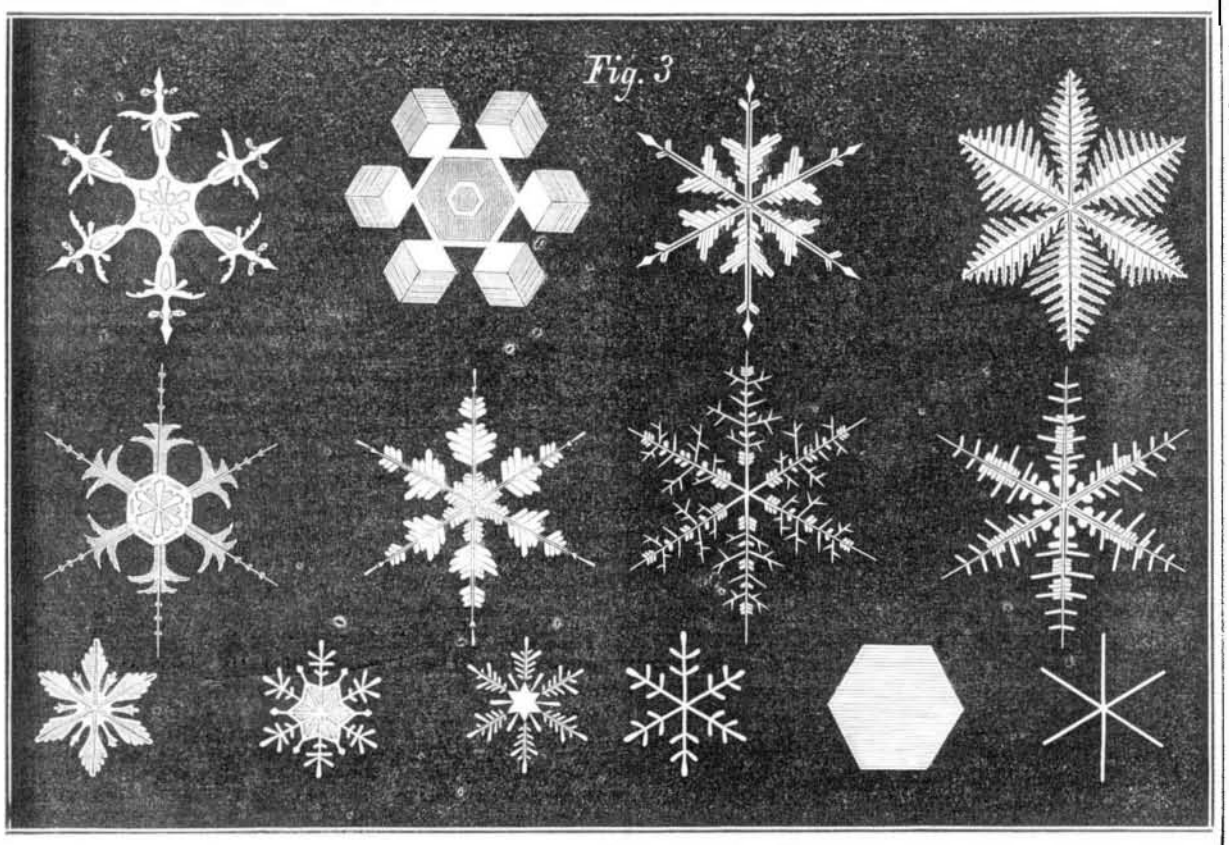
These clouds may fall as rain, but as I have said, they may also fall as snow. I suppose that snow is such a familiar thing to every boy and girl here present, that it may seem to be hardly worth thinking about; but still this substance is one of the most wonderful and beautiful things in the whole world; and when snow is formed in a very still atmosphere, as I have often had the pleasure of seeing it formed in the Alps, it takes the form of those beautiful figures which are represented in the diagram yonder. (Fig. 3.)



It forms as small, six-rayed stars. This is the form of the snow which goes on loading the Alpine mountains year after year; and when we look at these mountains, and at the valleys connected with them, we find that the most wonderful series of appearances presents itself. On very closely observing the snow upon the Alpine slopes, we find that it is in a state of motion. We find that the snow has been incessantly moving down the Alpine slopes into the valleys; and hence we have the valleys filled with rivers of ice. On standing for the first time beside one of these rivers of ice, you would imagine that it was perfectly motionless, and that a body so rigid as ice could not move at all; but when you make proper observations, you find that the ice is perpetually moving down, and thus we have these glaciers of the Alps. I have no doubt that every boy here will one day visit those glaciers for himself. I have here a sketch of one of the most famous of those glaciers. It is called the "Mer de Glace," and is situated near Chamounix. This Mer de Glace has its great feeders from the snows that fall upon Mont Blanc and the series of mountains which are rudely sketched in this diagram. Here is a great cascade where the snow, after being half consolidated—squeezed together so as to form ice—actually moves down, forming a cascade of ice which comes along this valley. Here is another basin where the snows collect, and where its particles are squeezed into ice, and you have this ice also always in a state of motion.

Now let us look at the lines which I have drawn on the diagram. The mountains beside the glaciers are always sending down stones and dirt, and consequently you always have lines of dirt carried down; and you see that where two glaciers have their sides turning and uniting as here shown, they form a line along the middle of the trunk of the glacier. Now these lines which I have mentioned are called *moraines*. Those at the side are called *lateral moraines*, and those in the middle are called *medial moraines*. We have in the Mer de Glace these three moraines. If we examine this glacier we find that notwithstanding the rigidity of ice it moves down like a river. Eminent men have worked at this subject; Saussure worked at it a little, not much, and was followed by Bordier, who observed that ice behaved almost like a viscous body. He was the first to propound the fact that ice was of this character. He was followed by Rendu, who also took up the idea that ice behaved like a viscous body, such as honey, treacle, or tar, or paste. Then he was followed by Mr. Agassiz, and another, and they determined the velocity with which this ice falls. Then came Principal Forbes, an eminent Scotchman, and his measurements pushed the question far beyond its former stage. And then came Mr. Huxley and myself; and we pushed the matter a little forward; and afterwards I did a little on my own account in reference to this question. It is in this way that scientific knowledge is accumulated. It goes rolling on and becoming bigger like a snow-ball, and thus it is that science grows and has grown to what it is at the present day.

A Transcript from Old Records.

From "Morse's Gazetteer," published in 1797, we take the following relating to New York city:

"The city was incorporated in 1696. It is two miles in length and one mile in breadth. Its population in 1756 was 11,000; in 1771, 22,000; in 1786, 24,000; in 1796, 70,000.

"From the gallery in front of Federal Hall, at the head of Broad street, George Washington took the oath of office as President of the United States, April 30, 1789.

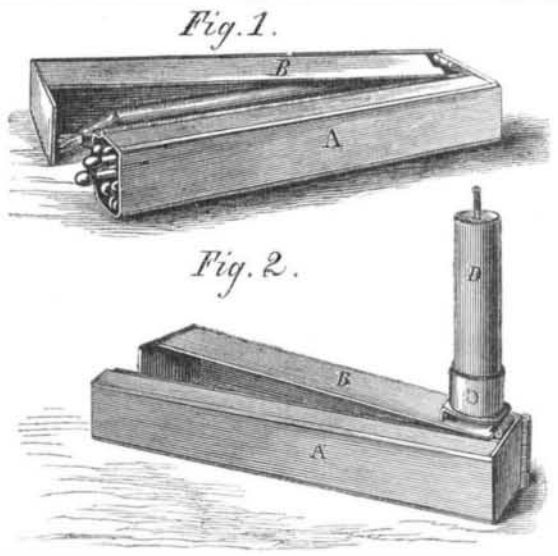
"The supply of water is insufficient, and many of the inhabitants are provided from a well at the head of Queen street, from which the quantity of 110 hogsheads, or 14,400 gallons is daily drawn, and on some hot days the amount of 216 hogsheads. The well is but 20 feet in depth, and holds but three feet of water, which is sold at three pence per hogshead."

From the same work, under the head of "Mingo Town," Pa.: "In this vicinity are some springs which yield 'Petrel,' a bituminous fluid." [The "coal oil" which so universally dispels the darkness of 1868.—ED. SC. AM.]

And from the same work, under the head of "Territory"—relating to the Northwest Territory of the United States—is taken the following prediction, made eleven years previously to the passage of Robert Fulton up the Hudson river in a steamboat: "It is probable that steamboats will be found to do infinite service in all our extensive river navigation."

WHIPPLE'S COMBINED TAPER HOLDER AND MATCH SAFE.

The object of this invention is to furnish a ready means of providing a light on occasions when an ordinary lamp might not be accessible or convenient to carry about. For this purpose the little device shown in the engravings is admirably adapted, being neat, handy, and so small as to be readily carried in the vest pocket. Larger sizes for ordinary candles



are also made. It will prove of great advantage to parties camping out, to mechanics at work in dark places, hunters, frontier's men, and convenient for Christmas tapers. It was patented in the United States, May 28, 1867, by John A. Whipple, 297 Washington street, Boston, Mass. It is also the subject of several foreign patents.

The case proper is in two parts, hinged, and formed of sheet metal. One compartment, A, is the match receptacle; and the other, B, a case or box for its reception. Hinged to the end of the match safe is a socket, C, for holding an ordinary candle or a miniature candle, or taper, D. When closed the contrivance is simply a rectangular box, being, for the small size, about three quarters of an inch square by three-and-a-half inches long. When opened the taper and its socket stands on one end of the case, and the case is a handle and standard for the light.

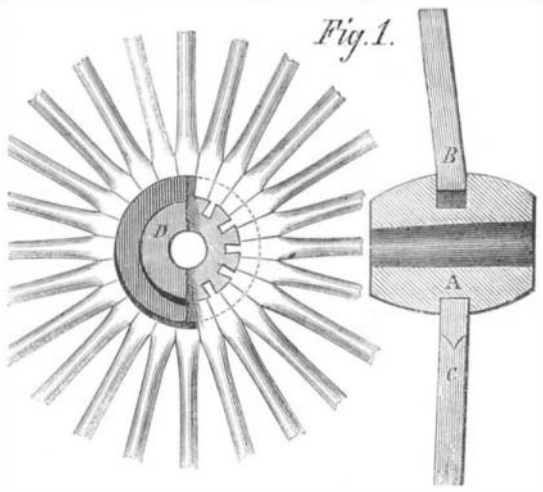
The foregoing is sufficient to give the reader a correct idea of this eminently handy and useful device. All orders and other communications should be addressed to the patentee, as above.

ANY subscriber who fails to get his paper regularly or has not received all the numbers of this volume is desired to inform the publishers by mail; missing numbers will be supplied.

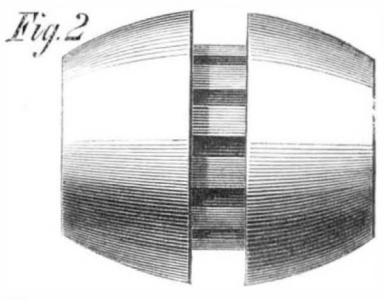
SAWYER'S PATENT CARRIAGE WHEEL.

One great difficulty experienced by carriage makers in constructing a strong and elegant wheel is the necessity of cutting away in mortises so large a proportion of the hub as to greatly weaken this important and central part. The design of the improvement shown in the engraving is to retain the largest number of spokes in a wheel, while the hub shall not be weakened by cutting away the most of its interior in mortising.

In this invention only every alternate spoke is mortised, the others, or supplementary spokes, acting as keys or wedges, yet being firmly held in place by their contact with the other spokes, and with the shoulders or rims on the hub. The hub has a circumferential groove—Fig. 2—turned in it of sufficient width and depth to receive the ends of the supplemental spokes. At the bottom of this groove the mortises for the true spokes are cut, which are seated in the usual manner, they, with the auxiliary spokes, making a solid continuation of the wheel hub, the whole being thus securely locked and fastened.



A, in the engraving, Fig. 1, is a section of the hub. B, a



section of the true spoke showing the tenon, and C, the supplementary spoke, seated in the circumferential recess. The figure marked D, shows the wheel as constructed, the dotted lines on one side denoting the periphery of the hub.

Instead of cutting a score or recess in the hub, it may be made quite small, and two strong bands or flanges of iron or other metal may be shrunk on, or otherwise secured to the hub, their inner surfaces forming the recess or groove which will secure the spokes firmly in place. By means of these bands, wheels already in use may be strengthened by the introduction of supplementary spokes, without diminishing the strength of the hub by increasing the number of mortises. This device applies to wheels, the hubs, spokes, and fellies of which may be made of metal, as well as those which are composed of wood.

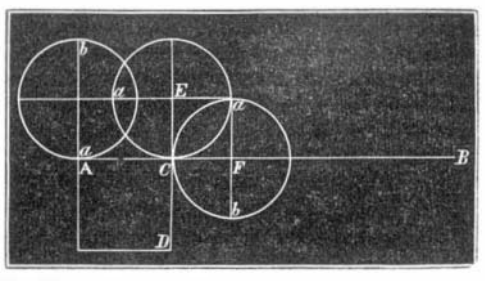
Practical wheelwrights, and others, will readily see the advantages of this mode of constructing wheels. It was patented through the Scientific American Patent Agency, Oct. 22, 1867, by W. T. Sawyer, Whistler, Mobile Co., Ala., whom address for further information.

THE MOVABLE WHEEL QUESTION.

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

We are in continued receipt of many communications upon the subject, but are obliged this week to curtail our selections. We shall return to the subject next week.

MESSRS EDITORS:—You say that a wheel in revolving around a fixed wheel of the same size makes but one revolution on its axis. You say that L. M., by the diagram given, proves himself wrong. I beg leave to disagree with you, and think the following sketch will make it appear that the wheel does make two revolutions:



If the line, A B, is equal to the circumference of the wheel in revolving from A to B, the wheel will make one revolution, but if A B be bent into a square then the wheel will make two revolutions in passing round it.

Suppose the wheel starts at A, in going from A to C, one-fourth of the distance, A B, the wheel would make one-fourth of a revolution; now before the wheel can advance on the line

C D, the point at C must remain stationary while the center, E, moves round to the point, F, making another quarter of a revolution. One half a revolution is made on one side of the square, or rather one side and at one angle. If the square be changed into a polygon of an infinite number of sides, or a circle, the case will not be changed. A. C. SEKELL.

Boston, Mass.

As the rolling wheel, in making one revolution upon its own axis, moves over a distance equal to its circumference, which is designated A B by the above correspondent, the distance traversed by the wheel in making a revolution upon its own axis will be the same whether the path traversed be curved or rectilinear. If the wheel made two revolutions upon its axis, the distance traversed by it would be twice A B.

MESSRS. EDITORS:—Allow me to give my theory of the solution of the question of "How many revolutions will a wheel make on its own axis in going once round a fixed wheel of the same size?" I do not profess to be much of a mechanic but I think I have the solution. I took two ordinary cotton spools and put a shaft through one of them, then marked both the spools off into quadrants. I also marked the end of the axis, then held the axis firm and rolled that spool round the other one. I found, by observing the marks on the end of the axis and also the marks on the face of the spools, that there were *apparently* two revolutions on the axis, while there was only one on the circumference, and then by a little consideration I found that the axis itself had made one revolution in an opposite direction from the spool, because in going all round it had presented all its sides to the surface of the fixed wheel, thus making the two *apparent* revolutions while in reality there was only one revolution of the wheel. This is easily undertood when it is considered that the circle the axis describes in going round the fixed wheel is just twice as large as the surface of the fixed wheel, consequently it is necessary that it should show two revolutions while in reality making only one. J. B.

Philadelphia, Pa.

Advice to Young Mechanics.

In referring to the growing inclination on the part of young men, after they have served long and hard apprenticeships to acquire a good trade, to abandon that mode of making a living and to enter the legal or medical profession, where it is supposed greater emoluments can be secured and larger honors won, a cotemporary well observes that nineteen cases out of twenty such ventures are failnres, for two reasons. First, the professions require peculiar talent and the most thorough education. As a rule, apprentices to the trades have neither the time nor the means to acquire this education. Hence, when a mechanic at the end of his apprenticeship aspires to and enters any one of the professions he does so at a great disadvantage. He may be a fluent speaker, know how to argue a point in a debating society or harangue a crowd at a ward meeting, but such talents do not fit him for the legal profession. He may know how to extract a splinter from his own hand, how to make a salve, how to mix a powder or administer a pill, but all this, while it might qualify him as a good nurse, does not fit him for the medical profession. The fact is, the young men who abandon their trades are tempted to do so by a feeling of false pride, erroneously imagining there is no honor to be secured in a pursuit of the mechanical arts. History proves the fallacy of such suppositions.

The brightest names which now adorn the annals of all countries are of the best mechanics who have blessed mankind with the productions of their genius. All that is beauiful and grand is the result of improvement in mechanics. The pendulum, the main-spring, the barometer, thermometer, printing press, steam engine, locomotive, sewing machine, telescope—all, all are the result of mechanics' arts, making those famous who produced them, and the people great who adopted them.

A good mechanic who becomes a pettifogger or quack, merely because he is too proud to work at his trade, is, indeed, a pitiful object. A man of the right mental balance, who has proper mental form, with the necessary independence, will win as much honor and as fair a living in the trades as in the professions; indeed an indifferent lawyer or doctor lacking briefs or patients, is always a miserable being, a bad example in the community. Let our young mechanics, then, become ambitious in their own peculiar vocations. If they dignify their trades by becoming proficient therein, the trades will dignify them with the highest honors. If mechanics pursue their business with a purpose to self-improvement therein, and not merely to hammer and file and saw, but to improve the art, to develope something new therein, the mind will be strengthened as the arm becomes muscular, and the heart of the mechanic will be made to swell with as true a pride as ever glowed beneath the doublet of a prince. Will the young mechanic think of these truths?

Walking and its Uses.

Dr. A. L. Wood, in the *Herald of Health*, gives the following sensible advice on walking.

Exercise is absolutely indispensable to the physical well-being of man, and walking is one of the most useful of the various modes of exercise. As a people we ride too much and walk too little. If we are in the country, and have a mile or two to go, we wait—perhaps long enough to walk the entire distance—for a horse to be got ready, and then sit lazily in our seats while this noble animal rapidly carries us to our destination. If we are in the city, and have a few blocks to go, we get into an omnibus or a horse car and sit our journey out, just as though we were not created with legs the same as horses are. The nation's legs are rapidly diminishing in size for the want of exercise, hence the demand for false calves and for easier modes of locomotion is on the increase; so, also, is dyspepsia, liver complaint, general debility, and other physical derangements, which result, in great part at least, from a lack of muscular action.

The special advantages of walking, as an exercise, are many. Perhaps the most important is that it takes us out of doors, and keeps us there in the pure air and the bright sunshine. The exercise, which is gentle and prolonged, increases not only the frequency but the fulness of respiration, thus bringing a much larger quantity of oxygen into the lungs and through them, to the blood, thereby giving the finishing touch to the process of digestion and vitalizing "the red current of life." Another advantage to respiration is this: when a person is sitting or standing still, the exhaled air from the lungs, which is unfit to be breathed again, fills the space about the face, and a portion of it is taken into the lungs at the next breath; especially is this the case if the head is bent forward; but when a person is walking and expels the air from his lungs, his head is carried past the expired air before he draws in another breath, and thus he gets a supply of pure air, with its full proportion of oxygen, at every inspiration, and thus is the vigor and vivacity which results from exercise in the open air partially accounted for. Walking is very beneficial to the digestive organs, by the gentle yet constant motion which it imparts to them, and which is essential to their long-continued, healthful action. It brings into action and properly develops more muscles than any other one mode of exercise. It tends to equalize the circulation of the blood. Pedestrians, rope-dancers, and those who exercise their legs a great deal are not troubled with that almost universal complaint—cold feet. The simple reason is that exercise calls the blood to the parts exercised, and the blood feeds and warms.

One great objection to walking is that it takes so much time. True, it takes some time; more, as a general thing, than it does to ride; but so does the accomplishment of any thing desirable; and is not good health desirable? In the end, however, it results in the saving of time, by preserving the health and increasing the vigor of all the physical and mental functions. In no way is there so much time wasted, to say nothing of vitality, as in being sick, and yet people are unwilling to give a little time to keeping well.

To obtain the greatest amount of good from walking, it must, like every thing else, be done right. In the first place, it is always best to have some definite object in view when going out to walk, some particular place or object of interest to see, some purpose to accomplish, or some friend to visit, and not walk merely for the purpose of walking, if any other object can be attained at the same time. But better walk without any other object than not walk at all. The position of the body while walking is of great importance. The body should incline slightly forward from the hips, if walking slowly, and the inclination should increase according to the rapidity of the walk. The head should be kept on a line with the body, the shoulders and hips held back, and the chest unimpeded in its action by tight clothing or otherwise. The arms should be allowed to swing freely at the side. The respiration should be carried on entirely through the nostrils, and not through the mouth. In commencing a long walk, walk slowly at first, and gradually increase the speed. Invalids, and persons who are unaccustomed to walking, should begin with short walks, being careful not to overdo, and increase the distance as their strength and endurance increase. Any one who will practise this precept—never ride when you can just as well walk—will not only be more vigorous and healthy, but will accomplish far more than he or she otherwise would.

Absorption of Gases by Solids.

Among the interesting observations of Mr. Graham, Master of the British Mint, upon the passage of liquids and gases through solids, is the fact that atmospheric air, by passing through india-rubber, becomes super-oxigenated, and will rekindle smoldering wood like pure oxygen. Any kind of light india-rubber receiver, in which a vacuum may be obtained, the size being sustained by mechanical means, will collect super-oxigenated air; the better if the india-rubber be thin and the temperature high. Mr. Graham makes the suggestion that the solid films pass gases through them by first condensing them to a liquid form within the substance, and then passing them off on the other side by evaporation. Hydrogen pases through red-hot platinum, while oxygen and nitrogen do not, or not in appreciable qualities; hence their compounds with hydrogen are readily dialyzed by this method. The passage of carbonic acid, chlorine, hydro-chloric acid, vapor of water, ammonia, coal gas, and hydro-sulphuric acid, is also inappreciable, while the hydrogen, in compounds containing it, passes. One volume of red hot platinum absorbed 0·207 volume of hydrogen, retained in while cold, and gave it off on reheating. One volume of palladium absorbed 643 volumes of hydrogen, sensibly increasing its weight, and when heated afterward, gave off the most of it in a continuous stream. On the other hand, osmium-iridium does not absorb hydrogen, and copper absorbs it very slightly. Gold absorbs hydrogen and nitrogen slightly. Silver absorbs 0·289 of its volume of hydrogen, and then presents a beautifully frosted appearance. Oxygen is taken up in the proportion of 0·745. Red-hot iron and steel pass hydrogen as readily as platinum does.

Notice to Correspondents.

In consequence of a derangement of water pipes our editorial rooms were flooded a few days ago and a large quantity of correspondence and MSS. destroyed. Correspondents who fail to receive a response to their communications will please write again.

Recent American and Foreign Patents.

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

LOOSE PULLEYS, GEAR WHEELS, ETC.—George M. Morris and John McCreary, Cohoes, N. Y.—This invention relates to a new manner of forming the recesses, channels, or grooves in the hubs of loose pulleys, gear or other wheels, or in the bushings fitted into their hubs.

BRUSH.—William W. Clark, New York city.—This invention consists in so forming brushes used for painting, varnishing, and other purposes, that the bristles which form the brush are rendered more elastic and the brush more durable than when they are put together in the ordinary manner.

SAW HOOD.—C. D. Blakeslee, Grand Rapids, Mich.—This iuvention relates to an improved saw hood and consists of an adju table guard on which the hood is hung of peculiar form protecting every part of the saw except where the lumber is fed to the saw.

CONSTRUCTING MOLASSES CUPS.—Griffen B. Halsted, New York city.—This iuvention consists in constructing the cup of tinned iron plates swaged or struck up int wo vertical equal parts or halves, the edges of the swaged parts being trimmed and then united together by soldering. The feet, knob, lid, and handle, being afterward applied or attached.

PAWL AND RATCHET ATTACHMENT FOR THE NUTS OF SCREW BOLTS.—D. Elliot and E. Seely, New York city.—This invention relates to a pawl and ratchet attachment for the nuts of screw bolts whereby the nuts are prevented from casually loosening or becoming unscrewed. The invention consists in a novel manner of constructing the pawl on the washer of the bolt and in forming the ratchet on the nut, whereby a very economical device for the purpose specified is obtained.

NAIL PLATE FEEDER.—Cyrus D. Hunt, Fair Haven, Mass.—This invention relates to a new and useful improvement in feeding apparatus for turning or reversing and feeding nail plates in a nail-cutting machine automatically.

BRACE FOR CARRIAGE HOODS.—Moses Powe, Belvedere, N. J.—This invention relates to the joint of the brace of carriage tops or hoods and consists of a rigid metallic sheath lapping on three sides of the joint when the hood is raised.

HAND TRUCK.—Wm. May, Binghamton, N. Y.—This invention relates to a hand truck which is so arranged that it can easily take hold of boxes, packages. etc., and that it can be readily handled.

PISTOL AIM HOLDER.—Fisher A. Spofford and Mathew G. Raffington, Columbus, Ohio.—This invention relates to a device for holding the aim during shooting practice with toy guns and pistols and for retaining the same when it has been hit, also for retaining the balls or marbles ejected from the guns or pistols.

MACHINE FOR FORMING SHEET-METAL MOLDINGS.—Valentine Fischer, New York city.—This invention relates to a new machine for pressing moldings for cornices, etc., from galvanized or other sheet metal and consists in so arranging the machine that but two kinds of dies for all kinds of smooth moldings that may have to be formed are needed, viz., rounded and square dies. Of the latter but one set is required for making all sorts of angles while of the rounded dies as many sets must be provided as there are different-sized curves to be represented in the moldings.

SKATE.—Alfred Woodham, New York city.—The present invention relates to the fastening of skates to the boot or shoe sole, and to that class of fastenings which sieze the boot or shoe sole upon its sides and heel; the invention consisting in a novel arrangement of such side clamps upon the foot rest of the skate and in their connection together at corresponding points upon each side of the skate whereby a fastening is produced of most simple form and in its construction practical and not liable to become disarranged or to break from use and wear.

SLIDING PEN HOLDER.—C. M. H. Warren, Brooklyn, N. Y.—This invention relates to a pen holder of that class in which the pen is allowed to slide so that its point may be protected in case of the dropping of the pen and holder upon the floor. The object of the invention is to obtain a very simple, economical and portable pen holder which will answer equally as well as the expensive telescopic holders now in very general use.

BUTTER WORKER.—Henry Garrett, Richmond, Mo.—This invention relates to a machine for working butter depriving it of butter-milk after taking it from the churn. The object of the invention is to obtain a simple and efficient device for the purpose and one which may be manipulated with the greatest facility.

CHERRY STONER.—Rufus Wright, Brooklyn, N. Y.—This invention relates to a machine for depriving cherries of their pits or stones, and it consists of a peculiar construction and arrangement of parts whereby the work may be done with great rapidity and in a perfect manner.

CARBURETTING MACHINE.—Iva Prichard, Terra Haute, Ind.—This invention is a simple and economical machine for the manufacture of illuminating gas from the volatile hydro-carbons.

PILE OINTMENT.—L. H. Mosely, Franklin, Tenn.—This invention is a compound which when properly applied works a speedy and infallible cure of the disease known as the piles.

RAILWAY SWITCH.—Joseph C. McCarty, Grafton, W. Va.—The object of this invention is to construct a switch by which the use of frogs can be avoided, and the cars be made to run always on a smooth, continuous track, and thereby to render the motion of the cars easier, and to save the wheels from wear.

CORN PLOW AND CULTIVATOR.—Isaiah B. Arthur, Sidonsburgh, Pa.—This cultivator is made with three handles, by which it can be more easily held and regulated. In connection with them, it has a new form of guards to protect the young corn from injury, and a new device for adjusting the instrument in width.

TOBACCO PIPE.—James Cook, West Groton, Mass.—This invention consists in placing and securing so as to be detachable at pleasure, within the bowl of the pipe, a cup or receptacle for the tobacco, that at its lower end is provided with a series of apertures for forming a communication between it and the stem, and with a space or chamber left around and between it and the interior of the bowl, whereby the stem cannot become clogged, and the smoke before passing to the mouth is cooled, as well as the tobacco kept dry and free from nicotine, as it is extracted by the smoking of the pipe.

GAS TORCH.—Wm. A. Lawton, New York city.—This invention relates to a method of constructing torches for the lighting of gas, whereby the alcohol or other fluid burned for that purpose is more economically expended.

VALVE.—Edward A. Rock, Ludlow, Vt.—This invention consists in arranging an open ring valve on the valve stem, which, when the valve is closed, shall be expanded by a stationary wedge in the valve seat.

TUNNEL EXCAVATOR.—Theodore A. Fisher and Anson F. Fisher.—This invention relates to a novel and useful method of constructing tunnels under water, and consists of an apparatus for boring and excavating the earth in the bottom of rivers, lakes, and other large bodies of water.

EYE GLASS.—J. K. McDonald, Newark, N. J.—This invention consists in the employment of soft rubber tubing for nose pieces, together with features of improvement.

BOOT ATTACHMENT.—Marvel M. Follett, Westboro, Mass.—This invention relates to a new and improved method of attaching the boot to the bodies of carriages, whereby they are rolled or wound up with more ease, and so as to occupy smaller space.

FILLING STEAM BOILERS.—E. Ferguson, Newbern, N. C.—This invention consists in attaching to the boiler a water supply pipe, which is provided with a suitable check valve, wherewith the boiler may be filled with water by the vacuum produced therein by the condensation of steam.

HARVESTER.—S. O. Bartow, Bethel, Conn.—This invention relates to a grain and grass harvester, and consists in an improved sickle-driving mechanism and an arrangement of the frame of the machine and gearing, whereby a very rapid motion of the sickle is obtained, and a clean, smooth cut of the same is obtained, with a moderate expenditure of power.