

cidental explosion, likely to be attended with fatal consequences to the gun detachment, must also certainly result. Other reasons might be given for not accepting the high estimate of this fuse, which, on insufficient grounds, seems to have been hastily formed. That the fuses have done better than the exceedingly defective French time fuse, does not prove much. Nevertheless, it may be fully admitted that the percussion fuse problem is very far from having yet been satisfactorily solved by our artillerists. It is one of exceeding difficulty; and it is quite certain that if not solved in England, they are just as far or farther from having satisfactorily solved it in Prussia. In France it seems to have been abandoned in despair, and Belgium can think of nothing better than following the Prussians.

The Catacombs of Rome.

Few travelers come to Rome without making a visit to the Catacombs, although few penetrate far into those dark and intricate recesses. Their origin is unknown—at least, there are no authentic records of their excavation. The purpose for which they were last used—the burial of the Christian dead—does not necessarily indicate the purpose for which they were formed. It is probable that they were dug out in order to obtain, for building purposes, the volcanic stone and sand which underlie the whole Campagna; but when, or by whom, is not known. The excavations may have been commenced before the time of the ancient Romans; but if so, they were continued in their day, as they contained the material required for the construction of many of their works. It was taken out by quarrying or digging, leaving only enough to sustain the superincumbent mass of earth. They are of great extent, reaching in every direction as far as modern research has extended. The whole Campagna is honeycombed by them. Openings occur in various places, and accidents have not been uncommon, in which riders over the Campagna have broken in and sustained severe injury. They are regarded as so unsafe, that visitors are usually taken only through a limited portion of those connected with the Church of St. Sebastian on the Appian Way. The rock and earth are liable to fall, and sad indeed would be the fate of those who should be buried beneath the falling mass; and sadder, yet, of those whose retreat should be cut off, while they were left to wander hopelessly, until compelled by weariness and weakness to lie down and die. Several years ago, a school, consisting of a teacher and more than twenty boys, descended into this subterranean city of the ancient dead, but not one of them returned to tell what was their fate. The fall of the earth over one of the passages by which they had left the main route, rendered their escape by the same way impossible; and although diligent search was made, nothing is known to this day of how or where in the vast labyrinth they met their death.

The peculiar interest attaching to these Catacombs is, that during the early ages of Christianity, in the times of persecutions by the Roman Emperors, they were the resort of Christians who fled to these recesses for safety, and probably to some extent for worship.

The passages are very narrow, not more than three or four feet wide, and about six feet in height. On each side and throughout their whole extent they are lined with niches, or shelves, cut into the wall one above another and usually four or five in height, in each of which there was just room for a body to be laid lengthwise. The fronts of the niches were closed with long slabs of terra cotta, cemented. Occasionally marble was used, with an inscription, containing some motto or symbol expressive of the wishes or hopes of the living for the dead. These niches are now all tenantless and open, but we could see where the dead had been reposing. The inscriptions are preserved elsewhere as relics. One of the long halls of the Vatican is lined with the marbles taken from these tombs.

The Catacombs connected with the church of St. Agnese, in another part of the Campagna, are nearly in the state in which they were discovered. The excavations are much more regular and on a larger scale than those which we had previously seen. Instead of being more unsafe, as they are generally supposed to be, they are less liable to crumble and fall. The rock in which the excavations are made is more solid, allowing the passages to be cut with more exactness, and they run often to a great distance in a right line. The roofs are vaulted with regularity, and the sides cut perfectly square. The same niches occur as in the other Catacombs, and rise above one another to the number of five or six, but they have not been rifled excepting to remove the slabs and inscriptions. The bones of the dead by hundreds and even thousands are lying where they were deposited sixteen or eighteen centuries ago.

After walking for a long time through these halls, some seventy feet below the surface of the ground, and having entered several chambers painted rudely in fresco, we ascended to another story, but not to the light of day. These passages are generally two or three stories in height, but seldom have any intercommunication. The air is exceedingly dry, and the temperature higher than that of the air above, but after a time it becomes stifling, although there is nothing unpleasant in other respects. It appears to be perfectly pure.

The inscriptions which are found upon the marble slabs with which the niches were closed, are an interesting study, and may be seen at any time in the main entrance to the museum of the Vatican. There are many pieces of rude sculpture in bas-relief, representing Scripture scenes, and generally those scenes which were most appropriate to the persecuted state of the early Christians. The three children in the fiery furnace, and Daniel in the lion's den, are frequently represented. The baptism of Christ and various scenes in his life are sculptured in the same manner. The

dove, as an emblem of peace, occurs very often. I give the translation of a few as a specimen:

"Lannes, the martyr of Christ, rests here. He suffered under Diocletian."

"In the time of the Emperor Adrian, Marius, a young military leader, who had lived long enough: with his blood he gave up his life for Christ. At length he rested in peace. The well-deserving, with tears and fears, erected this on the Ides of December, VI."

"Here lies Gordianus, deputy of Gaul, murdered with all his family for his faith. They rest in peace. Theophila, his maid, erected this."

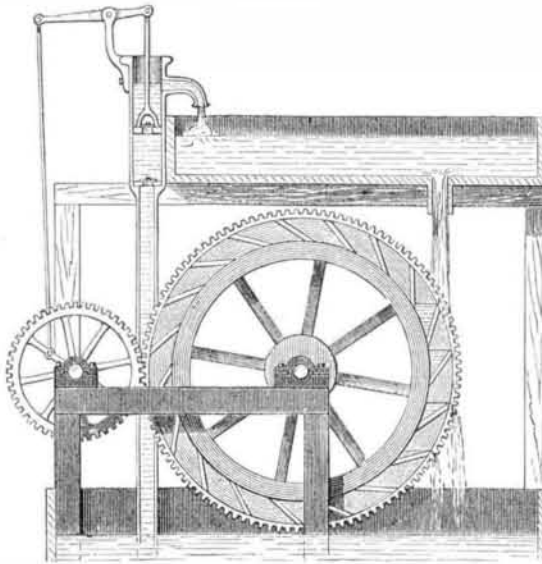
"In peace," and "In Christ," frequently occur upon the slabs which closed the graves.—*N. Y. Observer.*

PERPETUAL MOTION.

NUMBER XI.

Fig. 24 shows a principle so often employed for the production of self-moving machines that it ranks next to that of perpetually eccentric weights, in its delusive power upon minds of inventors. The attempt to compel a water wheel to raise the water which drives it, is, in one form or other, perpetually recurring in devices upon which our counsel and opinion is sought. The worst of the matter is, that in most

FIG. 24.



cases our advice to drop such absurd projects is received as evidence of our want of sagacity and knowledge, and our would-be client becomes the dupe of some not over conscientious patent agent, who pockets his fee, and laughs in his sleeve at the greenness of the applicant.

The device illustrated is one submitted by one of these enthusiastic individuals who, without understanding the first principles of mechanics, believes he is about to revolutionize the industry of the world by his grand discovery; and as honor, and not pecuniary reward, is his object, he seeks to make public his invention through the wide circulation of this journal. He is quite willing we should adversely criticize the device, because its merits are so great that no amount of skepticism, resulting from our blind prejudice, can, he thinks, influence candid minds against a principle so obviously sound and, sublimely simple. It is unnecessary for us to describe the device, as it explains itself. The inventor has not tried it to see whether it will work. What need, when anybody can see on paper that "it must go?"

FIG. 25.

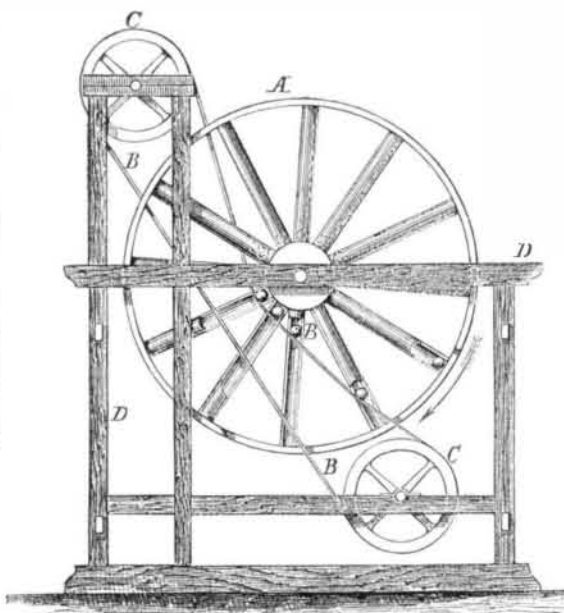


Fig. 25 represents an attempt at securing the desired object by means of eccentric weights, kept so by means of an endless belt and pulleys, of which the inventor thus writes:

The annexed drawing shows how I have at length taken this enticing jilt (perpetual motion), though after a long and weary chase—

Through pleasant and delightful fields,
Through barren tracts and lonely wilds;
Mongst quagmires, moesses, mires, and marshes
Where dell or spunkie never scarce is!
By chance I happened on her den,
And took her where she didna ken.

A represents a wheel with twelve hollow spokes, in each of

which there is a rolling weight or ball. B is a belt passing over two pulleys, C. There is an opening round the wheel from the nave to the circumference, so as to allow the belt to pass freely and to meet the weights. The weights are met by the belt as the wheel revolves, and are raised from the circumference till they are at last brought close to the nave, where they remain till, by the revolution of the wheel, they are allowed to roll out to the circumference. By this arrangement, the weights are, on one side of the wheel, always at the circumference, so that that side is more powerful than the other, which causes the wheel continually to revolve. D is the frame of the machine. The arrow points out the direction in which the wheel turns.—*DIXON VALLANCE, Liberton Lanarkshire, Nov. 10, 1825.*

In 1612, Thomas Tymme, Professor of Divinity, published a philosophical dialogue, in which he discourses of the perpetual motion invented by Cornelius van Drebbel, a Dutchman, who was engineer to King James, in England.

Tymme's work is a small quarto. The author's name on the title papers occurs in the smallest type. It is repeated again in full—'Thomas Tymme'—both to the dedication "To the right Honourable Sir Edward Coke, Lord Chief Justice, &c., &c.," and also the Address to the Reader, which latter concludes:

And for that rare things move much, I have thought it pertinent to this Treatise, to set before thee a most strange and wittie invention of another Archimedes which concerneth Artificial perpetual motion, imitating nature by a lively patterne of the Instrument it selfe, as it was presented to the King's most royall hands, by Cornelius Drebbel, of Alchmar in Holland, and entertained according to the worthinesse of such, a gift my paines herein bestowed and intended for thy profit and pleasure, if it seeme but as iron, yet let it serve for the Forge and Anvill of good conceit, if the discourse seeme rough, shadow it, I pray thee, with the curtaine of smooth excuse: &c.

The work is divided into two parts, the first containing six, the second four chapters.

Chap. 3.—Concerneth the nature and qualitie of the earth: and the handling of a question whether the earth hath natural motion or no.

Also herein is described an Instrument of Perpetual Motion, as stated in the list of Contents.

At page 56 commences chapter 3, from which we extract the following:

PHILADELPH.—For as much as the Earth and Sea make but one globous body united and combined together, I pray you describe the form hereof to me.

This is explained by Theophrast—the dialogue occupying four pages—at last he says:

... And to make plaine the demonstration unto you, that the Heavens move, and not the earth, I will set before you a memorable Modell and Patterne, respecting the motion of the Heavens about the fixed earth, made by Art in the imitation of Nature, by a gentleman of Holland, named Cornelius Drebbel, which instrument is perpetually in motion without the meanes of Steele, Springs, and waights.

PHIL.—I much desire to see this strange Invention. Therefore I pray thee, good Theophrast, set it here before me, and the use thereof.

THEO.—It is not in my hands to show, but in the custody of King James, to whom it was presented. But yet behold the description thereof here after fixed.

PHIL.—What use hath the globe, marked with the letter A?

THEO.—It representeth the Earth: and it containeth in the hollow body thereof divers wheels of brasse, carried about with moving, two pointers on each side of the Globe doe proportion and shew forth the times of dayes, moneths, and yeeres, like a perpetuall Almanacke.

PHIL.—Both doth it also represent and set forth the motions of the Heavens?

THEO.—It setteth forth these particulars of Celestiall motion. First, the houres of the rising and setting of the Sunne, from day to day continually. Secondly, hereby is to be seene, what signe the Motion is in every 24 houres. Thirdly, in what degree the Sunne is distant from the Moone. Fourthly, how many degrees the Sunne and Moone are distant from us every hour of the day and night. Fifthly, in what signe of the Zodiacke, the sun is every Moneth.

PHIL.—What doth the circumference represent, which compasseth the Globe about?

THEO.—That circumference is a ring of Cristall glasse, which being hollow, hath in it water, representing the sea, which water riseth and falleth, as doth the flood, and ebbe twice in 24 houres, according to the course of the tides in those parts, where this instrument shall be placed, whereby is to be seene how the Tides keepe their course by day or by night.

PHIL.—What meaneth the little globe above the ring of the Glasse?

THEO.—That little Globe, as it carrieth the forme of a moone cressent, so it turneth about once in a moneth, setting forth the encrease and decrease of the Moone's brightness, from the wane to the full, by turning round every moneth in the yeere.

PHIL.—Can you yeeld me any reason to perswade me concerning the possibility of this motion?

THEO.—You have heard before that fire is the most active and powerful Element, and the cause of all motion in nature. This was well knowne to Cornelius, by his practise in the untwining of the elements, and therefore to the effecting of this great worke, he extracted a fierie spirit, out of the minerall matter, joining the same with his proper aire, which included in the Axeltree, being hollow, carrieth the wheeles, making a continuall rotation or revolution, except issue or vent be given to the Axeltree, whereby that imprisoned spirit may get forth. I am bold thus to conjecture, because I did at sundry times pry into the practise of this gentleman, with whom I was very familiar. Moreover, when as the King, our Sovereigne, could hardly beleeve that this motion should be perpetuall, except the misterie were revealed unto him: this cunning Bezaleel, in secret manner, disclosed to his Majestie the secret, whereupon he applauded the rare invention. The fame hereof caused the Emperor to entreate his most excellent Majestie to licence Cornelius Bezaleel to come to his Court, there to effect the like Instruments for him, sending unto Cornelius a rich chaine of gold.

PHIL.—It becometh not me to make question concerning the certaintie of that, which so mighty Potentates out of the limity of their wisdomes have approved, yet me thinketh that time and rust, which corrupteth and weareth out all earthly things, may bring an end to this motion in a few yeeres.

THEO.—To the end of time may not weare these wheeles by

their motion, you must know that they move in such slow measure, that they cannot wear, and the lesse, for that they are not forced by any poise of waight. It is reported in the preface of *Euclides Elements*, by John Dee, that he and Hieronimus Cardanus saw an instrument of perpetuall motion, which was solde for 20 talents of gold, and after presented to Charles the fift, Emperour: wherein was one wheele of such invisible motion, that in 70 yeeres onely his owne period should be finished. Such slow motion cannot wear the wheels. And to the end rust may not cause decay, every Engine belonging to this instrument, is double guilded with fine gold, which preserveth from rust and corruption.

PHIL.—This wonderful demonstration of Artificiall motion, imitating the motion Celestiall, about the fixed earth, doth more prevaill with me to approve your reasons before aledged, concerning the moving of the Heavens, and the stability of the Earth, then can Copernicus assertions, which concerne the motion of the Earth. I have heard and read of manie strange motions artificiall, as were the inventions of Boetius.

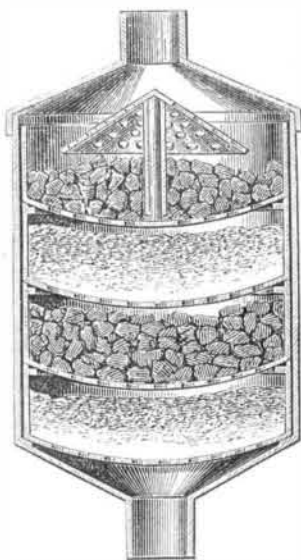
After enumerating these and others, Phil. concludes:

These were ingenious inventions, but none of them are comparable to this perpetuall motion here described, which time by triall in ages to come, will much commend.

THEO.—These great misteries were attained by spending more oyle than wine: by taking more paines than following pleasure.

IMPROVED CISTERN FILTER.

This filter is the invention of G. W. Lampson, of Waterloo,

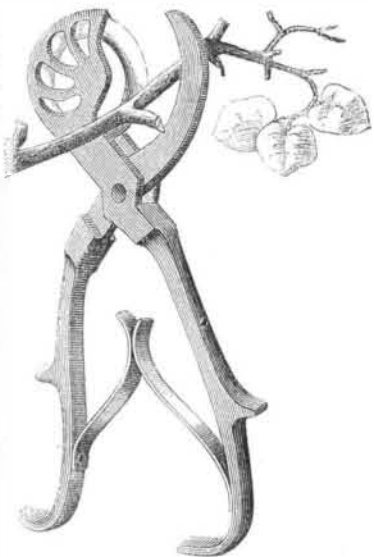


N. Y. It consists in a series of pans arranged one above the other, in the manner shown, in a suitable receptacle. Charcoal and gravel may be used as filtering material, or any other approved material found convenient may be substituted. The water entering the filter falls upon a perforated cone, which distributes it over the filtering material in the upper pan. It then passes through the substances placed in the lower pans, and is drawn off free from impurities at the bottom.

PRUNING SHEARS.

It is well known that a curved edge, or one which cuts obliquely across the grain of wood, is more effective than a straight edge, cutting square across the grain. This principle has long been recognized in the construction of turning tools, carving tools, axes, etc.; and even in the use of tools with straight edges, the apprentice soon learns unconsciously to give the edge a slight inclination, finding that in that position the cutting is accomplished with much greater ease.

In the use of tools constructed on the shears principle, where the blades are short, and the substance to be cut is thick, the latter is liable to be thrust out from between the blades, and thus defeat the attempt at cutting it. Especially has this been the case in the use of shears for pruning trees, vines, and hedges where the branches vary greatly in size. The invention shown in the annexed engraving shows a form of pruning shears, wherein the principle of inclined cutting edges is combined with a curved blade, which prevents the branch from slipping from between the blades, and therefore renders the tool much more effective than those with straight blades. The branch is also liable to force its way between the blades and strain the pivot. In this device this is prevented by a blunt blade, which construction gives two points of support for the branch instead of one, as in the old form of shears.



This tool is the invention of George H. Clinton and D. H. Harris, of New Haven, Conn., and has been patented.

American Needles.

A new demand for articles of American industry has, says the *Bureau*, just come to light in the shape of an order from England, to the agent of one of the largest manufacturers in this country, for 50,000 American needles to be sent to Birmingham, England, which was for years the only city in the

world in which the manufacture of needles and fish-hooks in a large scale was carried on. For something more than a year past the same concern has been shipping fish-hooks to England in considerable quantities. The reason for this order is that we are making good needles cheaper than they can be made in the Old World, on account of the improved machinery in use in our factories. This exchange of business seems very strange at first, but we will soon become accustomed to it and expect it. A large number of articles are now made here for shipment to England and the Continent, which a few years ago were not manufactured in this country at all; and many articles are now exported, which we have procured abroad for many years, and which are now made much cheaper in this country than any other.

The Broken Atlantic Cables.

The recent failure of the two British cables leaves both continents at the mercy of the single French submarine telegraph, and considering that damage to the latter may occur at any time, it is of the utmost importance to the commercial world that the repairs be made at once.

What the trouble is, with the two cables that have ceased working, is difficult to apprehend, but that some under-current has moved the cables upon the edge of a cliff or rocky point, till the coatings are abraded and insulation destroyed, is not improbable. The *Robert Lowe* (British steamer) is at St. John's, Newfoundland, on a grappling and repairing expedition, and it is to be hoped that we may soon hear that both cables are perfect and communication restored. The survey of the bed of the Atlantic ocean is now so complete, that, in any future cable there will be less difficulty in placing portions of wire rope, heavier and better protected, in such parts as the difficult places at the bottom of the sea may make necessary.

The damage is known to have occurred at about 65 miles from Heart's Content, Newfoundland. The grappling for the cables is simple enough, but the rough weather, usual at this time of year, off Cape Race, may delay the completion of the work until Spring.

Correspondence.

The Editors are not responsible for the opinions expressed by their Correspondents.

A Defect in the Patent Law of 1870.

MESSRS. EDITORS:—Allow me to call your attention, and that of your readers, to the closing paragraph of section 33 of the new patent law. The whole section reads as follows:

SEC. 33. *And be it further enacted*, That patents may be granted and issued or reissued to the assignee of the inventor or discoverer, the assignment thereof being first entered of record in the Patent Office; but in such case the application for the patent shall be made and the specification sworn to by the inventor or discoverer; and, also, if he be living, in case of an application for reissue.

This closing paragraph enacts that all applications for reissues shall be sworn to by the original inventor, if he be living.

This is not only a great hardship on assignees, but will probably prove disastrous to inventors, if it be not speedily abrogated. The hardship of it upon assignees is well illustrated by a case which has lately come up in my practice as an attorney. A manufacturing company paid some \$30,000 to an inventor, for his patent of an improvement in the manufacture of an article which is one of their staples. He squandered the money, and then attempted to make precisely the thing he had before sold to the company, who, of course, resorted to legal proceedings and stopped him. This naturally left bad blood between them.

Now other parties, having discovered an oversight in this patent, have procured patents based thereon, and are proceeding to claim as their own that which plainly belongs to the company. To stop these pirates, it is first necessary to reissue the company's patent; but, under the present law, to do this, they must procure the oath of the original inventor, who would about as soon part with his right hand as thus oblige the company. It is useless to talk about bills in equity; he would soon put himself beyond the bailiwick of any officer, if this were attempted. Now, is this an isolated case? Probably four out of every ten assignees would at this moment find it very difficult to ascertain the whereabouts of their assignors, and equally difficult to procure their oaths when found, except upon payment of considerable, and oftentimes large, sums of money.

In just the degree that this provision is found a hardship on assignees, will it prove disastrous to the interests of inventors, as a rule. To a large majority of inventors their inventions are valueless if they cannot sell them, for very few inventors are, themselves, possessed of means to manufacture and introduce their inventions; and if purchasers are to be practically almost deprived of the right to reissue the patents they purchase, thus putting it out of their power to suppress ingenious evasions of their rights, they will be very slow to purchase even valuable inventions. Poor inventors find abundance of difficulty now in disposing of their patents, and they can ill afford to have this heavy load put upon their camel's back. They will surely revolt when they come to understand the practical working of this seemingly harmless little enactment.

The new patent law was, probably, drafted by the late Commissioner of Patents; and this provision must have taken its rise in a curious hostility that he seems to have had against reissues, a hostility that he carried so far as to push him into—as the writer believes—an unprecedented overslaughing of the acts and decisions of his predecessors—a charge which, when made, it is perhaps well to illustrate.

The writer had, during the late Commissioner's term of office, occasion to prosecute an extension case on a reissued

patent, before the Office; it was favorably reported upon by the examiner who had it in charge, and on the last day before the expiration of the patent it came before the Commissioner in person for his final approval. He made no objection to the findings and decision of the examiner below, but refused the extension on the ground that the reissue contained new matter not in the original patent.

Now, as this very question had been expressly decided upon when the patent was reissued by one of his predecessors, every way competent and fit for his office; and as a Commissioner is not, in law, a court of appeal to overturn the decisions of his predecessors; and as the late Commissioner, being a trained lawyer, cannot be ignorant of the true doctrine of *stare decisis*, it is fair to put this act down as most arbitrary, and, with his approval of the enactment spoken of above, as indicating a strong hostility to reissue.

Inventors and owners of patents should lose no time in pressing upon their Representatives and Senators in Congress, to have this enactment repealed, and that right speedily.

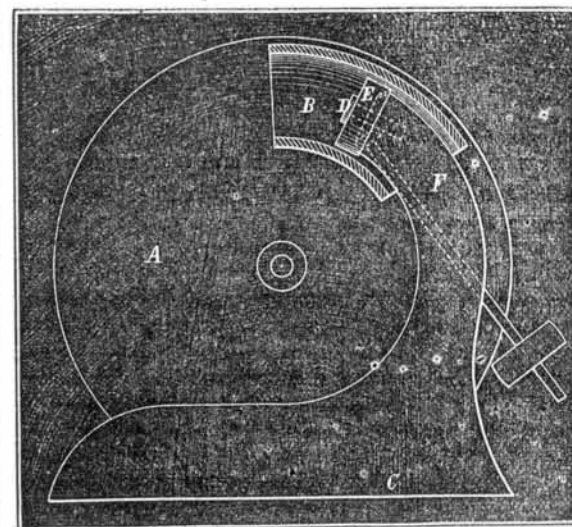
W. E. SIMONDS.

Hartford, Conn.

Boring out Curved Cylinders.

MESSRS. EDITORS:—Permit me to give you a solution of L. Q.'s problem in your issue of Nov. 20th.

A, in the accompanying sketch, is the face plate of a lathe



on which B, the piece to be bored, is fastened (by blocking and straps, not shown) at the right distance from the center to give the desired curve to the hole. A cast-iron piece, C, is to be bolted to the lathe bed, while the part, F, (which is cast at about the same curve that it is desired to give to the hole) is set so that, when the face plate is turned backward, it will enter B centrally. D is a pin passing through E, and driven or screwed into E is a revolving head, which carries one or more cutters, and is made to turn on the pin, D, by means of internal bevel teeth, which engage with the pinion shown in dotted lines. A strip of tin soldered to the revolving head, and projecting back a little over B, will keep the chips out of the gears.

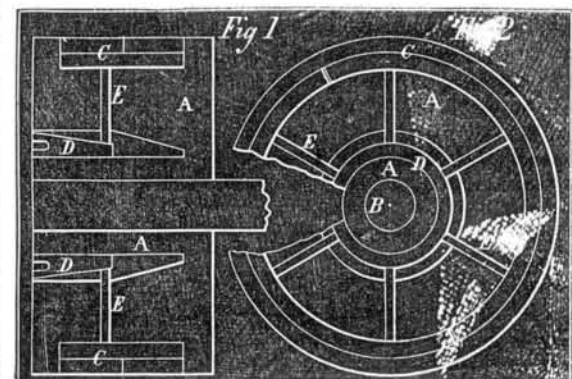
S. G. STODDARD.

Bridgeport, Conn.

A New Piston.

MESSRS. EDITORS:—The annexed diagram is illustrative of a new steam engine piston, which is so constructed that its rings may be set out or adjusted without removing either of the heads of the cylinder. I know that this feature in a piston is not new, but I am sure that I have never seen one of so easy mechanical construction and so simple and perfect in adjustment as this one.

The body, A, of the piston has several radial holes for the reception of the spindles, E. These spindles fit easily in the holes, and are of course exactly of the same length. Their outer ends are in contact with the inner packing ring, and the inner ends rest upon the conical ring, D. This rin



works upon a screw thread cut on the hub of the piston, A. The engineer has only to remove a plug in the center of the cylinder head, and apply a forked wrench to the ring, D, when any adjustment of the rings, C, is necessary.

When cast-iron packing rings are used, a stiff spiral spring should be applied in each spindle hole to prevent churning the cylinder.

F. G. W.

Preservation of Honey. Invention Wanted.

MESSRS. EDITORS:—Whenever we desire light upon subjects of general interest, or wish to call out new inventions, we are wont to turn to the *SCIENTIFIC AMERICAN*, and seldom fail to awaken attention, and elicit a satisfactory reply from some of your many readers.

Every one who is at all acquainted with the nature of honey knows that in a short time the transparent, viscid liquid changes to a thick candied substance. On placing a