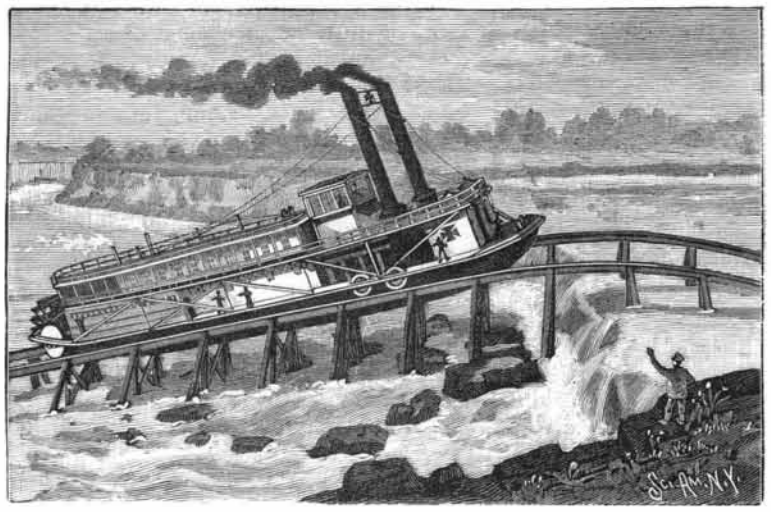
APPARATUS FOR CARRYING VESSELS OVER OBSTRUCTIONS.

This apparatus is designed for carrying vessels over obstructions, such as rapids and falls in rivers, that would otherwise not be navigable, so that a continuous transport upon such rivers is rendered possible. The steamboat is provided with wheels mounted upon a truck placed near the bow. These wheels are arranged within a guard rail, that prevents them from being injured when the boat is lying against a wharf, and are designed to run upon rails carried by a suitable trestle. As here illustrated, the stern is supported by wheels carried upon the extended paddle-wheel axle; the necessary power to move the vessel along the track is here applied. Barges that are to be towed by the steamboat are furnished with suitable trucks and wheels to run upon the rails. In certain cases the barges might be towed over the obstruction by means of a stationary engine, which could, if needed, be employed to assist the steamboat.

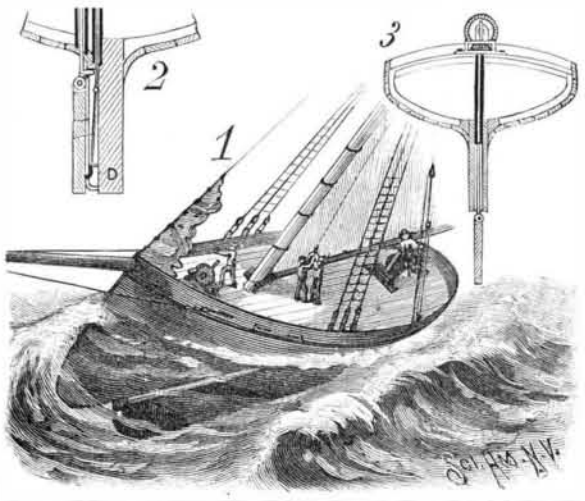


GRONDAHL'S APPARATUS FOR CARRYING VESSELS OVER OBSTRUCTIONS.

This invention has been patented by Mr. W. A. Grondahl, of Portland, Oregon.

SWINGING CENTERBOARD FOR VESSELS.

The construction of this centerboard is clearly shown by the accompanying engraving. It is preferably made of metal, several tons in weight, and is hinged to the lower ends of rods, so that when lowered it is free to maintain a vertical position in the water, no matter to what extent the vessel may heel over. This prevents leeway of the vessel, while the weight tends to right it; and as the centerboard always presents a vertical surface in the water, it causes the vessel to more readily answer the rudder. The upper parts of the rods are screw-threaded, and are provided with suitable gearing by which they may be raised or lowered. In the construction shown in the sectional view, Fig. 2, the side of the keel is provided with two bars, that stand out from the keel. On the lower ends of the lifting rods are eyes that run upon these bars. Provision is made for holding the lower edge of the centerboard against the side of the keel when it is raised.



[DEERING'S SWINGING CENTERBOARD FOR VESSELS.

The lifting rods are inclosed in tubes, which may be fastened by screwing them into the wood of the vessel or into a screw cap below, fitted for that purpose. This method saves the cutting of floor and timber and the cost of building walls, while additional space is obtained for the carrying of cargo. There is no danger of the cargo being shifted against the sides of the centerboard well and causing a leak. This swingboard may be used the whole length of a vessel's bottom. When a vessel is rolling, the great resistance offered by the common centerboard sometimes causes trouble by breaking the board or opening the vessel. This centerboard obviates this danger, as the vessel simply swings each side of it, like a buoy riding to an anchor.

This invention has been patented by Mr. James A. Deering, of 44 Wharf Street, Gloucester, Mass.

Yellow Light for the Dark Room.

For the covering of glass for dark rooms and developing lamps, Dr. Stolze, in the *Wochenblatt*, proposes an emulsion made by dissolving 10 parts of nitrate of lead in 100 parts of water. To this solution is added, constantly stirring, either 6 parts of neutral chromate of potash or 4 parts of the bichromate. This emulsion is cooled, chilled, reduced into nodules, and washed. After being liquefied, glass plates can be coated with it in the same manner as ordinary emulsion plates. Such a light acts exceedingly well, and can be used with great safety for the handling and developing of plates. The color is of a pure yellow, and appears very light to the eye. By giving a thinner or thicker coating, the color and opacity can be easily regulated. To protect these plates from moisture, it is advisable to coat with a crude collodion to harden them, or a chrome alum bath will do as well; and to prevent cracking or tearing when exposed to the heat of a gas or lamp flame, a little grape sugar is added to the emulsion; this will make the coating pliable. Another method for making red glass for the dark room was lately given by M. Cassau in the *Photographisches Archiv*. Five grammes of carmine are dissolved in 40 c. c. of ammonia solution. Two grammes of picric acid are dissolved in 450 cubic centimeters of water, to which 7 grammes of glycerine are added. In this last solution 50 grammes of hard gelatine are allowed to soak one hour, and afterward dissolved in the water bath. When the gelatine is thoroughly dissolved, the carmine is added to the mixture. While warm, it is applied to an ordinary sheet of glass or window pane with a wide brush. As soon as the first coat is thoroughly dry, a second or third can be applied until the desired density is arrived at.

A SIMPLE METHOD OF INSULATING UNDERGROUND AND OTHER WIRES.

The illustration herewith shows an easily applied form of electrical insulation, whereby a great many wires may be placed in a small space, and all will be readily accessible at any point of the line. The insulation is formed of sheet material, such as rubber, bent into reverse pockets, as shown in Fig. 2, and supported in form for use by spring clasps, preferably made of wood, such as hickory, these clasps being light and thin enough to be easily bent to the desired shape. In combination with such insulation a covering of waterproof canvas is used, as shown in Fig. 3, inclosing the insulator and wires, strengthening the insulation and excluding moisture and dirt from contact with the conductors. The whole is carefully insulated, and constructed without the use of metal. The alternating loops or spring clasps of wood are secured to the insulating sheet at short intervals, say at a distance of about six inches from each other, and six conductors are preferably arranged in each insulating covering, as being about the number which can be most conveniently handled in manufacture and in placing in position for use. A cable composed of ordinary main line wires for aerial and underground purposes is thus quickly formed by hand. When applied aerially, it may be secured to the poles without cross arms and glass insulators. This cable may also be emptied, for repeated use.

This method of insulation will permit the easy tapping of any line, and making an outlet with connecting wire to any building or office where groups of wires pass. Compactly grouped, with canvas covering, the wires cannot be mixed and twisted; and the wires can be placed within the insulating covering when they are not absolutely straight, the clasps making them all parallel with each other. The illustration shows how this form of insulation can be used beneath a street pavement, by inserting a wooden box near the surface, which would hold, if one foot square, over 1,200 wires insulated according to this plan. The construction of this continuous insulation is simple and inexpensive, and it is designed for aerial and underground electric conductors, for telegraph, telephone, and electric light circuits.

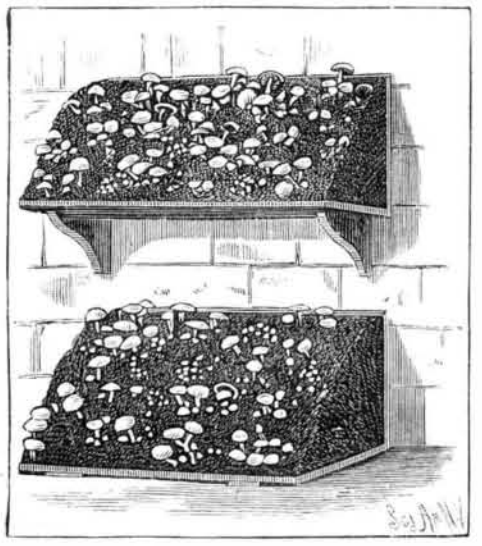
This invention has been patented by Mr. Samuel F. McGill, of Keene, N. H.

IF the manger or feed box be so foul as to emit a sour smell from any cause, it should be carefully cleansed and washed with a solution of soda or potash until perfectly sweet again.—*Lewiston Jour.*

MUSHROOMS ON SHELVES.

Short horse droppings, partially dry, thrown in a heap and allowed to ferment, form the right kind of material for raising mushrooms artificially. A good way is to build shelves on the wall of a shed or cellar, as shown in the illustration; fill each full of this material; press the droppings close; cover with two or three inches of soil. Allow the bed a few days for the heat to rise, when it is ready for spawning. This spawn is sold by seedsmen in the form of bricks, which have to be broken up into small pieces about the size of a hickory nut, and set into the bed just below the soil.

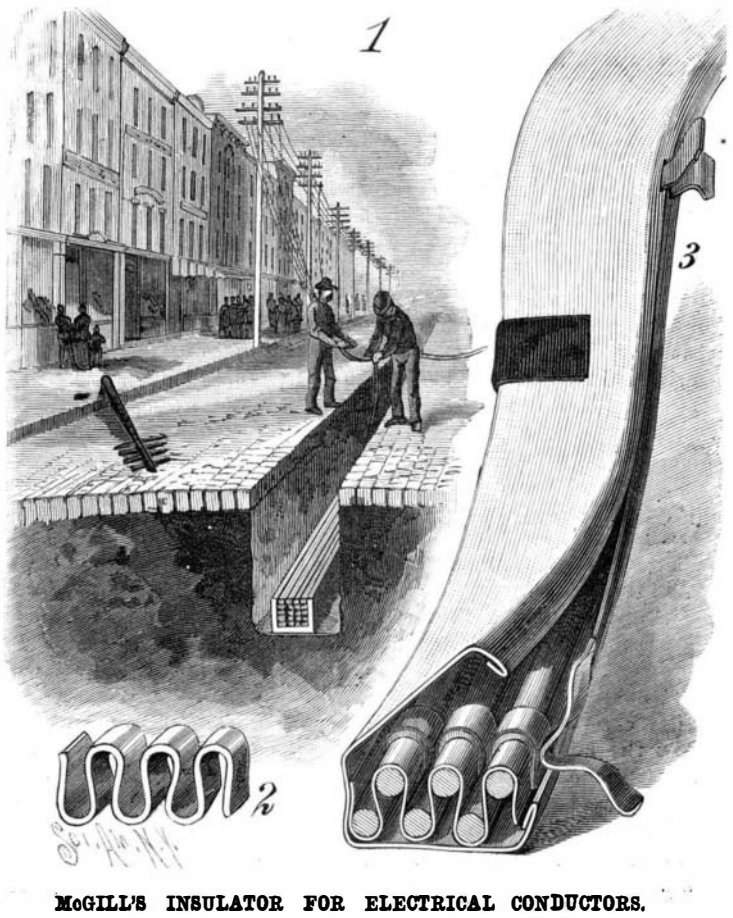
If the bed is right, having a gentle heat and a little moist, not wet, the spawn will quickly spread through the whole mass, and in about a month the little white buttons will appear all over the beds, and in a very short time after the full-sized mushrooms. Any position that can be kept not warmer than 65° or 70°, and not colder than 50°, will grow them the whole year through, but beds require to be renewed after a second crop, which can often be had from the same spawning. Any place light enough to work in will be light enough to grow mushrooms; indeed, some grow them without any light.—*Country and Town Journal.*



MUSHROOMS ON SHELVES.

Sawdust for Cleansing Garments.

Mr. Scott proposes to cleanse garments by submitting them to a uniform friction produced by sawdust from hard wood, and in connection with benzine, naphtha, or analogous solvents. The garments impregnated with any of the above solvents are placed in a revolving apparatus along with sawdust of mahogany or any other suitable wood. By the employment of this wood powder it is stated that an economy is effected of 25 to 27 per cent of the cleansing material employed, and it is stated besides that the brightness of the colors is not impaired. The principle is not altogether a new one, since dyed skins, or rather skins the wool or fur of which has been dyed, are very often exposed with sawdust in a revolving cask, not only to remove any adhering particle of color which may not have been fixed on the fiber, but to give at the same time a kind of finish by the gentle rubbing action.



McGILL'S INSULATOR FOR ELECTRICAL CONDUCTORS.

A Model Cholera Hospital at Rome.

The London *Globe* gives an interesting account of a new cholera hospital at Rome, which the Pope has caused to be built. Contact with the outer world is carefully guarded against by grated windows, telephones, and by a revolving barrel, with half its circumference open, by which provisions are taken into the hospital. The water supply is drawn from a well, and is quite separate from the city supply. The drain is formed of an iron tube, sixteen inches in diameter, the joints being hermetically sealed with lead. There is a disinfecting boiler in which corrosive sublimate is placed. There is a room called the "chamber of observation," which has a staircase leading up to the first floor. In this room dead bodies are placed for a given time, as it is well known that cholera patients often show signs of being dead when really only apparently so. The room is, by means of an electric apparatus, in communication with the director's office. The body being laid on a bed, both hands are put into a sort of copper muff; between the hands is put an instrument so sensitive that, should there be the slightest movement of the hands or any other part of the body, this instrument would instantly close the electric circuit, and the bell in the director's office would be set ringing; at the same moment another instrument registers the number corresponding to the bed upon which the body is lying. The chamber is warmed by steam, so as to facilitate resuscitation. The laboratory is provided with a gasometer for the storage of oxygen, which is taken to the wards for administration in gas bags. On the ground floor are four wards for doubtful cases. Should they get worse, they are sent up in the lift to the cholera wards above, their clothes and bed linen being immediately burned. Another room is set apart for women in childbirth, and there are two more for undressing patients, so that the infected clothes may be destroyed, the Pope furnishing new clothing for all recovered cases. The cubic space allowed for each bed is thirty-six cubic meters. The ventilation is carried on by means of funnels with gas jets below. The chapel is in communication with the sacristy of St. Peter's, so as to form an easy access for the Pope, should he wish to visit the hospital; but before returning into the sacristy, his Holiness and suite would have to go into a room near it for disinfection.

Detection of Leaks in Water Mains.

The microphone is now being used in Germany for the purpose of detecting loss of water through leakage in town mains. The apparatus consists of a steel rod, which is placed upon the cock in the neighborhood of which the leak is suspected, and a microphone attached to the upper end of the rod. A dry battery and a telephone complete the equipment. No sound is heard in the telephone if the cocks are closed and no leak occurs; but a leak of even a few drops through a badly fitting cock causes sufficient vibration in the pipe to affect the microphone, and to give audible sounds in the telephone. At the recent meeting of gas and water engineers in Eisenach, it was stated that the apparatus is so simple to handle that, with a little practice, ordinary workmen are able to detect and localize any leak.

A UNIQUE SYSTEM OF WATER WORKS.

BY E. O. HOVEY.

As everybody knows, water is frequently raised to a desired height by means of a hydraulic ram set in a stream at the foot of a hill, or at the bottom of dam, or at some other place where there is a natural fall of water; but at Elk River, Minn., there is a peculiar arrangement, a description of which may prove to be of interest.

The town is situated at the junction of the Elk and Mississippi Rivers, thirty miles northwest of Minneapolis. The geological formation is the area of modified glacial drift of central Minnesota. About half a mile northeast of the station the railroad passes within a few yards of the southwestern edge of a tamarack swamp, in which water is found on or near the surface. For a long time it has been known that, within a limited area southwest of the railroad at this point, good water could be had at a depth of eight feet, while just outside of this area water could not be found short of eighteen feet. The idea occurred to Mr. T. S. Nickerson, who lives at Elk River, and is water supervisor of the Breckenridge division of the St. Paul, Minneapolis, and Manitoba Railroad, that a hydraulic ram might be set so as to utilize this difference of water level. Test holes twelve feet deep were sunk with an elongated post hole auger, at the points marked A, Fig. 1, to determine the location of the edge of the basin of water standing at eight feet. Water failed to come into these holes, but at the point, B, Fig. 1, water was struck at the required depth. The operations which pertained directly to the setting of the ram are of especial interest. On a line supposed to be perpendicular to the rim of the basin a ditch sixteen feet long, two and a half feet wide, and about twelve feet deep was dug to allow the water to flow off while the "supply" well was in process of construction. This well is twelve feet in circumference and twelve feet deep, The first six inches of the well and ditch were cut through the light and sandy but fertile soil characteristic of this region, the next six and a half feet through loose gray sand. Then, on the line between the well and the ditch, the diggers struck a dike two feet wide at the top, but soon increasing in width to four feet, composed of coarse sand so firmly cemented by infiltrated oxide of iron and carbonate of lime as to render the use of the pick necessary in removing it. This dike is impervious to water, and, as shown in Fig. 2, has an inclination at this point of about 75° south of west. Northeast of the dike the well passed through coarse gravel containing many large stones, while southwest of it nothing but the loose gray sand was found. In the coarse gravel a copious supply of water was met with, which flowed off freely through the loose sand of the ditch.

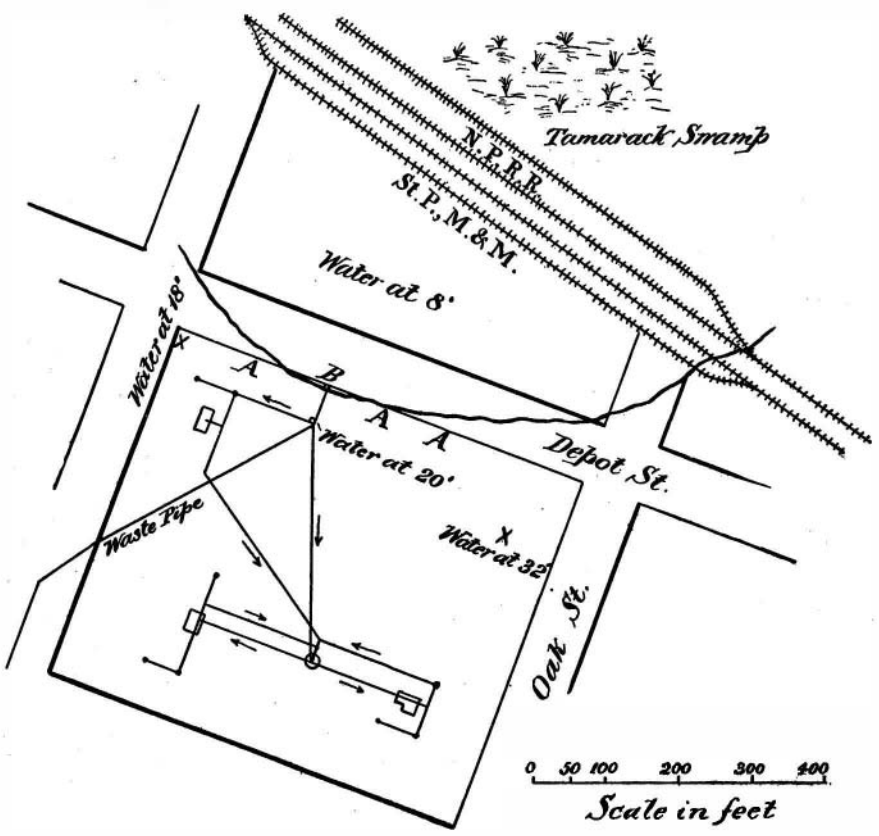


Fig. 1

A two and a half inch iron pipe was laid in the bottom of the well and ditch, the well was bricked up in the usual way, and the trench in the dike outside of the well was filled in with cement to make a water tight joint about the pipe and to prevent the washing away of the dike. Fifty feet southwest of this well another one, called the "waste" well, eight feet square, was sunk to the depth of twenty feet, and cairned to prevent caving. Water was met with at this depth, or the well would have been made deeper. A No. 6 hydraulic ram was then placed in the waste well at a depth of 16 feet, and was connected with the two and a half inch iron pipe mentioned above. The ram there has a head of water of eight feet, and it furnishes three houses and their dooryards with an abundance of water. The arrangement of the pipes leading from the ram is illustrated in Fig. 1. Each pipe, after making the circuit of the house and dooryard which it supplies, is connected with a 250 bbl. tank, the bottom of which is 16 feet above the ground, which connection greatly increases the force of the stream at each faucet. In each pipe, after it passes through the house, there is a check valve to keep the water from flowing back from the tank through the house.

For about a year, *i. e.*, until the present summer, the waste water from the ram found free discharge through the loose sand surrounding the well; but lately the sand has seemed to be saturated with water, and drainage has not been sufficiently rapid. Therefore, three months ago Mr. Nickerson laid a two inch iron drain pipe from a depth of 18 feet in the waste well to a point 1,200 feet distant on the terrace of the Elk River, and the waste water is easily disposed of through this outlet.

The water within the basin is strongly impregnated with iron and has but little lime in its composition, while that from wells without the basin contains much lime and but little iron. The water from the tamarack swamp is like that found in the basin. The dike of coarse sand has been cut into at one other place, and found to trend in such a direction as to warrant the supposition that it forms a retaining wall on at least the southern and southwestern sides of the basin and tamarack swamp, thus preventing their waters from flowing off into the loose gray sand and descending to the general water level.

Mine Drainage.

In mining anthracite coal, it is necessary to keep the mines clear of water, which accumulates in large quantities, and which must be removed either by gravity or by powerful engines and pumps, and must find its escape through the natural water courses. This water is acidulated with sulphuric acid, and consequently is destructive to iron pipes, kills fish, and cattle refuse to drink it. The Pennsylvania Coal Company owns a large colliery in Scranton, called the Gipsy Grove Works, and the water from this mine is pumped and discharged into a small stream called Meadow Brook, a tributary of the Lackawanna River. In 1868, J. Gardner Sanderson built a handsome residence on Meadow Brook, below the colliery, on which he made a fish pond and provided machinery to force the water of the brook into tanks in his house for domestic use. As the operations of the colliery grew and the discharge of mine water increased, the water of the brook became so contaminated as to destroy Mr. Sanderson's pipes, kill his fish, and, indeed, the water became totally unfit for use. He then sued the coal company for damages.

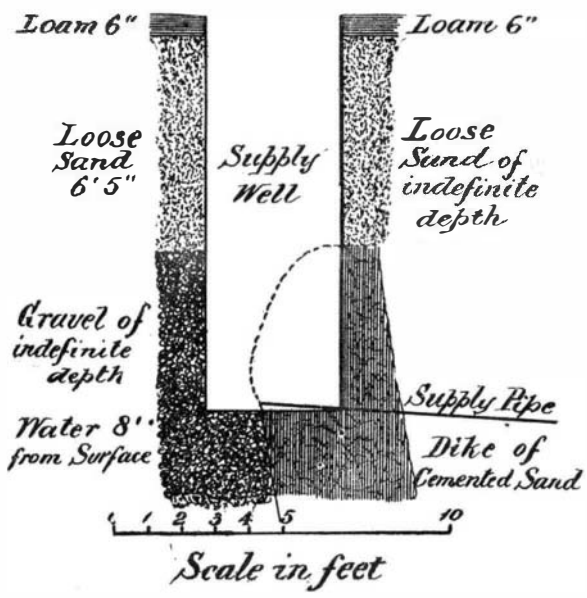


Fig. 2

The Supreme Court of Pennsylvania has given judgment against the Sandersons, and the matter is finally settled.

In the decision, the court says:

"If damages may from time to time be recovered, either in the present form or as for a nuisance, punitive sums may be resorted to to prevent repetition or to compel the abatement of the nuisance; indeed, if the right to damages in such case is admitted, equity may, and under the decisions of this court undoubtedly would, at the suit of any riparian owner, take jurisdiction, and, upon the ground of a continuous and irreparable injury, enjoin the operation of the mine altogether. . . . The defendants have done nothing to change the water or diminish its purity, save what results from the natural use of their own property. The water, as it is poured into Meadow Brook, is the water that the mine naturally discharges; its impurity arises from natural, not artificial, causes. The mine cannot, of course, be operated elsewhere than where the coal is naturally found, and the discharge is a necessary incident to the mining of it. . . . The right to mine coal is not a nuisance in itself; it is a right incident to the ownership of coal property, and the owner cannot be held for permitting the natural flow of mine water over his own land into the water course. . . . The defendants were engaged in a perfectly lawful business, in which they had made large expenditures, and in which the entire interests of the community were concerned; they were at liberty to carry on that business in the ordinary way, and were not, while so doing, accountable for consequences which they could not control."