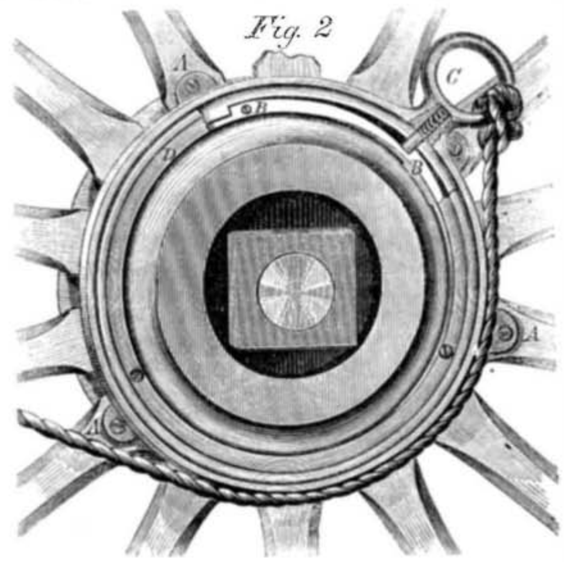
Automatic Device for Holding Horses.

As a servant and companion of man the horse is a useful and valuable animal, but when he takes the bits between his teeth, when, as Job says, "he paweth in the valley, and rejoiceth in his strength," when he "swalloweth the ground with fierceness and rage," that is, takes a race-course gait, he becomes a troublesome customer.

Multitudes of accidents to life and limb are daily chronicled in the papers caused by runaway horses. Valuable lives are lost, persons crippled for life, and property to a large amount destroyed for the want of properly hitching teams, or neglecting to tie them at all. Hitching posts are not always convenient, and so the driver, hoping his team will stand during a momentary absence, leaves them; they are startled by a fluttering paper, a puff of steam, or the screech of a whistle, and he returns to find his vehicle a wreck and his team ruined.

There have been several devices to prevent horses from running away when the driver was absent such as the strap and weight used by physicians, as an anchor to the horse, and an attachment of a halter to the wheel by means of some mechanical device, but this one claims to possess advantages over any other which has yet been tried.

Fig. 1 gives an idea of the device as attached to a wagon, and Fig. 2 shows its construction and operation. It is a ring surrounding the hub of a wagon or carriage, and secured to the spokes by the lugs and screws, A. This ring has, on an inner projection, a series of ratchet teeth, as seen at B, with which a catch sliding into a receptacle in the shank of the loop, C, engages, being moved forward by a light spiral spring. The loop, C, forms a part of an exterior ring which turns freely on the ratchet ring and is secured in position by the back projection of that, and also by the outer casing or ring, D, which is represented as broken away, to show the inner ratchet, for about one fourth the circumference.



CHAPMAN'S HORSE HOLDER.

It will be seen now if the reins of the horse, or a halter, be secured in the loop, C, (in the engraving a common rope is shown,) any effort of the horse to start or run away will only result in winding up the line, and the further he draws the carriage the more the line will be wound around the hub. Of course the pull upon the horse's mouth will be very severe as the leverage is so great. In one direction, the pawl would, of course, merely slide over the teeth of the ratchet, while, in the other, the wheel could not be moved far until the pawl became obstructed by the teeth of the ratchet. The first is the condition of being "backed," the other the moving ahead. Beside being a preventive of danger, this device seems to be admirably adapted to break young horses to stand.

This improvement can be attached to any carriage, wagon, or other vehicle without making any alteration in the wheel hub, and is so simple as not to be liable to get out of order. It was patented through the Scientific American Patent Agency, Nov. 13, 1866. Further information regarding it may be obtained by addressing W. B. Chapman & Co., La Salle, Ill. [See advertisement on another page.]

THE SIEMENS FURNACE.

There is a small collection of gas-furnace models exhibited at Paris by Messrs. Siemens, and now distinguished with the highest prize of the international jury, viz., the "grand prix." It may be said with justice that the Siemens furnace in this present Exhibition holds much the same position which the Bessemer process held in 1862, viz., that of the most important and most successful metallurgic invention of the day. It is hardly less important than the Bessemer process, and although its invention dates about as far back as Mr. Bessemer's patents, it has only lately attained commercial success. In the space of the last five years the Siemens furnace has not been very materially altered or improved, but it has been largely introduced and its success established in many different branches of industry. The first manufacturers in England who availed themselves of the new furnace, were the glass-makers. For purposes of metallurgy greater difficulties and prejudices required to be surmounted. Some of the steel makers on the continent led the way. Mr. Mayr, of Leoben, in Styria, we understand to have been the first to introduce the new furnace for crucible steel making on a large scale. In this instance the unfavorable position of the Styrian iron works with regard to the supply of mineral fuel, was the principal inducement to apply gas in the steel-melting furnace. The gas is made at Mr. Mayr's works, from lignite, which cannot be directly applied for melting steel, as the heat from it when burnt on the grate, is not sufficient to produce the high temperature required for this operation. Mr. Mayr erected ten gas furnaces, and they have proved a complete and perfect success, enabling him to make crucible cast steel by means of the cheap and very inferior lignite which exists in his locality. Within the last two years the Siemens furnace has been adopted in all the larger Bessemer steel works in England. In France, the Siemens furnace is gaining ground with equal rapidity, and there are now twenty furnaces in course of erection under Mr. Siemens' own superintendence at the Creusot Works.

There are two distinct principles embodied in the Siemens furnace, viz., the application of gaseous fuel, and the regeneration of heat by means of piles of bricks alternately passed over by the waste gases and by the gases entering the furnace before their combustion. The gas producer is a brick chamber about 6 feet wide by 12 feet long, with its front wall inclined at an angle of 45° to 60°, according to the nature of the fuel used. The inclined plane is solid about half way down, and below this it is constructed as a grate with horizontal bars. The openings for introducing the coal into the gas producer are on the top or roof of this chamber, and the air which enters through the grate effects the combustion of the coal at the lowest points of the chamber. The products of this combustion rise, and are decomposed by the superposed strata; they are, moreover, mixed with a quantity of steam which is drawn in through the grate from a constant supply of water maintained underneath the latter. The steam in contact with the incandescent coal also decomposes and produces hydrogen and carbonic oxide gas, which are mixed with the gases produced by the coal direct. The whole volume of these gases is then conducted to the furnace itself by means of wrought-iron pipes. The gases enter one of the regenerators. The regenerators are chambers packed with fire-bricks, which are built up in walls with interstices and air spaces between them, allowing of a free passage of gas around each single brick. Each regenerator consists of two adjoining chambers of this kind, with air passages parallel to each other, one passage destined for the gaseous fuel, and the other for the supply of atmospheric air required for combustion. Each furnace has two such regenerators, and a set of valves is provided in the main passages, or flues, which permit of directing the gases from the producer to the bottom of either of the two regenerators. The gases, after passing one regenerator, arrive at the furnace, where they are mixed with the air drawn in at the same time, and produce a flame of great heat and intensity within the body of the furnace itself. They then pass, after combustion, into the second regenerator, which forms a set of down flues for the waste gases, and ultimately leads them off into a common chimney On their way from the furnace to the chimney, the heated products of combustion raise the temperature of the fire bricks over which they pass, to a very high degree, and the gases are cooled more and more the further they proceed through the regenerator. After a certain time the fire bricks close to the furnace obtain a temperature almost equal to that of the furnace itself, and a gradually diminishing temperature is arrived at in the bricks of the regenerator proportionate to their distance from the furnace. At this moment the attendant, by reversing the different valves of the furnace, opens the heated regenerator for the entrance of the gaseous fuel and atmospheric air, at the same time connecting the other regenerator with the chimney for taking off the products of combustion. The entire current of gases through the furnace is thus reversed. The cold air from the atmosphere, and the comparatively cold gases from the producer, in passing over bricks of gradually increasing temperature as they approach the furnace, become intensely heated, and when they are mixed in the furnace itself, enter into combustion under the most favorable circumstances for the production of an intense heat. The principle of this so-called regeneration of heat, therefore, consists in storing up the waste heat in one set of fire bricks, and afterward making use of that heat for elevating the temperature of the fresh gases introduced for combustion. The action of these regenerators is so perfect that, with a temperature of somewhat about 4,000° in the furnace, there is no more than about 300° to be felt at the base of the chimney, the escaping gases having a temperature no greater than is absolutely required for maintaining the draft.

This is the present state of this beautiful and important invention. It has supplied us with the power of maintaining an exactly regulated temperature in a furnace of any required size and shape; it has made us practically independent of the quality and nature of the fuel used for producing the required heat from the most moderate, up to the very highest temperature. It has reduced the expenditure for fuel to a very great extent, and it has given us one of the greatest desiderata in so many metallurgical operations, viz., a *clean* furnace, free from ashes, dust, and dirt, and perfectly suitable for the working of the more refined and purified materials which modern industry has produced and is still constantly improving upon. We have further to name as an important feature of the Siemens furnace, the possibility afforded by it of changing the nature of the flame at will, by altering the relative proportion of air and gas admitted through the flues. A surplus of oxygen in the mixture will produce an oxydizing flame, and will give all the corresponding effects upon the materials exposed to its action. By the admission of a surplus of gas, on the contrary, the flame can be made of a reductive character, and used accordingly for de-oxidation. In metallurgy, and particularly in the treatment of iron and steel, this is of the utmost importance. There are already several new modes of manufacturing steel direct from the pig iron, patented and practically carried out in France and in Germany, wherein the Siemens furnace is made use of as an indispensable condition for their success. The Exhibition contains a collection of samples of very fine steel made by M. Berard's process. This is called "Acier à gaz." and is made in a Siemens furnace direct from pig iron. M. Berard constructs a Siemens furnace with the bottom formed into two separate parts, each hollowed out like a dish, and with a bridge between them upon which the pigs introduced into the furnace receive a preliminary heating. The flame is maintained with a surplus of oxygen, and a quantity of pig iron is melted in one of the chambers or dishes. The oxydizing action of the flame decarburizes and refines the pig iron, and after a certain time a second quantity of pigs is thrown into the second dish and melted there. The flame is now reversed in its direction; the oxydizing flame is made to enter at the side where the fresh pig iron is placed. In passing over this, and oxydizing the carbon, silicon, and other impurities in the iron, the flame loses its surplus oxygen, and becomes of a neutral, or at least only slightly oxydizing character. In this state it passes over the other bath of molten iron, now partly refined, and it continues to act upon the impurities without attacking the iron itself. At a certain moment this portion of iron is completely converted into steel, and that part of the furnace is then tapped so as to make room for a fresh charge of pigs in that place. After that the current of gases is again reversed, the second bath now entering into the position previously taken by the first, and so the process is carried on continuously with two portions of iron, one freshly introduced and acted upon by the oxidizing flame, the other partly converted into steel and exposed to the neutral flame passing away from the first. M. Berard states that by protracting his process, and by adding speigeleisen, he can remove sulphur and phosphorus from the iron, and make steel from inferior pigs. Such statements, however, have been so frequently made by inventors, without having been borne out by facts in actual practice, that we must be cautious in accepting them.

Messrs. Emile and Pierre Martin, of Sireuil, have also commenced steel making in a Siemens furnace. They melt a quantity of pig iron, and introduce wrought-iron scrap, puddled steel, or other malleable iron into the mass while exposed to the oxydizing influence of the flame. They have produced steel of excellent quality by this method, and are now about to introduce their process into several steel works in France. The great advantage obtained by them, and one which has not yet been arrived at by the Bessemer process, is the conversion of old iron rails and similar articles into steel. This is a great desideratum—particularly at this present moment of transition of the permanent way from iron into steel—is well known, and attempts have been made by Mr. Bessemer, Mr. Adamson, and several others, to effect the same thing in the Bessemer converter. The first trials, although they proved the possibility of converting old iron rails into steel in that manner, gave an unsatisfactory commercial result. It was found that the rails required to be heated to a white heat before being introduced into the converter, that no more than one third of such rails could be added to the proportion of two thirds of very graphitic pig iron, and, with all this, that there was a greater waste in the converter, and more "scull" in the ladle, than with pig iron. Messrs. Martin, on the contrary, are able to use a proportion up to two thirds of old rails to one third of pig iron; they can manage the fusing very completely, and without excessive waste, and with a moderate consumption of fuel, advantages which are all due to the Siemens furnace which they employ. Mr. Siemens has himself very recently patented an application of his furnace to the manufacture of iron and steel direct from the ore, and he has exhibited a model of such a furnace in Paris, to which is added a small piece of steel produced in that manner direct from the iron ore. The furnace is constructed somewhat similar in form to the Rachette furnace, viz., with two parallel sides sloping downward so as to form a kind of trough between them. The ore is charged at both sides on the top of the furnace, and slides down the inclined planes of the two sloping sides. At the bottom of the furnace the gases from the producer and the necessary supply of air are admitted, and produce an intense flame, the products of combustion rising upward through the masses of ore, which are acted upon in a similar manner to that in the blast furnace. With very pure manganese ores it is possible to manage the process so as to decarburize the newly produced iron immediately after it is made, or rather the heat can be made sufficient for melting a metal which contains less carbon than common cast iron as made in the blast furnace, and at a lower temperature. This metal is natural steel, or "raw" steel, and, made from ores of sufficient purity, may have all the qualities of the best cast steel. The specimen exhibited by Mr. Siemens, and made, we understand, at his Model Steel Works in Birmingham, where the first experiments with this new process have been carried out, is of very fair quality as far as can be judged from its general appearance and fracture. We have been informed that Mr. Siemens is now erecting a similar furnace at Barrow-in-Furness, intending to make steel from hematite ore direct, at the Barrow Steel Works. Mr. Siemens' new process, if successful and economical, would do away with blast furnaces, and all other processes for making and refining iron now in use, but it is too little advanced at this moment to allow of a judgment of the probability of its practical success, to say nothing about relative economies. Its practicability remains to be established; but if we consider how much the same inventors have already established, how difficult it was to believe in the success of the Siemens furnace itself when first brought out, and how completely they have succeeded in this respect, we may be justified in entertaining some hope that this new invention will ultimately prove equally successful, although at present it may appear very revolutionary and contrary to adopted notions.—*Engineering.*

MEE'S HOSE COUPLING.

The intention of the inventor in this device, is to make a tight coupling without the aid of a washer, or of the loose setting-up ring, or of any device for forcing the two parts of the coupling together in the line of their axes, in order to form a water-tight joint. This coupling does not depend upon the mechanical force exerted to close the joint, but the pressure of the water itself makes the joint tight.

Fig. 1.

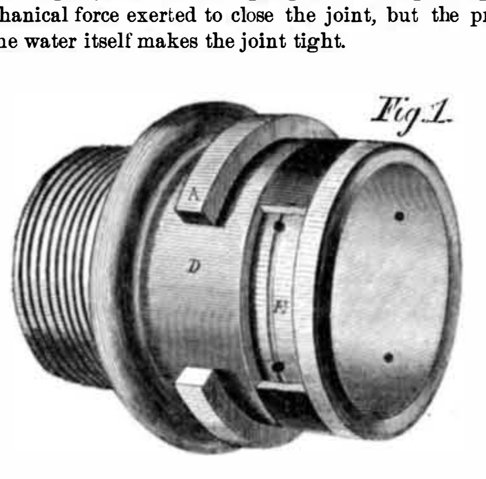


Fig. 2.

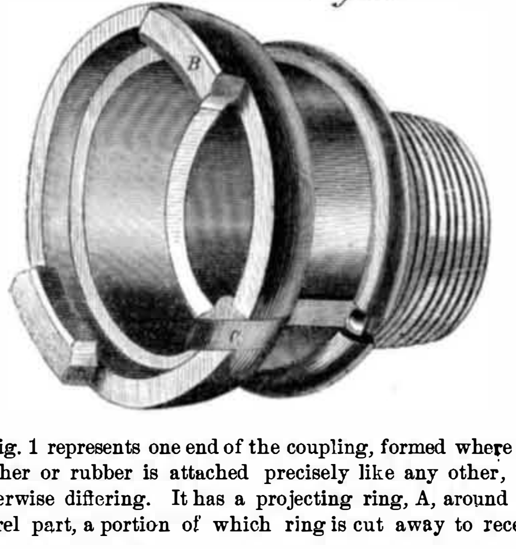
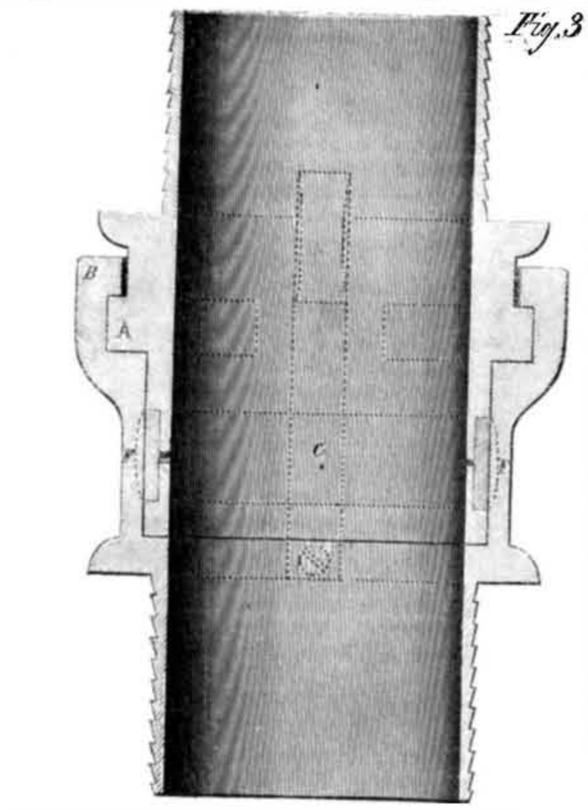


Fig. 1 represents one end of the coupling, formed where the leather or rubber is attached precisely like any other, but otherwise differing. It has a projecting ring, A, around the barrel part, a portion of which ring is cut away to receive the hooks or snugs, B, Fig. 2, which pass by the ring, A, and, by a slight turn of one or the other part, securely lock the two lengths of hose or the two parts of the coupling together. This partial turning is, of itself, a sufficient lock to the parts, but to render "assurance doubly sure" a spring catch, C, is introduced which springs into the space, D, Fig. 1, between the parts of the ring, A, and prevents the parts from unlocking unless force is used to raise it from its seat.

Near the end of Fig. 1 is turned an annular groove in which is seated a rubber ring, or a ring of some elastic substance to



act as a packing. It will be noticed that a row of small holes is bored through from this annular recess to the inside of the coupling, the holes communicating on the outside with one another by a channel, E. Through these holes the water inside the hose or coupling finds its way, and its pressure forces out the elastic ring against the inner surface of the section shown in Fig. 2, making a perfectly water-tight joint. Fig. 3 is a longitudinal section, and will give a correct idea of the invention. It represents the parts, as connected, with a recess at F, which, if thought expedient, could be made to receive the extension of the flexible packing when the pressure is applied, although it is believed from numerons experiments this is not necessary.

A patent for this improved coupling was obtained by Barney Mee, May 7, 1867. It is manufactured by Mee & Jackson, Troy, N. Y. Applications for rights, etc., will be promptly attended to if addressed as above. It can be seen in this city in use at No. 99 Wooster street, on engine No. 13.

Mechanical Uses of Castor Oil.

We find in one of our exchanges the following remarks relative to the use of caster oil in the trades, more particularly its application to leather: It is much better to soften and to redeem old leather than any other oil known. When boots and shoes are greased with it, the oil will not at all interfere with the polishing afterward, as is the case with lard, olive, or any other oil. In Harrisburg, Pa, the old leather hose of some of the fire companies was greased with it, and found to become almost as soft and flexible as new leather. Leather belts for transmitting motion in machinery will usually last three to five years, according to the wear and tear they are exposed to; when greesed with castor oil they will last ten years or more, as they always remain flexible and do not crack. Beside this advantage, castor oil will prevent slipping, so that a belt three inches wide, impregnated with it, will be equal to a belt four and a half inches without castor oil. It is necessary, however, to wait twenty-four hours, till the oil has disappeared from the surface and penetrated the leather, otherwise the freshly greased surface will cause slipping. The rats and other vermin detest anything impregnated with castor oil, and will not touch it;—another advantage.

Geography of Plants.

In an article on this subject by M. T. Lippincott, of New Jersey, the following rules were given, for determining the fitness of districts in the United States for the growth of certain varieties of wines.

Those places which have a summer temperature of 65.6°, a hot month of 70°, and a September of 60°, will ripen Delaware, Clinton, Perkins, Iona, Logan, Israella, with other hardy varieties. The temperature of their growing season corresponds to a mean of 65° and upward, and an aggregate of heat of about 8,000° Fah.

Those places which have a summer of 70°, a hot month of 72°, and a September of 63°, will ripen Concord, Hartford Prolific, Diana, Creveling, etc. Their season of growth corresponds to a mean of 67°, and an aggregate of 8,500°.

The Isabella requires a summer of 72°, a hot month of 73°, and a September of 65°, and a mean during its growing season of 70°, and an aggregate of 10,000°, of heat, etc. etc.

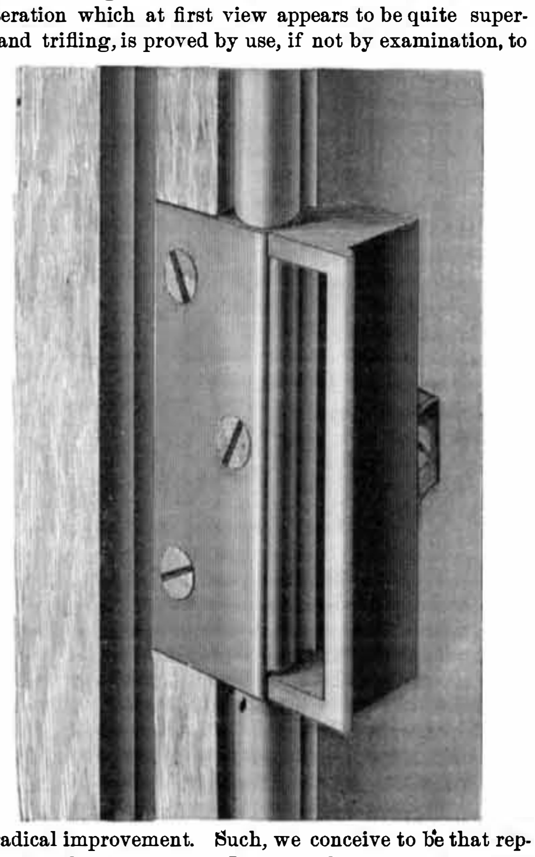
The summer temperature of Buffalo, N. Y., is 68°; it has a hot month of 7[illegible] and a September of 62°; and it is said that the temperature of places on the banks of the Niagara, north of the city, is from two to three degrees greater.

Washing the Streets.

To keep the streets of a great city clean is a problem which those who have thought the least about it are the most ready to solve. Those who understand it find their greatest difficulty in the cost. In the city of London, where every feasible scheme of street improvement may be tried, Mr. William Haywood, the engineer to the Commissioners, has been trying a series of experiments in "cleansing streets by washing"—a plan that seems very easy but is not very cheap—and has made a report from which the London *Journal of Gas Lighting* extracts the following reliable information. A portion of one of the principal thoroughfares was selected, 2,000 feet long, having a superficial area of carriage way of a little under 10,000 yards. Sixteen hydrants were fixed at a distance of 16 feet from each other. The first experiments were made in September last, and they were continued for a week at a time at different periods of the year; the weather, however, happened on each occasion to be tolerably fine. Ten men were employed with two jets, each morning for two hours and three quarters. Two men, who assisted in moving the hose, also swept the surface near the curbs while the water was playing, so as to save passengers from the annoyance of the jet being directed close to the foot-ways. The straw and refuse which would not go down the gullies was washed into the channels by the action of the water, and was then swept up and removed by scavengers. The quantity was scarcely a quarter of a load daily. The work was generally done between half-past two and six o'clock in the morning. The quantity of water consumed was about two gallons to each square yard. The streets were much cleaner than after ordinary scavengering, and this was most marked when rain came on after washing, for the surface did not become muddy until toward the end of the day, while the other streets of the city became muddy rapidly. On the whole, the comparison was greatly in favor of the surface cleansed by water. The cost of the machinery was £1175 per mile lineal; the cost of washing nearly 20s. for each washing, labor forming about half of that sum. There are about seven miles of thoroughfare in the city similar to those washed, and the annual cost of cleaning them by water would amount to £7932. These seven miles are leading thoroughfares. The cost of water at its present price would amount to £3282 per annum, and for the whole city, to £6000 per annum. But this is filtered water, of the same quality and price as that supplied to the breweries. Mr. Haywood suggests that the water should be obtained direct from the Thames, and if the washing system be adopted, the magnitude of the demand would justify some expense in pumping machinery for obtaining a cheaper supply. It would be objectionable to wash the streets in frosty weather, and in severe weather it would be impossible to use it; therefore the services of a staff of men, carts, and horses must be retained for emergencies. Pavements kept so clean will be more slippery during dry weather, and less slippery in damp greasy weather. The superior cleanliness will make the streets more noisy. Mr. Haywood thinks that the sewers would not be injured, and that the sewage about to be used for the reclamation of waste land would be improved by the admixture of street sweepings.

DA CUNHA'S LOCK CATCH.

Improvements in the form and style of articles in common use are not among those least valuable. Sometimes, indeed, an alteration which at first view appears to be quite superficial and trifling, is proved by use, if not by examination, to



be a radical improvement. Such, we conceive to be that represented in the engraving. It is a catch for ordinary door locks, those which are secured to the outside of the door, and differs from those ordinarily in usé in being much stronger in construction, and much more securely attached. The common catch is held to the door jamb by two or more screws, the strain upon which tends continually to draw the screws from the wood.

This catch is of cast or malleable iron made with a project