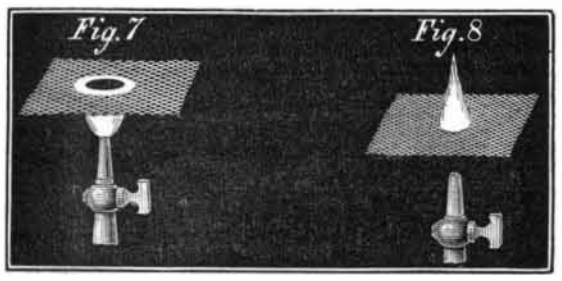
case, instead of having the heat transferred, as in liquids or gases, by the passage of hot masses through the remaining bulk, we have a transmission of heat from atom to atom of the copper; and this process, as I have said, is called *conduction* of heat, in contradistinction to the other process, which is called *convection*.

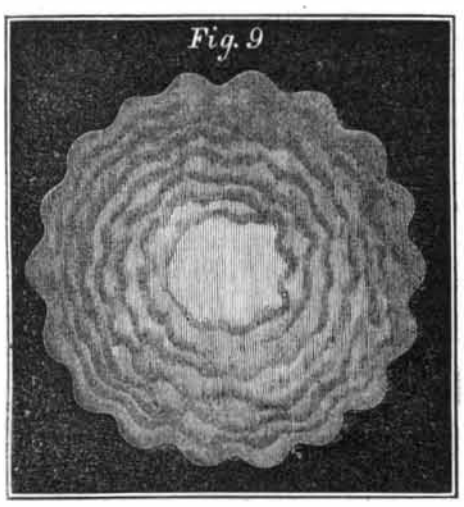
And now I have to go on to another subject of a somewhat different character; but in passing I must say a word upon a very useful piece of apparatus, the safety lamp, which, unfortunately, is not always wisely used. I will state the problem which the inventor of this simple, but very wonderful apparatus placed before him. You must know that in our coal mines the miners are prevented from using a candle to light them while at their work, in consequence of the quantity of gas which is in the airof the mines. In former times they used to employ a flint and steel, and work by the feeble light of the sparks. The problem which Sir Humphry Davy, the inventor of the safety lamp, set before him was this: "How can I give the miner light, and still preserve him from this explosive gas?" and he thought, "Can I put a light in any way within an apparatus so that, although the light shall shine through the apparatus, the gas outside will be prevented from exploding?" He found out that a flame could not pass through a piece of ordinary iron gauze. In fact, the flame is so much cooled by the wire gauze, in consequence of iron being a good conductor of heat and carrying the heat away from the flame, that the flame cannot get through. You see that when this iron gauze (Fig. 7) is placed over the



flame, the flame is entirely cut off, and cannot pass through; and if we light the gas above the gauze it will burn there, but the flame is preventedfrom reaching the gas below the gauze. (See Fig. 8). Now, Sir Humphry Davy, when he made the miner's safety lamp, surrounded the candle wick or the oil wick with a wire gauze; and, although the light can pass through the meshes of the gauze, you might have an explasive mixture within and without the lamp, but the flame inside could not propagate itself to the gas outside, being unable to pass through the gauze.

I come now to another subject, and a very interesting one. I will ask Mr. Cottrell to heat a silver crucible, or dish, almost to redness; and supposing I then pour water into it, what do you think will occur? You might at first say, "Well, the water will be converted into steam." That is not quite the case. You will find when I pour the water into the vessel that the heat of the vessel produces such an amount of vapor from the water, that the water is supported upon a spring or elastic cushion of its own vapor, and is thrown into the form of a sphere, and the water rolls about in its own vapor. In order to show you this effect, we will cause a beam of light to fall right into the silver basin, and that beam of light will illuminate the drop of water which we pour into the basin. The image of the interior will be then thrown upon the screen We now blow in a little water.

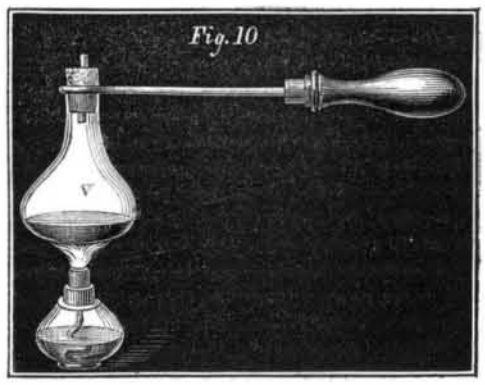
Now you see represented on the screen the globules of water rolling about—rolling about upon a cushion of their own vapor. Sometimes in this experiment we get a most beautiful figure produced by the water. We get a rosette form of globule. The vapor breaks away from the water in a kind of musical way. We will see if we cannot get the rosette form—a crimping of the edge of the drop of water.



[After a few seconds the rosette form occurred. See Fig. 9]. When the basin is not very hot, at first these little crimpings arise, and then, when the vapor is not sufficiently strong to lift the water out of contact with the basin, the water will come into contact with the basin, and will suddenly boil. There it is. [At this moment the spherical form ceased, and the water boiled up and immediately disappeared with a hissing sound]

I must now send Mr. Cottrell down stairs to prepare something of very great interest and beauty; but as I do not know whether the experiment will succeed or not. I do not wish to raise your expectation. If, however, it succeeds, the experiment will be a very useful and a very important one.

In the meantime I want to show you what may occur in consequence of this spheroidal condition of water on a hot surface. I have here a little copper boiler (Fig. 10). I will cork this boiler up, but I intend first of all to heat it very highly indeed, and then I will place a little drop of water into the boiler. I now heat the boiler, and Mr. Chapman



will hand me some hot water, and when the boiler is heated I will pour a little into it, and that water will roll about as a spheroid. Vapor will be given off, but being small in amount, while the water is rolling about it will escape through a small hole in the cork. I will then withdraw the boiler from the source of heat, and the drop of water will then come into contact with the hot boiler; steam will be generated, and I think that that steam will be sufficient to expel the cork into the atmosphere. [The experiment was performed with the result anticipated.] There you see the steam drives out the cork the moment the water becomes changed into vapor by contact with the hot surface of the boiler. In this way we may have very serious explosions, but that is a subject into which I cannot go at present.

I want now to make an experiment or two which shall illustrate the character of a certain substance with which I am now going to operate. I have had occasion to mention gases several times in these lectures. Now, gases and, in fact, the very air we breathe, are nothing more than the vapors of substances possessing very low boiling points. For instance, Mr. Faraday, to whom we are indebted for the very finest investigations upon this subject, succeeded in squeezing together the particles of the gas which is contained in this vessel, and forming it into a liquid; and there are other gases which have been liquefied by Mr. Faraday. One of them is a gas called carbonic acid, which we breathe out of our lungs. I want to generate a quantity of carbonic acid gas in this large round glass vessel. We have at the bottom of the vessel some bicarbonate of soda, and I have here an acid. If I pour the acid into the vessel it attacks the bicarbonate of soda, and we get this carbonic acid gas liberated. I dare say we shall presently have accumulated enough for our purpose. [After an interval]—Now let me see whether the gas which has been liberated has not the power of putting out a candle. This will show whether the gas exists in this vessel or not. [A lighted taper wa lowered into the vessel, and was immediately extinguished by the carbonic acid gas therein contained.] Yes: there is the gas. You see it is incompetent to support the combustion of the candle. The vessel is very nearly full. Now I will show you that this gas is very much heavier than ordinary air. I might ladle it out or dip it out in a bucket, and if I did so in front of the screen you would see it fall like water from a vessel, although under ordinary circumstances it is quite invisible. But I want to show you its heaviness by means of a soap bubble. I will blow a bubble from this clay pipe, and allow that bubble to fall upon this invisible gas. You will find that the bubble will float about upon the surface of the gas as if it were floating upon the surface of a visible liquid. [Successive soap bubbles were then prodnced, and on being detached from the tobacco pipe, were gently dropped on the surface of the carbonic acid gas, and while floating there, were illuminated with electric light.]

Let me now tell you what I have sent Mr. Cottrell to do. Down stairs in the laboratory we have two very strong iron bottles, and these two bottles are filled with this carbonic acid. The gas in those bottles has been liquefied, and at the present moment he is turning a cock and allowing the liquid carbonic acid to turn into gas. What I want you to understand is that when the liquid carbonic acid turns into vapor it generates enormous cold, just as our vapor of water did on its production, only the cold generated by the carbonic acid is far greater. The consequence is, that when this liquid is turned into a gas and generates this cold, a portion of the vaporis turned into snow, and we thus obtain carbonic acid snow. I am almost afraid to speak to you about this matter, lest we should fail to get this wonderful substance. If I do get it I intend to put it into this vessel and make a few experiments with it which will both delight and surprise you. If we get the solid carbonic acid we shall be able to freeze water and produce ice in a crucible when it is actually heated to redness. First of all the carbonic acid snow is itself very cold, but in order to make it still colder I pour a little ether upon it. This turns it into a paste; and this mixture of carbonic acid and ether gives us nearly the greatest cold which has ever yet been produced. If we put that paste of carbonic acid and ether into the hot crucible, what occurs? The carbonic acid and the ether evaporate, and they so evaporate as to produce a protecting coating of vapor of carbonic acid between the red hot crucible and the pasty mass within it. In point of fact, the pasty mass does not touch the crucible at all. It remains intensely cold within the crucible. If we are successful in getting the solid ca bonic acid, I shall dip this small brass sphere containing water into the mixture of ether and carbonic acid in the hot crucible; and I have no doubt that the water will freeze and will burst the brass sphere, and we shall then be able to take from the red hot crucible a sphere of solid ice. Mr. Cottrell is a long time bringing the solid carbonic acid. I am afraid he is not successful. Allow me simply to walk down stairs and see that the matter is going on rightly. [The lecturer then went in quest of the carbonic acid. On returning to the theater he resumed as follows]—I am sorry to say that my worst anticipations have been realized. The experiment below has has not succeeded. Here, however, is a little of this wonderful carbonic acid snow—solid carbonic acid. I will put a little in my mouth, and breathe against a candle. If I inhaled it I should kill myself; but I do not intend to inhale it. I intend simply to *exhale*. [The candle flame was then extinguished by the gas exhaled from the lecturer's mouth.]

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?"

This discussion continues with unabated interest and we are in receipt of a great variety of additional communications, with models and curious diagrams. Examination of the subject leads to study of the laws of motion, which becomes more interesting the further it is carried and is undoubtedly of benefit to the participants.

The two revolution philosophers may rejoice in the accession to their cause of Dr. Vander Weyde. late Professor of Mathematics and Chemistry, Gerard College, whose letter follows.

The editor of the Newburyport, Mass., *Daily Herald*, also appears as a two-revolution champion. and winds up a leading editorial as follows:—If the editor of the SCIENTIFIC AMERICAN "really needs any further light on the subject let him stand up face to face with another man of about his size—or a good looking woman—and revolve around him or her, and he will see that he will face the same side of the room *twice*, before he returns to his original position.

"The reason of the apparent discrepancy between a wheel revolving once to measure off its circumference on a plane and twice on a circle, is simply that in the latter case half of the motion is constantly wasted in space, so to speak, in getting round to the surface on which it is to revolve—'that's what's the matter.'"

Clear as mud that. If our cotemporary cannot do better the two-revolutionists will disown him. We would say to correspondents that we are always glad to hear f om them; but of course we cannot publish every letter. We shall however endeavor to give every side a representation, and if a direct reply is not always given, correspondents will find their answer in some parallel representative case.

We still adhere to "one" and the majority of our correspondents coincide with us. We however take pleasure in giving a full and fair hearing to those who say "two," and for this reason make perhaps the most numerous selections from their letters.

MESSRS. EDITORS:—Let us suppose fixed wheels of different diameters and the case will become clear. First, let the fixed wheel be very small, commence with one infinitely small, a point; then a movable wheel turning around a point will have made exactly one revolution around its own axis when it has returned to its first position, no matter where this point is situated, it may be near the axis or near the circumference, inside, or even far outside the wheel. In the same manner the moon makes one revolution around its own axis when it turns once around the center of the earth. (In regard to the earth the moon makes, of course, no revolution at all around its own axis but she does so in regard to sun, stars and the rest of the universe.)

But when a wheel rolls in the same time around another wheel the effect of this rolling is added to its own rotation; however small this fixed wheel may be the moving wheel will make more than one revolution around its own axis; the number of these revolutions will depend on the relative size of the movable and fixed wheels; so when the fixed wheel is half the size of the movable it will make one and one half revolutions; if the wheels are equal the movable will make two revolutions, if the fixed wheel is twice the size the movable will make three revolutions, if three times the size four revolutions, and, in short, the movable wheel will always make one revolution more than the number expressing how often the size of the movable wheel may be divided into that of the fixed wheel.

It is scarcely worth while to exhibit wood cuts to illustrate these truths. Let any one who is not clear on the subject make the wheels out of disks of cardboard and rotate them rolling one along the other; it will serve him at the same time for a mental, geometrical and mechanical exercise, taking for his model the figure, page 67 (which is perfctly correct and demonstrates clearly the two revolutions), and making the wheels of different relative diameters the above-mentioned number of revolutions will be found to take place when rolling one around the other. P. H. VANDER WEYDE, M D.

MESSRS. EDITORS:—I have just tried the experiment of a movable wheel revolving round a fixed wheel of the same diameter, and find it makes one revolution. I cut two wheels out of a thin piece of wood, made one fast, and f om a given point on each rolled one around the other and one revolution is all I could make. It is astonishing what an amount of figures have been indulged in to prove the contrary while by a simple experiment they might prove "one" to be correct.

Camden, N. J HENRY M. TEST.

MESSRS. EDITORS:—About the wheel question: I would like to ask L. M. how many times the arrow head points to

ward the center of the fixed wheel in making one revolution around the fixed wheel? It points there but once and therefore the movable wheel makes but one revolution on its own axis. N. L. B.

Boonton, N. J.

Messrs. Editors:—A wheel rolling once around a fixed wheel of the same size makes two revolutions on its own axis: you say "one" but avoid giving a demonstration anxiously desired by your readers—you are not obliged to give it, but must stand by the consequences. I maintain the "wheel" makes two revolutions on its own axis, this I will demonstrate with your permission, in the Scientific American; but should you refuse my offers, then I would necessarily get the assistance of some other paper. An answer would oblige

Aurora, Ill. James Thierry.

In reply, if our correspondent will look at back numbers he will see that we have been engaged in demonstrating the subject for several weeks past. But it seems we do not progress quite fast enough for him; and he turns his wheel once too often for us. If he can write something interesting and short, we shall be happy to publish it.

W. E. H. replies as follows, to our comments on his article and diagram published last week:

"Until I received your paper of March 7th, I supposed that not only was I sound in the faith, but that my belief was known of all men.

"I most certainly hold that the movable wheel makes two revolutions on its own axis, while passing once around the fixed wheel. This I prove by showing that the index, *b*, secured to the movable wheel, points in every direction from its axis twice while passing once around the fixed wheel.

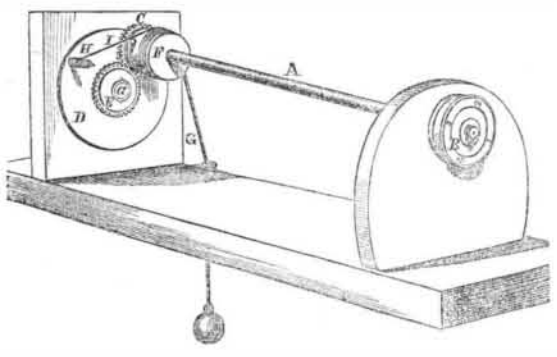
"With regard to the axis, I would say that an axis 'of a body' is 'that *line* about which the body revolves, or may be supposed to revolve.' It has no extension but length, and is no more capable of revolution than a cherub is of sitting down.

"If we once admit that an axis may be a cylinder, and revolve, such expressions as the earth's revolution *on* its axis every day, become absurd.

"For, if we suppose a pointer fastened to this so-called axis of the earth, near the pole, like the short pointer in the diagram of last week, it will turn with the earth each twenty-four hours. The earth, moving with the same angular velocity, the pointer will ever be directed to the same meridian; according to your argument the earth will not turn on its axis at all, seeing that, to turn over, it must have twice the angular velocity of the so-called axis. It was to avoid this difficulty that I used the word "bearing" so frequently in my letter. The axis of the wheel coincides with the central line of the bearing of which it is also the axis.

"Wm. E. H."

W. E. H. also sends us, from the office of the two-revolution philosophers, another very neat model illustrating their views, with the following note:



"Messrs. Editors:—Having leisure, I have made another machine to illustrate the question The postulate here taken is, that when one end of a shaft revolves on its center or axis, the other does also. Two wheels, B C, are fastened to the opposite ends of a shaft, A, one end of which is pivoted in a movable disk, D, which rotates around a fixed wheel, E, of the same size as C; the shaft, A, being long and slightly inclined. The wheel, B, is to be turned by hand until it has made a complete revolution, when the opposite wheel, C, will be found to have moved but half way around the fixed wheel, E. Another turn of the wheel, B, will carry wheel, C, completely around E.

"I have, also, attached a pulley, F, to the wheel, C, on which a cord, G, may be rolled, and will be found to encircle the pulley twice in each 'orbit.'

"Middletown, Conn. W. E. H."

In reply to our correspondent's postulate, it is sufficient to say, that, because both ends of a shaft make the same rotation, it does not therefore follow that a wheel revolves twice upon its own axis, in rolling once around a fixed wheel.

The above diagram represents a device by which compound rotary may be converted into direct rotary motion, or *vice versa*. The axis of wheel, C, is carried in the rotating disk or carrier, D, which has its axis of motion at *a*; and by reason of the gearing together of C E (the latter being fixed) the wheel, C, is caused to rotate once upon its own axis for each rotation of the disk, D, upon its axis, *a*. These motions are both transmitted through the gear teeth; and a cord, G, hung upon pulley, F, or upon wheel, B, will be wound twice for each rotation of the disk, D, because the effect of both rotations, namely, the rotation of the carrier or disk, D, upon its axis, *a*, and the rotation of the wheel, C upon its own axis, are both imparted to the cord.

Now when we separate these two motions and allow only one of them, namely, that of the wheel, C, to act upon the cord, we shall then make clear to the eye the true and actual number of rotations of the wheel, upon its own axis, in rolling once around the fixed wheel, E.

In order to separate the cord from the effects of the rotation of the disk, D, we have only to set the cord spool, H, upon the disk and extend the thread, I, to the pulley, F; and now, on rolling the wheel, C, once around the fixed wheel. E, the cord will be wound up once, because the wheel, C, has rotated once upon its own axis.

Our friend's model and diagram practically illustrate the error of the two-revolution philosophers, and prove the correctness of those who adhere to "one."

Messrs. Editors:—Having been a reader of your valuable paper for twenty years except the four years that I was locked up in Dixey, I feel an interest in anything in which its opinions are opposed by any one, as I have always found them correct. I do not suppose that you need any assistance to show that you are correct on the wheel question. But as it is an open one, allow me to give my views on the subject. L. M., and others are trying to prove to the world that there is a wheel within a wheel; allow me to say that I am unable to see it. If L. M. will place a pin in the center of the fixed wheel and one in the center of the movable wheel and connect them by a strip or rod, and mark a point near the center of the movable wheel and pass the movable round the fixed wheel, he will find that the point marked will pass the connecting rod but once, therefore it makes but one revolution around its own axis, and one revolution around the fixed wheel, making two distinct revolutions. Samuel Hand.

Midville, Ga.

Messrs. Editors:—Here is a mathematical solution of L. M's problem. If a wheel three feet in circumference is rolled once around on a plain surface it, of course, accomplishes just three feet distance, the axis also has traveled just three feet indicated by the dotted line. Now when this wheel is rolled around another of the same size the axis will travel through a space of six feet, it being the circumference of a circle two feet in diameter.

Now for mathematics. If a wheel makes one revolution while its axis travels three feet how many revolutions does it make when its axis travels six feet? Ans. Two. Because six is twice as many as three. Surrender! all you "oneists" as gracefully as you may after such a persistent fight all on the wrong side. T. L. B.

Boston.

The question is not how far the axis travels, and we therefore decline to surrender.

Messrs. Editors: Referring to the diagram in your last Vol. XVIII., page 133, of H. Anderson, Peekskill, N. Y., if the loose end of the thread be held at the center of the fixed wheel, A (the only place to hold it), H. Anderson will find the thread wound only once around the shaft of the movable wheel, B. A. R.

Rochester, N. Y.

Messrs. Editors:—As a solution to the question, "How many revolutions does a wheel make on its own axis rolling around another of the same diameter once?" A. C. Sekell tries to prove that the wheel makes two. Mr. Sekell in his diagram makes the wheel turn a quarter of a revolution at each right angle of the square. But in doing this he changes the center. The second center is at the extremity of the diameter of the first circle. But in thus changing the center he destroys the first circle. Therefore the quarter of a revolution made by this circle cannot be added to the quarter of a revolution made by the first circle in passing over the first side of the square.

Again, to prove it mechanically, suppose a wooden block squared, the sum of its four sides equal to the circumference of a wooden wheel. Putting an axle in the wheel, let us commence at the first corner of the square; roll the wheel on its axle to the second corner. Thus far one quarter of a revolution has been made. Now let us lock the wheel; change the center to the tire of the wheel; on that center swing the entire wheel around the second side, and we are ready to make the second quarter revolution; yet the wheel has not revolved on its own axis, for the axle has been locked. Unlock the axle, and we can make the second quarter as before.

Newbern. P. W. T.

Messrs. Editors:—Every one seems to understand the wheel problem, but none seems to understand the cause of the difference of opinion. I think both sets of philosophers may congratulate themselves on being correct upon this question. The wheel makes one or two revolutions, according to the point from which it is contemplated. In relation to any point inside the circle scribed by the center of the moving wheel, it makes one revolution. In relation to any point outside of this circle it makes two. In relation to the sun, the moon revolves upon its axis. In relation to the earth, it is fixed.

Bristol. B. B. L.

It appears to us that both sides cannot be right. It is a question of fact, not of optical appearance.

Messrs. Editors:—If you want any wheels, to test "L.M.'s" principle with, we can send you a few dozen. Every one here has been manufacturing wheels for the last three weeks.

North Madison, O. H. R. S.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The extension of the Erie broad gage track to Chicago is no longer doubtful. The contract for the building of the intermediate connection of the Great Western with the Toledo, has been already made. This move has been demanded by the Western freight interest, on account of the high rates of the New York Central, the late advance being such as to prohibit the forwarding of freights further than Toledo. If the Erie directors had refused to meet the views of the railroad interest West, a junction would have been made with the Pennsylvania Central and the Baltimore and Ohio.

An English patent has lately been granted for an improved metal, from which it is claimed castings may be procured or steel manufactured in much less time and at a greatly reduced rate, than by other processes. After the ore is reduced in the blast furnace to the state of molten crude metal, the furnace is tapped, and the liquid metal runs off into a vessel or receptacle, when a blast of atmospheric air of a pressure of four pounds to the square inch, and upwards, is introduced into the mass through a hollow stirring rod. The effect is the driving off of the impurities, and the metal may run directly into molds, or steel of a fine quality may be procured by adding unmelted spiegeleisen or other compound of iron and carbon.

The new West Shore Hudson River Railroad is advancing with commendable energy, and the contracts for the first sixty miles will be closed this week. The negotiations for the purchase of the Northern New Jersey Railroad by this company have been successful, and the latter will enter upon possession shortly. The new road will connect with the proposed Midland line to Oswego and the Lakes.

California is rapidly extending her silk manufactures. It is announced that at the town of San José there has been started a silk manufactory with a capital of $100,000. The machinery has arrived, the foundations of the building are laid, and the worms are at work.

The Cheyenne papers claim that besides her gold treasures the territory of Wyoming proves to be very rich in the baser metals. Copper, iron, and lead are found in inexhaustible quantities along the base of the mountains for a long distance, from the Colorado line north. Good coal can be found all over the Laramie Plains, and in the same vicinity the discovery of oil and mineral springs has been reported.

The proposd Mexican Central Railroad, if built, will prove of the greatest benefit to that Republic. The design is to construct a road from the City of Mexico, four hundred and fifty miles, to Matamoras. From the Rio Grande to the Mississippi, supposing Vicksburg to be the objective point, is a distance of six hundred and forty miles. There is a road now running from Vicksburg west to Monroe, aiming at Shreveport, while an other is in progress from Houston eastward, aiming to touch both New Orleans and Baton Rouge. With the entire business of the best part of Mexico as a prize, both these roads would soon be completed.

The famous Comstock Lode, probably the most productive mineral vein in the world, is a strip of land only three miles long by 600 yards wide. The yield is valued at $12,000,000 annually. Five thousand men find employment in working it, and the produce for each workman is about $2,000 per annum. In 1865 there were forty-six companies working it, and they had excavated about twenty-eight miles of tunnels and drifts. The longest tunnel made is 3,200 feet; the greatest depth penetated is by the Gould & Curry, 821 feet.

General Palmer, the Treasurer of the Kansas Pacific Railway, has been exploring a route to the Pacific by the thirty-fifth parallel of latitude. He reports that rarely have they been obliged to resort to the maximum grade permitted by Congress, and on the highest summit on the route there will never be as much snow as on the Alleghanies; and for a summer and late autumn resort, there is not a finer spot on the continent than "President's Park," at that summit. If the company obtain the subsidy next spring, the road can be completed in four years' time.

Recent American and Foreign Patents.

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

Governor.—Ephraim P. Rogers, Corning, N. Y.—This invention relates to a new and improved method of constructing governors for steam engines and other purposes, whereby the same are rendered more effective in their operation, and whereby the expense or cost of a governor is materially lessened.

Frame for Carriage Tops.—James H. Flagg, Perkinsville, Vt.—This invention relates to an improvement in frames for carriage tops, intended for a top to be used as a substitute for an umbrella.

Churn.—C. H. Carver, Taunton, Mass.—This invention has for its object to furnish an improved churn, simple in construction, easily cleaned, easily operated, and which will do its work quickly and thoroughly.

Crib Attachment for Bedsteads.—Harriet Ruth Tracy, New York city.—This invention has for its object to furnish an improved bedstead and crib, so constructed and arranged that when the crib is not in use and is pushed into its place in the bedstead, the said bedstead and crib shall present a neat and uniform appearance, giving no indication of the presence of the crib attachment.

Self-raising Flour.—Wm. C. Hughes, Scio, Mich.—This invention relates to a method of preparing self-raising flour, and consists in a thorough and intimate incorporation of the fermenting principle with the flour when the grain is ground, in a certain proportion and at a low temperature.

Harness Pad Tree.—J. W. Hinman, Berlin, Wis.—This invention relates to the construction of a pad tree for gig, coach, or other harness, and consists in attaching the opposite sides or sections of the pad to a center piece by means of joints or hinges, whereby it is rendered flexible and self-adjustable to the back of a horse, yielding on one side or the other freely to his motion, and resting in an easy and comfortable manner.

Spring Bed Bottom.—E. E. Worden and H. Wilms, Brandon, Vt.—This invention consists in the use of elliptic springs or stays, and in the manner in which the upper frame is supported thereby, and also in the manner in which the spiral springs are supported and held in position.

Washing Machine.—P. F. Bindewald, Strongsville, Ohio.—This invention has for its object to furnish an improved washing machine, simple in construction, easily operated, effective in operation, and which shall be made wholly of wood, so that there may be no danger of the clothes being injured by iron rust.

Securing Labels in Glassware.—Edward W. Davis, Pittsburg, Pa.—This invention relates to an improved method of securing labels of brass and other metallic bodies in glassware.

Animal Trap.—William Miller, Chicopee, Mass.—This invention has for its object to furnish a neat, simple, and effective means for catching rats, mice, and other animals.

Harness Motion for Looms.—James Greenbalgh, Sen., Woonsocket, R.I.—This invention has for its object to improve the construction of the parts of a loom, by means of which motion is imparted to the harness, so as to simplify their construction and make them more effective in operation.

Fastening Metallic Collars on Bottles.—Edward Wattis, Philadelphia, Pa.—This invention relates to an improvement in the method of securing metallic collars to the necks of glass bottles or flasks, whereby the same are securely fastened without cement, and are rendered durable and firmly attached while the bottle lasts.

Combined Boiler and Hot Air Register.—B. B. Perkins, Chestertown Md.—In this invention a boiler connected with the register is attached to the side or end of the hot air flues in houses, for the purpose of utilizing the heat conducted away by the walls of the flue and of supplying hot water to the upper rooms of the house.

Rice Planter.—Elijah Wagoner, Westminster, Md.—This invention is a machine for planting and covering rice, by which all the operations required in the planting of that article are as carefully and accurately performed as if done by hand, and by which one man is enabled to perform the work hitherto requiring the services of dozens of laborers.

Envelope.—Sigmund Ullman, New York city.—In this invention a new method of constructing, folding, and sealing the envelope is employed, by which the use of adhesive gum is dispensed with, and when the envelope is sealed it is impossible for any one to open and close it again without leaving evidence of the transaction upon it.

Life-Saving Apparatus.—John B. Stoner, New York city.—This invention has for its object to furnish an improved apparatus by means of which