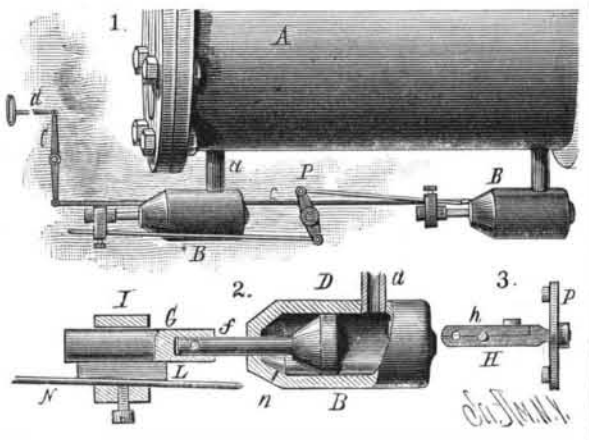
CULP'S FROGLESS SWITCH.

fit snugly against either the outer rail of the siding or against the rail of the main track. This rail is prevented from spreading by two sets of stops, placed as shown in the engraving. Connected with the switch rail by tie rods is a second rail, placed on rollers along the outside of the main track. One end of the second rail is held in place by a staple, while the other end is connected to the lever of a switch stand by a link. The movement of the lever moves the auxiliary rail and the switch rail to the position indicated by the dotted lines, and thereby opens the siding.

This invention has been patented by Mr. Abraham Culp, of Mount Carmel, Pennsylvania.

CYLINDER COCK.

This device is intended for use in connection with the steam cylinders of a locomotive or other form of engine, the object being to provide for the automatic discharge of the water of condensation at each stroke of the piston. Beneath and connected with the cylinder, A, by tubes, *a*, are placed two valve chambers, B, each of which has a bracket, in which the rod, *c*, is loosely mounted. This rod is so connected, by the lever, C, and rod, *d*, as to be within reach of the engineer. The plug valves, D, fit loosely within the chambers, and in the inclined seats are formed apertures, *n*, through which the water of condensation entering the chambers is discharged. The extended ends of the valve stems, *f*, are held in apertures formed in the forward ends of cylinders, G, which are adjustably connected to rod, N, pivoted to a rocker, P, carried by the arm, H, which is clamped to the rod, *c*, by means of the plate, *h*. Steam entering the front of the cylinder, A, passes into the chamber, B, through the tube, *a*, and forces the valve against its seat. This movement of the forward valve throws the rear one away from its seat, and allows the water that was behind the piston to escape through the opening, *n*. The movements are reversed when steam enters the other end of the cylinder. If necessary, the engineer can close both of the valve chambers at the same time by properly adjusting the rod, *d*, or can open both.

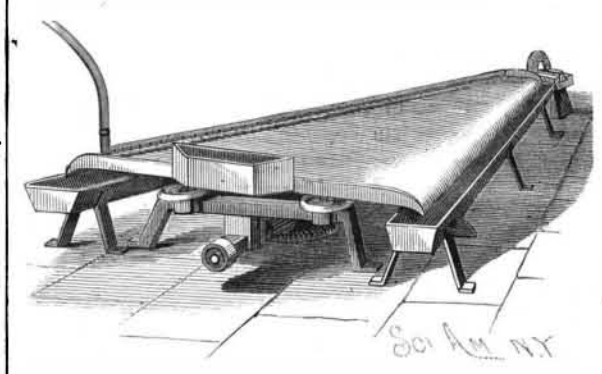


This invention has been patented by Mr. William Stoffel, of McHenry, Illinois.

MIXTURE FOR CLEANING GREASE SPOTS.—Equal parts of stronger ammonia water, ether, and alcohol form a valuable cleaning compound. Pass a piece of blotting paper under the grease spot, moisten a sponge, first with water to render it "greedy," then with the mixture, and rub with it the spot. In a moment it is dissolved, saponified, and absorbed by the sponge and blotter.

ORE SEPARATOR.

By means of the simple machine herewith illustrated, ores of various kinds may be washed and separated, and the valuable mineral and tailings separately and closely graded. The pan is formed of a flat plate, having down-turned aprons at the tail and head edges, and up-turned flanges at the front and back ends. The front end lies about at right angles to the tail, while the head preferably makes an angle of from twenty-five to thirty degrees with the tail. By means of simple mechanism arranged on the frame beneath the pan, the latter is given a horizontal movement. The front end of the pan is provided with fixed bearer feet, which rest loosely on the tops of the large heads of screws threaded into lugs of the frame. By adjusting these screws, the front end of the pan may be raised to give the desired inclination from the front to the rear end, and from the tail corner to the head corner. At the opposite or sharp end of the pan is fixed a bowed arm, at the end of which is swiveled a shoe, sliding in the grooved head of a screw provided with a lock nut. The pan may be thus vertically adjusted to give the necessary inclination from its front end toward its rear end. This method of supporting this end of the pan also provides for giving it a greater or less lateral throw toward and over the mineral box, which is supported under the head of the pan to receive the washed and graded mineral. This is accomplished by holding the groove or slideway of the screw head at any desired angle to the stroke line of the pan. The back ends of the mineral box and tailings box, which is supported beneath the tail edge of the pan, are connected by a conduit, through which excess of water in the mineral box may pass to the other, and thence out through a suitable spout. Water is supplied to the pan from a pipe placed along the head of the pan, the water being delivered in gradually diminishing quantity from the front toward the back end. This graduated water supply allows the coarser and finer ore particles on the pan to be thoroughly washed with a minimum quantity of water; this also prevents the finer valuable ore particles from being washed into the



KRAUSE'S ORE SEPARATOR.

refuse box. The crushed ore is fed to the pan through a box located at the front end, about over the driving shaft. As the pulp flows toward the back end of the pan, the quick movement of the pan toward its highest point will throw the heavier particles in that direction, while the lighter ones will arrange themselves down the slope, according to their weight, and the current will wash all the worthless material into the refuse box, while the valuable mineral will be carried into the mineral box in condition for smelting. Both the tailings and valuable mineral will be graded into different sizes in their respective boxes, and the larger particles of the former may be removed and reduced for subsequent treatment.

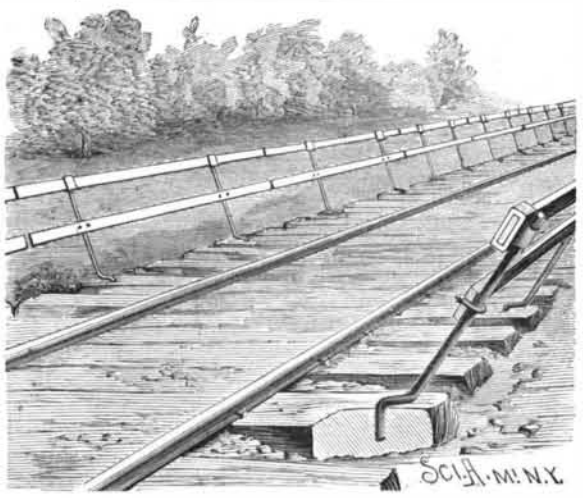
This invention has been patented by Mr. Henry C. Krause, of Lake Linden, Michigan.

Gapes in Fowls.

The fact that the disease known as gapes in poultry is produced by a parasitic worm (*Syngamus trachealis*), which infests the trachea of the birds, was settled long ago, and for most of our recent knowledge of the worm and the disease we are indebted to the prize essay of Pierre Megnin. According to this author, the mature worms and their eggs are coughed out of the throat of the infested fowl, and the disease is spread by its associates picking them up along with their food or by drinking water in which the eggs may have hatched into larvæ. No suggestion is allowed of any intermediate host. Mr. H. D. Walker, in an apparently carefully prepared paper on this subject (Bulletin Buffalo Society Natural Sciences, v., pp. 49–71, 1886) details many experiments which he has tried, and several of them point very strongly to the conclusion that the earth worm may, in many cases, play a part in the distribution of the pest. The embryos have been found living in the earth worm at all seasons of the year, and earth worms from infested localities, when fed to chickens, almost invariably produce the disease. Dr. Walker has also produced the disease in robins, and claims to have found the embryo of the lung worm of calves (*Strongylus micrurus*) in the earth worm.—*American Naturalist.*

RAILROAD FENCE.

This fence is designed to exclude roving animals from the track, and at the same time make available for grazing purposes all that part of the railway property lying outside of the track proper. The lower ends of the fence posts are placed in holes in the ends of the ties, and the upper parts of the posts are bent outward, as shown in the engraving. To each pair of posts are connected rails held by staples or by coupling blocks or heads. The staples are held to the rail and



COOLEY'S RAILROAD FENCE.

post by nuts, and the blocks have eyes to receive the rail and a socket to receive the post and a key which clamps the block firmly to the post. This fence may be erected very quickly, and when dismembered for transportation it occupies but little space.

This invention has been patented by Mr. James A. Cooley, of West End, Knoxville, Tenn.

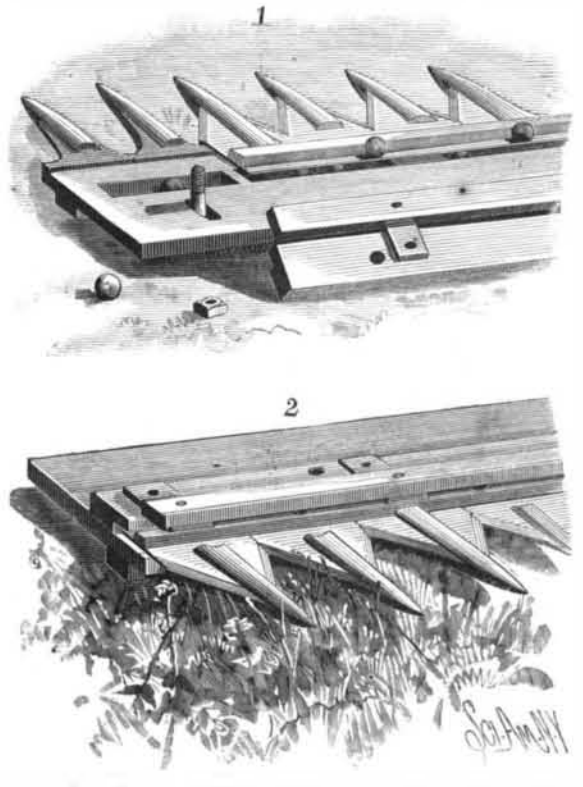
Smelting of Iron Sand.

A method by which the immense deposits of iron sand which abound on the coast of New Zealand can be successfully utilized has lately been discovered at Auckland. The feature of the new process consists in uniting a quantity of scoria with the sand when put in the blast. This has the effect of preventing the iron from oxidizing, an obstacle that has heretofore never been successfully overcome in smelting iron sand.

CUTTING APPARATUS FOR MOWERS AND REAPERS.

The principal feature in this cutting apparatus is the method of supporting the knives between roller bearings. The inner parts of the knife blades rest upon spherical rollers held in suitable grooves. Attached to the upper surface of the blades is a knife bar formed with a rear beveled edge, upon which, and upon the blades, is another series of rollers held in place by suitable grooves. The upper row of balls is slightly in advance of the lower one, so that the front part of the knife is pressed downward and made to cut close to the guards, thereby making it impossible for the knives to choke up. The knives are self-adjusting and self-cleaning, and, owing to the ball bearings, no more power is required to run the knife itself when cutting than when not cutting. The frame forming the grooves for the upper rollers can be adjusted forward or back as may be necessary.

This cutting apparatus is the invention of Mr. John C. Voss, of El Paso, Texas.



VOSS' CUTTING APPARATUS FOR MOWERS AND REAPERS.