beam. The ice has been cut parallel to the plane of freezing from a block of the so-called Wenham Lake ice. It has been cut, I say, parallel to the surface along which the ice grows. [After a short time the image of the ice-flowers began to appear on the screen.] I do not know any experiment that I have ever made which is more delicate and beautiful than this. The flowers are growing larger and larger. First of all you see these leaves, and within you see a crimping. Those spaces which you see are spaces entirely devoid of air, for you know that the water occupies less space than the ice. The ice is larger than the water which formed it, and as the inner portions of this piece of ice melt, the water occupies less space than the ice, and a small vacuum is produced at that spot. This screen presents a glorious surface of ice-flowers. Every particle of ice is built up in this beautiful way. The ice has now become disintegrated, but I do not think your patience has been ill rewarded.

TURNING A MOVABLE WHEEL AROUND A FIXED WHEEL.

"How many revolutions on its own axis will a movable wheel make in rolling once around a fixed wheel of the same diameter?"

In the earlier stage of this discussion, the two-revolution philosophers found no fault with the terms of the original question, as above presented, but without any qualification took the position that our answer, "one," was an error, and theirs, "two," the only true and correct reply. One of these champions, referring to the terms of the question, says, "It seems impossible to conceive how it could have been more clearly put, and we think its propounder deserves great credit for its extremely direct and explicit language."

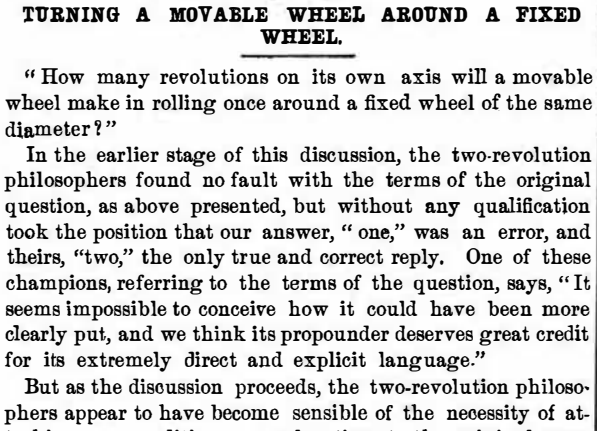
But as the discussion proceeds, the two-revolution philosophers appear to have become sensible of the necessity of attaching new conditions or explanations to the original question, in order to render their several positions tenable. One portion of them think that it ought to be expressly statedas part of the question, whether the axis is to be stationary, or is to revolve with the wheel; forif it revolves, the wheel will turn only once on its axis, but if stationary the wheel will turn twice on its axis.

To these we have replied that they might make the axis fixed or stationary, just as best suited them. In our view, the number of revolutions made by the wheel upon its own axis, will be precisely the same in either case, namely, one. Others of the dual philosophers deem it important that the word axis should be more explicitly defined. Some want the axle-tree, or journal on which a wheel ordinarily turns, to be defined as the axis. Others want the axis to be settled as being an imaginary point or line, drawn through the center of the moving wheel. To these we have answered that they might take their choice, as it did not affect the practical result, for the wheel will make the same turns on its own axis, whether the latter is defined as a point or a bearing.

With another portion of the two-revolution philosophers the daylight is beginning to dawn. They begin to see that unless the axial plane of both wheels is the same, all their mathematical calculations, postulates, theorems, astronomical references, and other supports, together with the dual conclusion based thereon, are likely to fall. They have been invited to answer explicitly whether the movable wheel in figure 11, made *one* or *two* revolutions upon its own axis; but have not yet responded. We also learn that our city two-revolution friends have been too modest to appear at the Printing Wheel Manufactory to claim their prizes, worth $10 each, deliverable on showing that the printing wheel turned twice on its own axis in rolling once around a fixed wheel of the same diameter. Perhaps they did not wish to bankrupt the correspondent who made the offer, by carrying off his entire stock in trade.

Here is a diagram of a little contrivance on the same principle as the printing wheel which any two-revolution philosopher, residing at a distance may readily construct. B is a

Fig. 18.



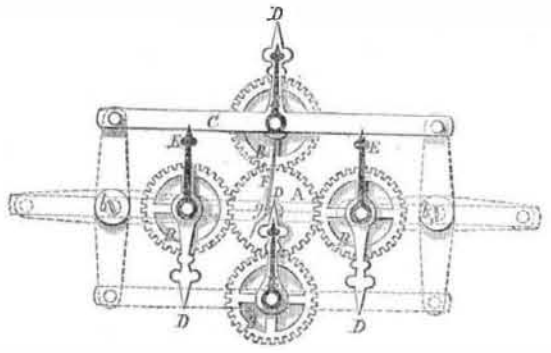
wheel set in a forked handle, C. Now roll B once around a fixed wheel, A, of same diameter, such as a table leg or a bottle and if you succeed in making B turn more than once upon its axis, then come to town with confidence and take home one of the $10 prizes offered last week.

We have lately made count of the wheel letters, and find we have some five hundred on hand; and still they come. We beg to remind correspondents that there are many other interesting topics that should engage their attention; and for fear that all their ideas will turn into wheels if the discussion is prolonged, we feel under the necessity of now moving the previous question. Those of our way of thinking will say "one." Contrary minds "one and a quarter," "two," "three," or "four," according to their several positions. Except for some novel or interesting comment we propose with the present number to dismiss the subject.

To the many esteemed correspondents who have taken part in the discussion we return our thanks for the candid and courteous manner in which they have presented their views.

MESSRS. EDITORS:—I think in counting the revolutions of a wheel on its axis from a pointer indicating its axial line, said pointer should not be allowed to revolve (as in W. E. H.'s model) but should always point in the same direction, say to one of the points of the compass. The mere changing of its position is no reason why it should change its direction. On referring to the accompanying diagram, it will be readily seen that the movable wheel, B, makes two revolutions on its axis while passing around the fixed wheel, A, once, its pointer, D, having been in conjunction with the pointer, E, indicating the axial line twice during its circuit.

Fig. 19.



I would add that the fact of the movable wheel winding the end of a string around itself only once while performing its circuit, the other end being held across the center of the fixed wheel, is not a proof of one revolution, as some of my "one revolution" friends will have it, but a distinct proof of two revolutions, which I think I can make clear by the following illustration.

It being conceded that the moon makes a revolution on its axis while passing around the earth, we will suppose one end of a line fastened to the moon and the other end held on the earth. How many times would the moon wind the line around itself while passing once around the earth? We must answer, *no times*. Now suppose that by some cause it made two revolutions instead of one on its axis, how many times would the line be wound around on completing a circuit. We now answer once, of course, consequently proving "two revolutions" instead of "one."

Two miter wheels, one fixed and the other held in position by means of an axle fastened at right angles to the axle of the fixed wheel and made to revolve around it in gear with the fixed wheel, seems to be regarded as an illustration of the "one revolution" theory. I think it should not be noticed in connection with this question, it being in fact but a wheel rolling on a plane, describing a circle of its own diameter, the plane of the wheel being at right angles (or nearly so) to the plane on which it rolls. A. W. BROWNE.

Brooklyn, N. Y.

A. W. B.'s letter was accompanied by a very neat model, of which the diagram, Fig. 19, is a view. A fixed wheel, B, movable wheel, and C, a bar-carrier, which conveys the wheel, B, around A. The ends of bar, C, are pivoted upon wrists, *b*; the dotted lines indicate different positions of C. D, index attached to B; E, index attached to bar, C; the center pin of E forms the journal or axle on which B turns.

This device differs not essentially from those presented by W. E. H., pages 150 and 166. In all of them that portion of the carrier which supports the movable wheel has the axis of motion at the center of the fixed wheel. In Fig. 19, the movable wheel makes one revolution on its own axis in rolling once around the fixed wheel, as may be readily proved by extending the cord, F, from *g*, to the movable wheel on which the cord will wind once. But A. W. B. appeals to the moon and earth to prove that, because a cord from a fixed wheel to a moving wheel winds once, therefore the latter turns twice on its axis. As neither of the bodies on which he depends are fixed, we submit that his appeal cannot rest.

Having called A. W. B.'s attention last week to Fig. 11, in which the one revolution of the moving wheel upon its own axis is isolated, and made distinctive, our correspondent, it will be observed, declines to attempt to apply his two-revolution doctrines thereto.

MESSRS. EDITORS:—While the learned are demonstrating that a wheel revolving around another of the same size, the latter being fixed, will turn on its own axis twice, will you permit an unlettered farmer to have his say? I have carefully studied the diagrams on page 106, present volume, and, notwithstanding the apparent clearness of the demonstrations, I can demonstrate their fallacy thus: Postulate, attach one end of a cord to the rim of a wheel, and the other end to a fixed axle projecting from the center of the wheel, and the cord will be wound once around the projection at each revolution of the wheel, on its own axis. Now, any one can see, by experiments, or by a careful study of the diagram of Mr. Hepburn, that such a cord would be wound but once around the supposed projection, while the wheel was passing once around its fellow. *Ergo*, the wheel made but one revolution on its own axis. WM. BASSETT.

Birmingham, Mich.

P. S.—Of course these gentlemen will find out, in due time, that one of the revolutions of the wheel is not on its own axis, but on the axis of the fixed wheel. N. B.

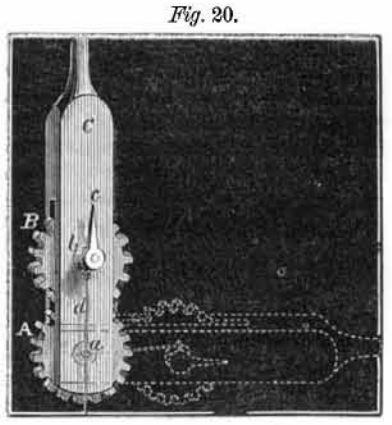
MESSRS. EDITORS:—The "wheel problem" has probably excited more thought and investigation, and will end in more benefit to a large class of your readers than any similar question started in your paper for years. With a simple model it is not difficult to convince nine out of ten that the wheel revolves twice on its axis in rolling once around the fixed wheel, and very difficult to convince them that the axis being carried around the circle with the revolving wheel neutralizes one half the apparent result, showing the revolution on its axis to be "once." The writer is not, therefore, "astonished at your patience" in keeping the question *open*, the result of which will be to *open* the eyes of many o your readers, and also to increase your subscription list.

INVESTIGATOR.

West Pittsfield. Mass.

MESSRS. EDITORS:—I am searching for new and important principles in scientific knowledge, and at first I did not see the benefit that could possibly be derived from the discussion of the wheel question. But, now, I really think I see the point; and I conceive it to be in the center of the fixed wheel in the form of a pivot, *a*, upon which we will place a lever,

Fig. 20.



C, fixed to the lever we will put the axle, *b*, and a pointer, *c*. Now we will place upon the axle the movable wheel, B, and we are ready for the original question, to which we shall pay special attention.

How many revolutions will a movable wheel make rolling *around* a fixed wheel? Around is the word that governs the answer, and signifies moving in a circle. Every circle has a center—no matter if it is only imaginary—and for the benefit of my many friends, I have provided the lever with a convenient handle to the center of the fixed wheel, so they can all take hold and roll the movable wheel once around the fixed wheel, and then they will be able to decide by carefully watching the change of position of the pointer, how many times the movable wheel turns on its own axis. I am for "one." L. J. COHOON.

Whitesville, Ind.

MESSRS. EDITORS:—I would like to ask you just "one" question about the "two" wheel problem. If you should slide (not revolve) the movable wheel entirely around the fixed wheel, would the movable wheel make a revolution, or any part of a revolution, upon its axis?

What a tempest you have raised upon this subject. The old and the young are in a jangle over it. The unmarried of uncertain ages still adhere to "one." The pretty young ladies declare they *must* be "won." Under your lead the "ones" have it. Their hope is in *you*, and, like Sumner, their cry is, "Stick," that "one"-ders may not cease.

Woburn, Mass. R. W. P.

MESSRS. EDITORS:—We have tried the wheel experiment repeatedly, looked at it in every possible light, and have finally come to the conclusion that you are right. This is the universal verdict of many persons here. To the superficial observer it would appear to make two revolutions, but upon trial I can readily see that the movable wheel makes but one revolution on its own axis, and one revolution around the center of the fixed wheel. T. D.

Mt. Lebanon, N. Y.

Bringing the Wheel Question to a practical issue:

MESSRS. EDITORS:—I have always held that a movable wheel makes but one revolution *on its own axis* in rolling once around a fixed wheel of the same size. I have borne the assaults and researches of the "two revolution" party with commendable patience. I have been kept out of bed until two o'clock in the morning quietly answering objections. My plate has been revolved until my pork and beans were cold. My biscuits have come to table lined and figured, evidently with a piece of burnt wood. Bridget has complained of a mysterious disappearance of sauce-pan lids. My sulky wheels have several times been removed. Yesterday, however, my equable temper broke down, when one of the "two revolutionists" brought the *moon* into the discussion. Now I take notice that when one calls the moon to his assistance he is in a bad case. For example, when a man tries to convince me that the moon is made of green cheese, he is a fool, or takes me for one. The old woman, who tried to dissuade her son from Sabbath breaking by citing the shocking example and punishment of the "Man in the Moon," was at fault both in religion and science. Messrs. Editors, that old woman is not dead yet. In short, I am a plain, matter-of-fact man, and consider all those kinds of celestial appeals, come they from professor or pedler, as mere moonshine.

This question can be brought to a practical issue: If a *whole* wheel makes *two* revolutions in rolling once around a fixed wheel of the same size, a *half* wheel must make *one whole* revolution in rolling half way around a fixed wheel of equal diameter. A corduroy road and a wheel-barrow having but a half wheel, will furnish the apparatus to try this on. See sketch, which explains itself.

Anyone wishing to try the experiment may address

JOB STUBBS.

Practical Lodge, Western Wilderness.

Fig. 21.

WHEELER—"*Two* Revolutions, or *One?*"
WHEELEE—"*Oh! ONE!*"

The Saline Springs of Onondaga, N. Y.

The brine from these springs results from water penetrating immense subterranean deposits of rock salt, made by the natural evaporations of salt water lakes, like the Great Salt Lake, Caspian Sea, etc., which lakes existed in geological periods millions of years ago, the basins forming them being afterward covered up by later deposits. They belong all to the upper silurian era, and are at such great depths that they are perhaps inaccessible to man, but the way the salt is obtained there is so economical that it is far superior to the quarrying done in dry salt mines; it is simply pumped up in solution through comparatively narrow and inexpensive tubes. When we take in consideration that most of the natural rock salt has to be dissolved, filtered, and recrystallized, we see here that nature has done the dissolving and filtering, in fact the brine in Syracuse is so clear that a simple evaporation, either by fire or solar heat, is sufficient to produce a superior article of table salt.

The state owns the springs, pumps up the water, chiefly by the water power of that part of the Erie canal passing through Syracuse, and sells the brine to the manufacturers of the salt. The total quantity of salt obtained in Onondaga county since 1797 is not less than 200,000,000 bushels, half of which was obtained during the last fifteen years. Each bushel contains 56 pounds of salt. Taking now in consideration that one cubic foot of solid salt weighs 140 pounds, 15 cubic feet make a tun. The amount of salt, therefore, removed during the seventy years that the springs have been in operation amounts to 5,000,000 tuns or 80,000,000 cubic feet of solid salt. This would form a single excavation in the earth of about 450 feet long, wide, and high; but the salt is not all removed in one breadth and the excavations are certainly distributed irregularly, over a large extent of subterranean territory. As the brine contains about 15 per cent of salt, it took seven times that amount of water to dissolve it; 560,000,000 cubic feet or 5,000,000,000 gallons of water have therefore all been evaporated by the heat applied during seventy years, and probably more, as the brines formerly used were not so strong by far as those obtained later by boring to a greater depth.

Editorial Summary.

GREEK FIRE.—In anticipation of further Fenian demonstrations, a memorandum relative to the treatment of nitroglycerin and Greek fire has been issued in England by order of the Home Secretary. Of the former explosive, the simplest mode of disposal recommended is to sink the containing vessels in deep water without attempting to open them. True Greek fire, it says, is simply a solid, highly-combustible composition, consisting of sulphur and phosphorus dissolved in the bi-sulphide of carbon, to which occasionally some mineral oil is added, with the view of increasing its incendiary powers. When the liquid is thrown on any surface exposed to the air, the solvent evaporates, leaving a film of the phosphorus or sulphide of phosphorus, which then inflames spontaneously. The proper mode of extinguishing such a fire is to throw damp sand, ashes, sawdust, lime, or any powder, wet sacking or carpeting, in short, any material which will exclude the air from the fire. No attempt should be made to remove the covering for some time after the flame has been extinguished. The place should afterward be thoroughly washed by a powerful jet of water forced upon it.

CONCERNING FROZEN POTATOES.—Dr. Adolph Ott, a frequent contributor to these columns, has been examining frozen potatoes for the purpose of confirming or disproving the truth of the common theory that the sweet principle of frozen potatoes is due to the conversion of starch into sugar. After a long series of experiments he concluded that this sweet principle was caused, during the freezing and thawing, by the sap bursting the cell and thus destroying vitality; at the same time decomposition sets in, which, though retarded by the cold, is not entirely arrested; the more so as at the season most likely to freeze, and especially during a snow storm, there abounds that powerful oxidizing agent, ozone. The outer portions, no doubt, are first attacked by it, and may thus be transformed into diastase, a body possessing the power of converting a comparatively large quantity of starch first into dextrine, and then, at the temperature of 140° to 170° as in the process of cooking, into sugar.

OBSERVING THE BESSEMER CONVERTER FLAME.—At the Atlas Steel Works, Glasgow, a very neat contrivance has for some time been used for enabling the observer to determine the point when the combustion of the carbon is completed. A square thin frame contains a combination of colored glasses, for instance, one dark yellow and two blue, or any other colors giving together a very dark neutral tint. Looking at the flame through these glasses affords the double advantage of preserving the eye from unpleasant effects of the intense light, and of making all smoke and other disturbing changes invisible. The flame, when thus viewed, looks white so long as the intense brilliancy due to the burning up of the carbon continues, but changes to a deep red at the moment all the latter has been consumed.

UTILIZATION OF SPONGY CELLULOSE.—In the process of making paper from wood, as practiced in Europe, round disks of wood are first subjected to the action of hydrochloric acid to dissolve out the spungy cellulose. This latter has, until lately, been a waste product, but is now converted into alcohol in this way: The wood is boiled for twelve hours in hydrochloric acid, diluted with ten times its volume of water. The acid liquid, which is charged with grape sugar formed from the spongy cellulose, is then withdrawn, the excess of acid saturated with lime or chalk, and a small quantity of yeast is added, the temperature being kept at about 68° Fah. Fermentation soon ensues, and when bubbles of carbonic acid gas are no longer evolved, the liquid is distilled to obtain the alcohol.

THE POISON OF RATTLESNAKES.—A Philadelphia physician, Dr. S. W. Mitchell, has been experimenting upon the venom of rattlesnakes, and concludes that there is no antidote to the poison, the remedies usually applied being nearly or entirely useless. Carbolic acid applied externally sometimes delays the result merely by affecting the local circulation. He has also confirmed the general belief that the poison is absolutely innocuous when swallowed, it being incapable of passing through the mucous surfaces; also that it is so altered during digestion that it enters the blood as a harmless substance. The venom is not injurious to the rattlesnake itself or to any other of its own species. The doctor attaches considerable value to large doses of alcoholic liquors, especially where the patient was not intoxicated at the time of being bitten.

SMOKE FROM GAS LIGHTS is not usually occasioned by impurity in the gas, but the evil arises either from the flame being raised so high that some of its forked points give out smoke, or more frequently from a careless mode in lighting. When we suddenly open the stop cock and allow a stream of gas to escape before applying the match, a strong puff follows the lighting and a cloud of black smoke rises to the ceiling. Daily repetition gives in time a blackened wall.

GARDINER, in his "Music of Nature," asserts that dogs in a state of nature never bark—they simply whine, howl, and growl. The Australian dog never barks, and Columbus found that the dogs he had previously carried to America had lost their propensity for barking. This peculiar explosive seems to be an acquired faculty, which the animal derives from his associations with man.

TIERS-ARGENT.—This beautiful white alloy, first made by Taloureau, consists of two thirds of aluminum and one third silver. It is now made perfectly homogeneous, and is easily fabricated. Its hardness and lightness are valuable qualities in table furniture. Spoons, forks, goblets, and salvers made of this material are rapidly coming into use in Paris.

LEUWENHOCK has computed that 100 single threads of a full grown spider do not equal the diameter of the hair of the beard, and when the young spiders begin to spin, 400 of them are not larger than one of a full growth, consequently 4,000,000 of a young spider,s threads are about the size of a single hair of a man's beard.

M. SALVERTE, in his work on the occult sciences, shows the probability that the ancients defended their buildings from lightning by conductors, and that the Temple of Solomon was thus protected.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

A bill to incorporate the Idaho, Oregon and Puget Sound Railroad Company has been introduced in Congress, petitioning for power to build a railroad from a point on the Union Pacific 113° 30′ west longitude, north to Snake river valley, thence northwesterly to Columbia river valley, thence to Portland, Oregon, and finally to Puget Sound. The company ask for every alternate section of public non-mineral lands to the amount of twenty alternate sections per mile on each side of the railroad line; also, United State bonds to the amount of $16,000 and $32,000 per mile for level and mountain routes respectively. A branch road is to extend to Montana.

One of the furnaces of the Crane Iron Company, at Catasauqua, Pa., lately turned out two hundred and forty tuns of iron in one week; a yield scarcely ever equalled in this or any other country.

The only coal mines which last year were worked within the limits of the Pacific territory, were those of Bellingham Bay and Monte Diablo, while the amount extracted was but 8,816 tuns from the former, and 71,322 from the latter, making a total of 80,138 tuns, against a product during the preceding year of 90,000 tuns. At the Monte Diablo mines increased facilities for transportation to tide water have been created by the construction of railroads, and it is expected that the beneficial results of these improvements will be felt another year.

A well of naphtha has been discovered at Kudaca, in the Caucasus, by boring. The liquid was first struck at a depth of 274 feet from the surface, and the yield for several weeks was at the rate of 1,500 barrels a day. Since then a fresh source has been met and a jet of naphtha, four inches in diameter, rises with great force to the hight of forty feet above the ground, affording a supply of 3,000 barrels daily.

The famous Thames tunnel, which for the twenty-five years since its completion has proved an indifferent speculation, is at last to be made of some practical use. It is stated that two railroads on opposite sides of the river propose forming a junction by means of this subaqueous passage-way, and will make gradual entrances a mile distant from either bank. The original cost of the tunnel was over $2,000,000. It was sold a few years ago for one half that amount, and even at this sacrifice the purchasers have found it to be a very unfortunate investment, the receipts, principally tolls from foot passengers drawn thither by curiosity, averaging but $125 per week, which have been entirely consumed by expenses. Under the railway management, the tunnel may possibly become a pecuniary success.

The manufacture of salt commenced in the United States at Syracuse, in the year 1797, since which time this locality has produced eighty millions of bushels. Last year's yield amounted to 10,000,000 pounds, or about two thirds of all the salt consumed in this country. A correspondent writes that salt of excellent quality is manufactured in Oneida county, Idaho Territory.

The citizens of Minneapolis are very much concerned over the unpleasant fact that the Falls of St. Anthony are receding up stream at the rate of three hundred feet per year. All efforts to prevent this stampede of the rapids, by protecting the ledge, have proved insufficient, and the inhabitants are fearing the total destruction of the water power upon which their prosperity depends, and the consequent degeneration of the city to the rank of a mere village.

The iron and steel works at Birmingham, Conn., used 4,000 tuns of scrap last year, making 3,500 tuns of finished iron, 350 tuns of imported steel in carriage and truck springs, and made 1,000 tuns of iron into axles of all grades and styles.

MM. Carver & Co., of St. Eteinne, France, have successfully utilized the gases given off in converting bituminous coal into coke. These gases are collected, drawn off into pipes, and cooled. From the liquids, condensed benzine, naphtha, sulphate of ammonia, and several dyestuffs are made; the uncondensed gas is used for illuminating purposes.

An establishment in Vienna manufactures knives from tungstenstegel, which are so hard as to cut glass like the diamond.

A singular gas explosion in an oil well is reported in the Titusville *Herald*, the like of which, it says, has never been known in the oil regions. While drilling an oil well, near Enterprise, the tools broke through the second sand rock into a crevice where an immense quantity of gas had collected. Thus liberated, the gas rushed out with a loud rumbling sound, tearing out the driving pipe and throwing it upward into the derrick. A loud explosion ensued on the gas becoming ignited from the fire in the engine, and the derrick and engine house were both destroyed.

The manufacture of starch from potatoes is extensively carried on in the Northern and Eastern States. A single firmin New England consumed 25,000 bushels of potatoes for this purpose in 1867.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

WATCHES.—George Frederick Roskopf, Chaux de Fonds, Switzerland.—This invention relates to an improvement in the construction of watches, which consists in having that portion of the mechanism of a watch known as the "escapement," fitted or attached to a plate or frame separate from the frame in which the "train" or other portion of the movement is fitted, the plate or frame to which the escapement is fitted being attached to the frame of the train in such a manner that it may be readily detached when necessary, and any of the known escapements, on a similar detachable plate or frame fitted or applied to the other portion of the movement. It also consists in constructing the detachable plate in such a manner, or arranging the several parts comprising the escapement on said plate in such a way that the 'scape wheel may be readily adjusted in a proper relative position with the pallets or other part or parts which work in contact with the teeth of the 'scape wheel, the detachable plate being secured to or in the frame which contains the train, or part of the watch movement, in such a manner that it may be adjusted so that the pinion on the 'scape wheel axle may always be adjusted properly in gear with the wheel of the train in which it is designed to work.

MANUFACTURE OF HATS, CAPS, BONNETS, NECKTIES, AND RIBBONS.—Treflé Garceau and Edward de la Granja, Boston, Mass.—This invention consists in combining paper pulp, india rubber, and paraffine in certain proportions, and thereby forming a composition peculiarly adapted to the manufacture of hats, caps, bonnets, neckties, ribbons, and other similar articles.

CULTIVATOR TOOTH.—M. F. Lowth and T. J. Howe, Owatonna, Minn.—In this invention the tooth is hinged, and provided with a brace, by which the angle of the tooth with the ground can be regulated, and which also operates to prevent the breaking of the tooth or beam by obstacles in the way of the cultivator.

ANIMAL TRAP.—Major B. Marshall, Draw Bridge, Md.—This improved trap is designed particularly to catch animals that travel in paths or leads, and the invention consists in so constructing it that it can be more easily sprung, and will more effectually secure the animal than will the traps hitherto in use.

FLUID METER.—Leicester Allen, N Y city.—In this invention a piston is balanced by a spring in such a manner that the piston, actuated by the flow of the water, will open a valve and give free passage to the water as long as there is no back flow, and when there is any back action will close, or partially close the valve and stop the flow. A registering apparatus records the amount that has passed through the valve.

COTTON SEED PLANTER.—A. J. Going, M. D., Clinton, La.—This invention relates to a machine for planting cotton seed, and consists in a peculiar construction and arrangement of parts pertaining to the seed-distributing apparatus, whereby the seed may be sown with certainty and without the liability of the hopper becoming choked or clogged. It also consists in using in combination with the seed distributing apparatus above alluded to a furrow opener and seed-covering device.

HOLDER FOR RAZOR STROPS.—George Scott, Steubenville, Ohio.—This invention relates to a holder for razor strops, and to the manner of securing the strop thereto, and consists in making the holder of a metallic spring band, curved or bent in the direction of its length, within the strop, extended between its two ends and there secured, at its full tension or thereabouts, and also in so bending the ends to the band that the strop can be secured thereto without the use of rivets or any additional fastening devices of any nature.

KNITTING MACHINE.—Henry Bogel, Watertown, Wis.—This invention relates to a knitting machine for making plain knit fabrics of any number of stitches. It is of very simple construction, works almost without any noise, and can be easily taken apart for the purpose of removing or replacing needles, and for repairing and cleaning the whole machine. Two sets of needles, each working independently of the other, are arranged in the machine, of which both or either one may be operated at a time, and thus one or two pieces of fabric may be knit at once.

WIND WHEEL.—Wm. C. Day, Mohawk, N. Y., and P. B. Day, Shelby, Mich. This invention relates to a wind wheel of that class in which vertical wings or sails are employed, and the wheel enclosed within a box provided with doors, by opening or closing which more or less wind is admitted to the wheel, and the speed of the same regulated as desired, and by closing the doors the motion of the wheel entirely stopped. The invention consists in the application to the doors of the box which encloses the wheel, of a chain or cord connected with a windlass, and arranged in such a manner that by operating the windlass all the doors of the box may be opened and closed simultaneously, and the wheel kept running at a uniform speed, or stopped entirely, when required, with the greatest facility.

SUBSOIL ATTACHMENT FOR PLOWS.—Charles Hayden, Collinsville, Conn.—This invention relates to a mode of attaching a subsoil plow or share to an ordinary plow, whereby the share may be adjusted, raised, or lowered, with far greater facility than hitherto,—readily detached when not required for use, so that the plow to which it is applied may be used as an ordinary plow, be simple in construction and capable of being manufactured at a small cost, and be of light or easy draft.

FOLDING BOW DISH FOR SPRING BALANCES.—Richard Murdock, Baltimore, Md.—In this invention the dish or platform upon which the articles are placed to be weighed by a spring balance is supported at its four corners by arms bowed or curved outward and so arranged that they can be readily fixed in position or not, and when not in use, can be folded together upon the dish so as to occupy but little room.

FRAME FOR HOP VINES.—Abram Shoemaker and Wallace Phelps, Conesville, N. Y.—This invention relates to a useful improvement in the construction and arrangement of frames for training hop vines.

HOP PICKING TOOL.—John Dean, Baraboo, Wis.—This invention relates to a new device for picking hops from the pole, and consists in the use of a rake with curved tines and with cutters at the ends which serve to cut the vines as the tool is drawn along the pole.

HYDRANT FIRE PLUG.—T. R. Bailey, Jr., Lockport, N. Y.—This invention relates to a method of constructing fire plugs or hydrants, and the invention consists in operating a cylinder valve in a suitable case and in the arrangement and combination of parts connected therewith.

MACHINE FOR COILING SPRINGS.—John Freeland and Daniel Ward, New York city.—This invention relates to a machine for coiling patent volute and other similar springs while hot, and consists in a frame constructed with head and tail blocks like a turning lathe having suitable driving gear and an adjustable spindle or mandrill around which the spring is coiled.

BRIDGE.—Frederick H. Smith, Baltimore, Md.—This invention has for its object to improve the construction of bridges so that any desired part of the bottom chord can be readily adjusted to tighten or loosen any desired part of the bridge or to allow any desired part of the woodwork to be removed and replaced.

ANGULAR SHAFT COUPLING. John M. Case, Athens, Ohio.—This invention has for its object to furnish an improved coupling or gearing for connecting shafts to each other at any desired angle which shall be so constructed and arranged as to securely couple the shafts, run with less noise, and with less friction than the ordinary bevel gearing, and which shall at the same time require less material for its construction.