

"ARCH ROCK," SAN FRANCISCO BAY.

Of the twenty-four dangers to navigation which have been located and charted in the bay of San Francisco, the one known as "Arch Rock" is the most conspicuous. Situated just one mile due west of Fort Alcatraz, it separates the north and south channels of the harbor, and is plainly visible to all vessels that enter or leave the port at all stages of the tide. It stands just before the eastern entrance of the Golden Gate, and is the first object in the bay that the swells from the Pacific strike. On account of its visibility, "Arch Rock" is easily avoided by navigators, though a number of wrecks have occurred at this point. Above the water line the dimensions of the rock are small. Its height above low tide is but 26 feet and its length about the same. An arch about 12 feet in diameter, through which small boats sometimes pass, has been worn through the center. Below water the rock expands gradually, so that in order to obtain a uniform depth of 30 feet at low tide, as is contemplated by the engineers, a bulk over 300 feet in diameter must be removed. In response to a memorial addressed to Congress by the commercial bodies of San Francisco, a survey of some of the most prominent dangers to navigation that obstruct the bay was ordered, and that of "Arch Rock" is now complete. Through the courtesy of Otto Von Geldern, the engineer making the surveys, profiles of the rock, east and west and north and south, have been prepared especially for the SCIENTIFIC AMERICAN. They give an excellent idea of the task involved. The rock is soft sandstone and easily disintegrated by explosives. The plan recommended by the engineer is to drill holes to the required depth and charge with dynamite. Drills can be operated either from boats or from stationary platforms resting upon the face of the rock, and adjustable for all depths and contour, and easily operated at all stages of the tide or condition of the weather, excepting in violent storms. The softness of the rock will permit rapid progress when the work is begun. Not more than two seasons will be required for preparation, and one blast, it is calculated, will utterly obliterate the rock as it now stands. The engineer calculates that 40,000 cubic yards of rock must be removed in order to attain the required depth of 30 feet at low tide. The plan pursued in blowing up the rocks at Hell Gate, New York Harbor, was considered, but the engineer believes that the work can be quite as effectively performed and much more cheaply by drilling from the exterior. It is believed that the whole expense will not exceed \$100,000.

Geology of the Yukon Region.*
BY G. FREDERICK WRIGHT.

The expeditions of the Canadian Geological Survey to the Yukon region, ten years ago, established three things having an important bearing on the gold prospects in Alaska and the Northwest Territory.

1. The gold-bearing strata which have been so productive all along the western coast of America extend without essential change into the Upper Yukon Valley as far as the Arctic Circle. Throughout the whole extent of the mountain ranges which face the

*The Independent, N. Y.

Pacific Ocean the same forces have been at work. Along a wide belt throughout nearly the entire length of the continent a belt of paleozoic schistose rocks have been fractured and filled with a network of quartz veins bearing more or less gold. McConnell reported essentially the same formations where the Yukon crosses the Arctic Circle that he had been familiar with west of the Rocky Mountains, the entire distance south to the United States boundary.

2. The Yukon River occupies a very old line of drainage. Its drainage basin has been elevated so long above the sea that the river has had time to cut long and deep canons across rocks of different geological ages, and to establish a pretty uniform gradient for a distance of nearly 2,000 miles. Schwatka built his raft at the head of Lake Lindeman, twenty-

therefore, were not able to make any prophecies as to the amount of gold to be expected. Nor is there any certain basis to go upon even after the present discoveries. There is little probability that anything but rich placer mines can ever be worked there with profit, and it is altogether likely that the placer mining will always be of the most hazardous kind.

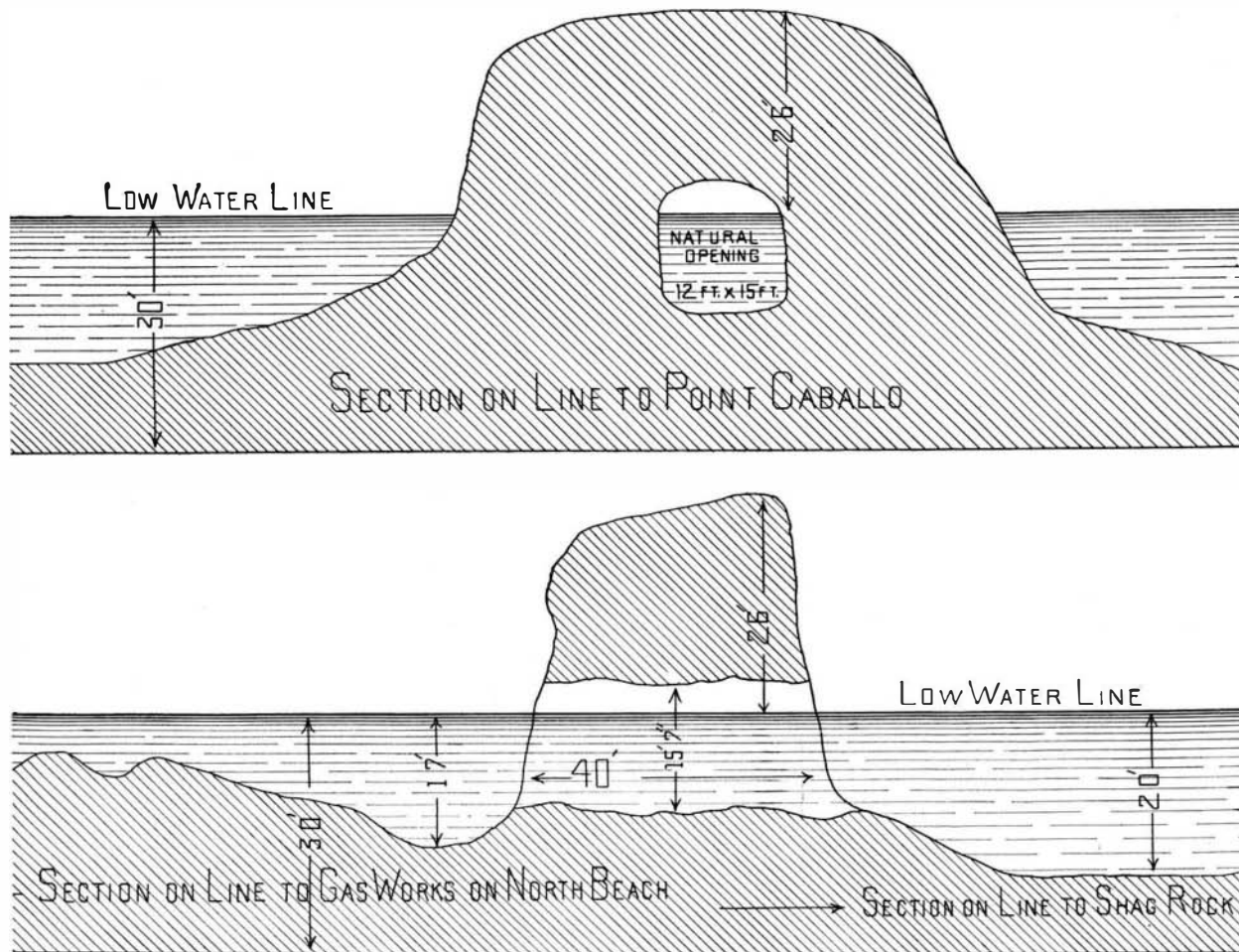
3. The effect of glacial erosion, to which reference is occasionally made in the papers, must be limited to the upper part of the Yukon Valley, considerably above the region of the richest discoveries. Russell, Dawson and Hayes all agree that, while glaciers formerly enveloped all the island along the Pacific shore of southeastern Alaska, they were of very limited extent on the northern side of the mountains which form the southern border of the mainland. In-

deed, the glaciers on the northern flanks of these mountains scarcely pass the sixty-second parallel, not reaching even to old Fort Selkirk. Hence, there is not much probability that any large amount of gold has been carried by ice action from one drainage basin to another. The gold of the placers in the Klondike region is probably all of local origin, arising from the disintegration of the rocks through which the stream and its tributaries have flowed.

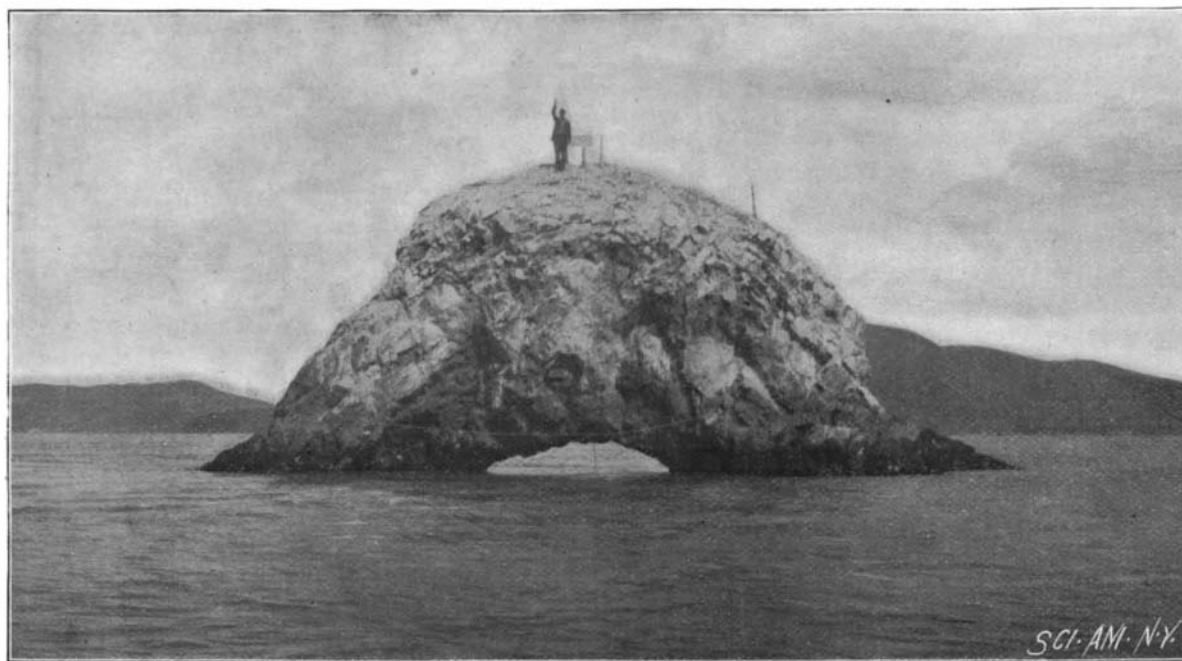
The conditions of life in that region are almost inconceivable to those who have not paid especial attention to them. Russell reported at repeated places along the middle Yukon that ice took the place of ordinary rock. Bluffs along the river on whose surface forests were growing would appear on close approach to be precipitous walls of stagnant ice covered with a small amount of soil and a deep carpet of moss. Anywhere on the surface one had but to dig down a few inches to find solid ice. Indeed, the ground never thaws there to a depth of more than a few inches. The placer mining will always have to be in frozen soil, except on the margin of the large streams. But the rich placers are on the small streams from thirty to one hundred miles back from the Yukon.

The region is a regular rat trap. Up to the middle of September parties can without much trouble get over the Chilkoot Pass with a small amount of equipment, and can work down the river 600 miles, as Schwatka did, on rafts or boats of their own construction. But, once in at that time of

year, there is no possibility of their getting back until the next June. The same is true about the ascent of the river, which freezes up in September and is not only unnavigable, but well-nigh impassable until the following June. The lower part of the stream freezes up earlier and thaws out later than the upper portions; consequently, the ice dams in the lower portions make floods of the most disastrous kind, and when those of the autumn subside they leave the ice so rough that it is unfit for sledging. If reasonable calculation could be made concerning the numbers to be there in the winter, provision could be made for them during the three months when the river and the passes are open. But it is now too late for this year, and there seems little doubt that adventurers will flock to the region beyond all probable means of support and will be beyond reach of assistance. One dreads to hear the story which the mails of next spring will reveal.



VERTICAL SECTIONS THROUGH "ARCH ROCK," SHOWING NATURAL TUNNEL WORN OUT BY ACTION OF WAVES.



"ARCH ROCK" IN SAN FRANCISCO BAY, SHORTLY TO BE REMOVED BY THE GOVERNMENT.

three miles from the summit of the Chilkoot Pass, and was transported on it 1,300 miles, with only two or three short portages above Miles Cañon, about 150 miles from the place of its construction. But the same raft was used the entire journey. From Miles Cañon the river is navigable for a distance of nearly 2,000 miles.

The significance of this is that it indicates an enormous period during which erosive agencies have been active in the valley. All young rivers crossing such diverse geological formations are obstructed by waterfalls or rapids impassable to navigation. The gold, therefore, which is found in the placer mines of the Yukon is the accumulation from an immense amount of disintegrated rock. If the veins near the surface have been very rich, an enormous amount may be expected from the placers. But from the amount of erosion, a considerable accumulation may have arisen from veins of very low-grade ore. The geologists,

Weeds Most Troublesome to Farmers.*

Wild lettuce, Russian thistle, Canadian thistle, Spanish needle, oxeye daisy (a species of chrysanthemum), wild and black mustard, purslane, stick weed or beggar's lice, burdock, yellow dock, bracted plantain, horse nettle, buffalo bur, wild carrot, rag weed and dog fennel.

Some of these weeds are annuals, some are biennials and some are perennials, and a knowledge of these distinctions enables the farmer to intelligently deal with the pests. Take, for example, the common burdock; it is a biennial—that is, it grows from the seed, and the first year it grows large leaves but does not throw out any seed stalk; the second year it goes to seed, and its burs containing the numerous seed pods will stick to live stock. Did any of you ever see sticking to stock these burs to be thrashed out in the pastures and over the farm, thus scattering the seed? Now, during the first year's growth of a burdock there is no use to cut it—in fact, it does more harm than good; but the second year, when it sends forth its seed stalk, just before it blossoms, cut it down in the vigor of its evil existence, and it will be dead forever. On the other hand, the yellow dock is a perennial, like timothy, and is a very mean weed. Its seeds do not spread so easily, but cutting it off does not kill it. It should be dug up, root and branch, and cast into the fire, that its seed may perish from off the earth.

Some weeds, especially annuals or biennials, may be killed by mowing them just before, or at the time, they blossom; but there are other weeds which cannot be killed by mowing after they are in bloom—for example, the Canada thistle will mature its seed even though it is cut down immediately after it has blossomed, as there is enough substance in the stalk to mature the seed.

The wild lettuce you all know very well, though the acquaintance is somewhat brief and disagreeable. It is a biennial, sometimes annual. It came to this country from Europe; its seeds are lighter and carried more easily than the thistle; it is a hardy plant and should be pulled out by the roots. The stem, close to the ground, is prickly and cannot be pulled without a covering on the hand. It is most troublesome in meadows; sheep will eat it and keep it in check in pastures. A full grown plant will produce about ten thousand seeds. There is a fungus which comes with

this weed which will attack cultivated lettuce. When cut near the ground it will send up additional sprouts which will go to seed.

The Russian thistle first appeared in Dakota in 1873, and is now found over the greater part of the State. In some places the fields have been abandoned. It was first noticed in Ohio in 1894 along the tracks of the Lake Shore Railroad, near Bryan. It is one of the worst weeds known, and a large portion of Europe is afflicted with it. It is an annual and should be cut down when it first blooms, for one plant will produce about twenty thousand seeds.

The Canada thistle grows about two feet high; has prickly leaves, rose purple flower, and is the lightest colored of all thistles. It has the power of reproducing itself from roots as well as seeds. It is a perennial plant, and therefore more troublesome than either the wild lettuce or the Russian thistle. It is often shipped from place to place in baled hay. It originally grew in Europe and not in Canada, but it reached this country from Europe through Canada. It is more common in Canada than in the United States. While it is more difficult to suppress than the Russian thistle, the Russian thistle is much more injurious. The better way is to never permit this pest to mature on the farm. After it or any other weed once obtains a foothold, the labor multiplies many times to suppress it.

Wild and black mustard are annuals—that is, they produce seed each year. The plants themselves die, and the following year the seed will grow and mature seed. After the ground has become full of this seed, the successful way to treat them is to mow each year, just as they bloom. If this be done for two or three years, the plants can be destroyed. But if the plants be growing in a meadow, they will mature seed before the grass is ready to cut, so that such fields should be pastured or cultivated.

Purslane you are all acquainted with, from its fleshy leaves and stems. It is a creeping plant, but can mature more seed to each plant than any other known plant. It is estimated that one plant will bring forth a million seeds, and it may be very troublesome when the ground becomes thoroughly seeded to it. The way to kill it is to cut off when it has reached a mature size, and before it has produced seed, and turn it to the sun. It is an annual, growing each year from the seed.

Stick weed or beggar's lice are troublesome little seeds that will stick to animals and especially to the

wool of sheep, but are easily suppressed if mown during their growth. Bracted plantain is a plant that grows annually from the seed, and may therefore be suppressed. The buffalo bur you are no doubt all familiar with, and it is easily suppressed, provided the plant be cut off before it goes to seed. It is an annual, and will not reproduce itself from the roots. Wild carrot is a very bad weed, and if there be but little of it, it should be dug up by the roots, and always, of course, mowed just at or before the time it blooms. It is a biennial. Rag weed is the most common weed in this country, and the best time to suppress it is when there is plenty of moisture to germinate all the seed; then mow off the weeds before the seed can mature; rake them up and let them rot, as they contain a good deal of fertilizing material.

The Spanish needle is an annual and may be suppressed by mowing before the seed can mature. It is a very troublesome plant and should be suppressed.

Much injury was done to the wheat last year because of the rag weed, there being so much rain that when the wheat was thrashed, the rag weed being wet caused some of the wheat to spoil, whereas, had there been no rag weed with the wheat, it would have dried out, so as to have done no injury. Thus thousands of dollars were lost to the farmers of Allen County alone because of the rag weed. It is an annual. The roots never reproduce; therefore mowing the ground, or cultivating it for two or three years, will destroy most of the seed. If the ground is thickly sodded, it will choke out the rag weed, but the seed will retain vitality for some length of time, so that when the meadow is broken up the rag weed will again appear. There are many other weeds that might be mentioned, but the same rule applies to the manner of suppressing them.

One of the greatest items of cost in the production of a crop is for labor expended in the extermination of weeds in order to give the crops a chance. If there were no weeds produced from the soil, the later cultivation of the crop would not be necessary. The value of the field crops in the United States for the year 1894, including wheat, corn, oats, rye, barley, buckwheat, tobacco, potatoes and hay, was one billion, six hundred and thirty million, eight hundred and seventy-three thousand, seven hundred and ninety-five dollars. Direct loss to machinery and stock and decrease in value of crops by reason of weeds amounted to ten million dollars.

*By Hon. J. D. Cable, in Annual Report of Ohio Farmers' Institutes.

RECENTLY PATENTED INVENTIONS.**Railway Appliances.**

CAR FENDER.—James K. Young, Meriden, Conn. This fender is a pivotally mounted frame having forward wheels which travel on the car track when the fender is down in operative position, and a portion of the fender is arranged to move forward when a person is caught upon it, thus holding one on the fender instead of throwing him in a way which might be dangerous to life or limb. The fender is readily attached to or removed from a car, and may be conveniently folded up against the dashboard if desired.

TRACK BRAKE.—Jefferson U. Elwood, McKeesport, Pa. This invention covers an improvement on two formerly patented inventions of the same inventor, and provides a shoe for track brakes of greater holding power than the ordinary shoe, and a more efficient mechanism for applying power to the shoe. The shoe has dovetailed or inwardly expanding recesses in its under surface, the recesses being filled with moulded blocks arranged to have a higher frictional resistance than the body of the shoe, and the operating mechanism comprises a worm and worm gear to which a grooved cam of decreasing radius is attached, giving great power in the application of the brake, by a movement which is rapid in the beginning, but slower and with increased power at a later portion of the application.

Electrical.

POWER TRANSMISSION.—Emil Lanhoff, Mulhausen, Germany. This invention relates to systems in which the motors may be capable, within wide limits, of gradually altering their rotary speed, instead of a step-by-step variation, the electrical connections being also so arranged that the size of the motors will be reduced to a minimum for high running efficiency. A regulating device is provided for the armature comprising a plurality of circuits whose potentials are to each other approximately as the terms of a geometric progression, in combination with another operatively connected regulating device comprising a plurality of resistances arranged in series to control the intensity of the field, whereby the variation of intensity will be approximately the same for all differences of potentials.

Bicycles, Etc.

A MUSICAL ALARM SIGNAL.—Rudolf Hartmann, Alfred Hartmann and George F. Reinhard, Jersey City, N. J. From a hanger loosely mounted on the head, according to this invention, two trumpets are pivotally supported over the front wheel, there being in each trumpet one or more reeds, each supported on a diaphragm, and a piston being arranged to have movement in each trumpet by means of cranks on a small grooved wheel which is brought into contact with the front wheel of the bicycle when the rider presses down on a handle or push bar attached to the handle bar. Any instrument of a musical type to be operated by the compression or exhaustion of air may be used instead of the trumpets, making the tones of an organ pipe or reed, or a whistle, or their equivalents.

Agricultural.

REAPING MACHINE.—Mihail Alexandrescu, Bucharest, Roumania. A machine to be propelled by hand, instead of being drawn by draught animals, is provided by this invention, and consists of a frame mounted on two wheels, with a cutter on its forward end to be operated by a connection with the axle, while an endless apron carries the stalks which are cut to a rack, where they accumulate in quantities corresponding to sheaves, when they are pushed off to be bound by hand. The knife bar carries three-sided blades, and has a reciprocating motion, being brought down to the proper distance from the ground by raising the rear end of the frame by the handles on which the operator pushes.

Mechanical.

BELT APPLYING DEVICE.—Fordyce A. Savage and Milan G. Wade, Dowagiac, Mich. To facilitate putting belts on pulleys, drums, etc., these inventors provide a simple form of adjustable clamping device to engage the periphery of the pulley and project to one side, where it engages one side of the belt, lifting the belt and turning it upon the pulley, after which the device drops from the pulley, as the latter makes a half revolution, bringing the device from beneath the belt. The device is made in two sections adapted to slide upon each other, so that it may be used on all sizes of pulleys.

PLUMB AND LEVEL, ETC.—Edward D. Beatty, Louisville, Ky. This invention affords a combination of a plumb and level with an ordinary folding rule, which may be conveniently carried in the pocket. A level glass with a suitable amount of liquid is held in a casing which is connected with the rule by a link, so that it may be made to rest on the side of the rule when the latter is in horizontal position for use as a level, or on the end of the rule when the latter is to be employed as a plumb, the casing being of a length equaling only the width of two members of the rule.

Miscellaneous.

COMPUTING SCALE BEAM.—William R. Dunn, Alton, Ind. A hollow weighing beam, according to this invention, has graduations to indicate units of weights, and located within this beam is a price indicating beam having suitable graduations, two weights being movable along the hollow weighing beam and adapted for joint or independent use to indicate the weight and the price at the same time. The improvement is designed especially to simplify the construction as well as to render less expensive scales of this description, adapting them also for convenient use for a wider variety of articles.

THEATER CHAIR MIRROR.—Samuel Walker, Brooklyn, N. Y. An attachment for mirrors is provided by this invention for use with any upright or nearly upright support, the mirror with its fixed housing or casing being adjustable and movable and being normally concealed and protected. A shifting device is arranged to be operated by the

foot in such manner as to slide the mirror out from its casing and hold it in exposed position as desired, leaving the hands entirely free, so that one facing the mirror may have a perfect view of the head and upper portion of the body without elevating the mirror above the top of the chair to which it is applied.

STOVE GRATE.—Edmund E. Flint, Tonawanda, N. Y. This is a grate for coal stoves which virtually constitutes an extension of the fire pot, and is so made that when shaken it grinds the cinders that may be between the sections, throwing out slate from its marginal portions, thus preventing the portion of the grate through which ashes pass from becoming clogged, and also promoting the draught. The grate is made with a pan section and a rim section, both provided with teeth, and each having movement in the same horizontal plane, one below the other, but the two sections moving in opposite directions, and one section moving faster than the other.

BANDAGE CUTTING MACHINE.—John R. Volz, New York City. A machine adapted to cut several strips of varying widths at one time, and capable of different adjustments to regulate the tension of the material while being cut, forms the subject of this patent. The machine comprises a suitable frame in which are journaled various shafts to rotate in unison, the driving shaft being turned by a handle on a pulley, from which is driven a cutter shaft and two winding shafts, the latter shafts being slidably mounted. The machine is of simple construction and easy to operate.

GARMENT CLASP.—Joseph Stern, New Orleans, La. This is a device more especially designed for use on the opening flaps of trousers, and permits of conveniently fastening the staple in place without stitching. A hook and a staple, each made of a single piece of sheet metal, are secured to the two flaps, the metal of the staple being bent upon itself to form two members, one having at its free end a pointed tongue to engage an opening in the end of the other member after it has been passed through the cloth.

A FISH NET NEEDLE AND WINDER.—George W. Raymond, Warrenton, Oregon. In needles for knitting fish nets and machines for winding twine on the needles, this inventor provides a needle having jaws or points at one end and means for regulating the space between the points of the jaws, while the winder comprises a rotary shaft to rotate the needle on a post which may be clamped to a table, and a spreader plate to open the points of the needle, the spreader plate having an eye for the passage of the twine.

VEHICLE ROLLER BEARING.—John R. Richardson, Madera, Cal. For the hub bearings of vehicles designed to carry heavy loads, this invention provides a bearing which extends the length of the spindle portion in order that the weight may be borne uniformly through the whole of such portion, to prevent the breaking down or crushing of the rollers or the boxing or spindle. It consists of rollers which bear for their full length between the box and spindle, there being a collar at each end of the box, and fitted to the collars are separate plates having projections which extend between the rollers at the ends.

PRISON CELL, VAULT, ETC.—Frank Peterhanel, Brooklyn, N. Y., and George H. Rothmann, Rutherford, N. J. The door, window grating or wall of a cell or vault, according to this invention, is composed of a network of connected pipes adapted to be connected to an exhaust device, this system being connected with a pipe leading to a central office, where an alarm valve is held on the pipe and closed by atmospheric pressure or adapted to be opened by a spring, sounding an alarm. A connected indicating disk also makes a corresponding alarm, giving the number of the cell, when a break has been made, destroying the vacuum in any of the pipes, the improvement being applicable to treasure vaults as well as prison cells, etc.

POST HOLE DIGGER.—Hugh L. T. Overbey, Summerville, Ga. This device has a lower cutting cylinder with internally beveled bottom cutting edge, and longitudinal slots in its side walls, and at the upper end of the cylinder is a hollow shank in which is secured the handle. A spring-pressed push plate is held movably in the cylinder, there being a foot piece for moving the push plate outward to remove the dirt taken up by the cylinder, the push plate returning to its normal position on removing the foot pressure, and not interfering in the least with driving the cylinder down into the ground.

FRUIT CLEANER.—Alexander Chambers, Newtown, Pa. For cleaning currants, raisins, dried apples, prunes, etc., this machine consists of a frame in which rails are arranged on an incline to support a slidable screen, conveniently adjustable in relation to a brush, the parts being so arranged that the brush and screen may be readily removed, and means being provided for the proper breaking up of the lumps before the fruit is acted on by the brushes. Screens of different mesh are provided for various kinds and sizes of fruit.

BAG TIE.—Albert Davison, Belvidere, Ill. A simple, easily operated fastener, which can be cheaply made and applied without injury to the bag, is provided by this invention. It comprises a plate section and a stud section, the latter having a hooklike main tongue and opposite guide and retaining tongues, the latter being deflected to form a hump. Means are provided for detachably connecting the plate section and the stud section, a cord or line of twisted wire being used in connection with the device.

BAG FASTENER.—Newell F. Wightman, Meriden, Conn. This invention relates to metallic fasteners for grain bags, and comprises a fastener made of two pivoted sections, an inwardly extending tooth on each section, a ratchet toothed arm on one section and on the other section a boxing having an opening for the passage of the arm. A block is adapted to engage the arm, a stem extending from the block through the end wall of the boxing, a spring surrounding the stem, on the outer end of which is a finger piece. The fastening maintains a substantially circular form and position, and will not slip from the bag.

HUB ATTACHING DEVICE.—Simon J. Harry, Washington, D. C. The axle, according to this improvement, comprises a spindle with a threaded stem and a non-circular seat at its inner end, on which is fitted