# The Knibbs Valve Patent Suits.

It is expected that the old Philadelphia, the first steam fire engine, which was recently taken to Boston as evidence in an important patent suit against that city, will be returned to its owners, the Insurance Patrol, to-day or tomorrow. The suit was by Marcus P. Norton and others, assignees of James Knibbs, of Troy, N. Y., who claimed to hold the original patent for a relief valve which was extensively used upon its steam fire engines by the city of Boston and elsewhere throughout the country. In the former city alone the royalties claimed by the plaintiffs amounted to \$450,000. The part taken in the case by the old engine Philadelphia was interesting. It seems from the statement of those who accompanied her to Boston that she was wanted to prove that the valve for which the complainants claimed the patent right had been used on her two or more years before the patent was issued. During the trial the court and jury adjourned to the Boston Common to witness a practical comparison of the working of the valve of the old engine with that of one of the latest construction. The result, it is said, was amazing, as the old engine, which many feared could not stand the strain, threw a larger stream with two pieces of hose than the other did with one. The valves, it was stated, were shown to be the same, to the satisfaction of the jury, and a verdict for the city of Boston was rendered on Saturday last. Among those who testified with reference to the valve of the Philadelphia was Jacob Neaffie, builder of the engine and member of the firm of Neaffie and Levy; Joseph L. Parry, the designer; Richard Warren, an engineer of the present Fire Department; and George Kurtz, the original engineer of the Philadelphia, who conducted the practical test at the trial, and who managed the engine over 20 years ago, when her usefulness was exhibited in the city of Boston, near the same spot, and a prize of \$600 won.-Phil. Lodger.

### Plate Glass Insurance.

A plate glass insurance company having to pay 1,456 losses in eight months to September, report 343 breakages from stone throwing, etc.; imperfect glazing caused 144; 86 door plates were broken by wind and 59 by wind and hail; burglars, 76; malicious persons, 43; runaway horses, 24; persons falling on sidewalk, 39; window cleaners, 103; moving shutters, 54; with other breakages from 59 down to 1, the last caused by a flying owl.

#### +++ CAR COUPLING.

The drawhead, A, which is of the usual form, is provided with a longitudinal slot in the bottom, in front of which are the usual pin holes. Two blocks project from the end of the car, and on one of them a standard is secured to which a lever, C, is pivoted, which passes through a slot in a standard on the other block. An offset or shoulder is formed in one edge of this slot on which the free end of the lever can be rested when it is to be held in a raised position. The lever extends nearly, or quite, to the side of the car, and if desired can be connected with a rod extending to the top of the car. To the middle of the lever is pivoted a pendulous ocking bar provided at its lower end with an inwardly and downwardly inclined weighted lug. D, and with a prong projecting toward the outer end of the draw head. The top of the draw head has an aperture through which the pendulous bar passes. When a car is uncoupled, the free end of its lever is raised and held in this position on the shoulder as shown in the left of the engraving. The coupling pin, E, will also be raised as it rests on the projection. The



#### BOOK HOLDER.

The board upon which the book is to rest is provided with wide central transverse groove, A', for receiving the back place by spring tongues, shown at D, secured to the upper surface of the raised portions. Parallel with and a short evenly tinned all over. From this it goes to the third part of the board, and which are open at the upper edge of the board. In the recesses are held sliding frames, which hemp to remove the coarser particles. It is next put in the inclined toward the upper surface of the board and having pads on their free ends. The pads are pressed on the leaves of the book, holding them down. A pintle passing through each slot and slide prevents the slides from being



WOOD'S BOOK HOLDER.

entirely withdrawn. When a leaf is to be turned the spring arms are raised and the slides drawn from the recesses, so that the arms will be entirely out of the way of the leaves. The slides are held in this position by the friction caused by the pressure of the spring against the sides of the recess. The device can be placed on vessels, desks, music racks, etc.

This invention has been patented by Mr. Elbridge J. Wood, of Palmer, Mass.

Manufacture of Tin Plate. Stoll, of Stuttgart, delivered a lecture on this important industry, one of the few not known here, of which Dingler's Polytechnic. Journal publishes the following interesting abstract:

Tin plate can be classified, according to the iron used, as follows: Charcoal plate, puddled iron, coke plate, and steel plate. In a few works sheet iron is still made of iron refined with charcoal. Of course an excellent quality of pig iron must be used to make puddled iron of good and best quality. Steel plate is made of very tough steel made by different processes. The so-called charcoal tin is made by refining pig iron and scrap with charcoal, and is very dense and strong. For this reason tin plate made from it is rather harder to work, but will stand longer and is better than that made from softer iron. Only puddled iron is generally used for coke plate, since a better quality is rarely required for such tin.

The iron used in making tin plate is prepared as follows: The blooms, weighing from forty to fifty hundredweight as they come from the puddling or refining furnaces, are first placed under steam hammers, then rolled into thin bars, which are cut up and tied in bundles. These bundles are strongly heated in the reheating furnace, thoroughly wrought, heated again, rolled into bars in calibrated rolls, then cut in lengths corresponding to the different sizes of plate, and called platins or plate iron. These bars are then rolled out with hard rollers into sheets, which are trimmed with huge scissors to the exact sizes met with in commerce. The sheets must be pickled to remove the costing of oxide (rust), either hydrochloric or sulphuric acid being used acording to circumstances

kettle, the fine tin or roller kettle, and the grease kettle. The different operations performed in these kettles take place in this order: The pickled and scoured plates are put of the book. The covers of the book rest on the raised parts in the first kettle and thoroughly coated with grease; of the board at each side of the groove, and are held in usually pure tallow, but sometimes palm oil is used. Then it goes to the tin kettle, in which it is moved about until distance from each end is a recess formed in each raised kettle, also containing tin. Here each individual plate is taken out and brushed with an oakum brush or pad of are bent upward at their outer ends, forming spring arms fine tin (passirkessel), then in the last kettle, that also contains hot grease, on a grating, or moved up and down in it by rollers. When the plates come from this kettle they are placed on racks to cool. The tinning is now completed, but they do not look very nice, owing to the adherent grease. To remove this they are drawn through three or four large boxes filled with slaked lime, sawdust, bran, or flour; flour is the best of all, for it cleans them better, and after it gets saturated with grease the flour can be used for cattle feed.

After the tin plates leave these boxes they go to the polishing bench to remove the dust. This bench consists of a table covered with woolen cloth, or a sheep pelt, and the sheets are rubbed singly with a rubber made of wool or sheepskin, which brings out the pure, fine luster of the tin.

The tin is next assorted by a careful inspection of both sides, and classified as first, second, or third quality. Sheets that are imperfectly tinned are sent back to the tinning room, while the rest are packed in wooden boxes and the brand hurned on.

Attempts have been made to replace the fat with chloride of tin, but tin plate made in this way was found to be inferior to that made by the old process, because it is far more prone to rust. At present scarcely any tin plate is made with chloride of tin, but some manufacturers use this process for tinning cooking utensils.

Another improvement consists in passing the tin, as it comes dripping from the last bath of melted tin, between rollers that squeeze off the excess of tin and leave a uniform coating of any desired thickness according as they are set close or far apart.

Elm is the wood generally used for boxing tin.

# Errors in Maps of New York State.

The survey of the State of New York, according to the official report of the Commissioners, bears out the conclusion that French's map of 1860 is the best map of the State in use, although it is found that the boundaries of counties in central New York are misplaced from one to two miles. The city of Owego is there placed a mile further west than it really is, and the western boundary of Tompkins County is two miles too far west. The boundaries as marked on the grounds are correct, and the State Survey maps, when completed, will represent the boundaries as they actually exist.

#### .... LOCOMOTIVE COW CATCHER.

The accompanying illustration represents a device for removing or throwing from the track animals or heavy obstructions, such as rocks, without danger of derailing the engine. The cow catcher is made of plates of boiler iron firmly connected to form a  $\wedge$ -shaped box, open at the under side and inclined to a point at its forward end. At the bottom is a frame of bars, serving to strengthen the plates. The catcher is bolted firmly to the bumper of the



DOUGHERTY'S CAR COUPLING.

weighted lug tends to swing the bar toward the end of the draw head, thus keeping the projection in place. As the link enters it strikes the lug below the projection and swings the bar inward, thereby moving the projection from under the pin, which drops through the link, coupling the two cars together. When the free end of a link held in one draw head is to be raised so that it can pass into the opposite draw head, the weighted end of the pendulum bar is permitted to act by its own weight on the end of the link, as indicated in the right of the engraving.

This invention has been recently patented by Mr. M. J. Dougherty, whose address is Box 136, Carbondale, Pa.

The material is rendered so hard and brittle by this treatment that it has to be annealed before proceeding to the next step, namely, smoothing and polishing it. This is accomplished by heating it in tightly closed boxes or muffles, the plates being packed tightly together. These muffles are placed on wagons and run in a warming furnace, where they are left ten. or fifteen hours. The polish-

ing is performed by drawing the sheets of iron, after they have been pickled and tempered, between polished rolls of hard cast steel heavily weighted.

To get a clean metallic surface, such as is requisite to receive the tin, the iron must be dipped repeatedly into quite dilute sulphuric or hydrochloric acid, then polished and scoured, each one separately, with sharp sand over the entire surface. It is now ready to receive the tin, and passes to the tinning room.

In this room there are five kettles, all of the same height, placed in a row and heated with fires beneath them. They are called the grease kettle, the tinning kettle, the brush lips, of Marshfield, Oregon.

PHILLIPS' LOCOMOTIVE COW CATCHER.

engine, and is made wide enough to cover the rails. On the lower edge of each side is connected a strong spring plate, having its end extending backward and downward so as to terminate just above the rail. The cow catcher is made strong enough to lift an animal so as to throw it back upon the rear part, from which it will roll off. The springs are strong enough to resist heavy pressure, and will remove small objects not removed by the catcher, and, in case the rails should be sprung, will act to force them down so that the wheels can pass safely over.

This invention has been patented by Mr. William Phil-

# Scientific American.

#### AMERICAN INDUSTRIES.-No. 88. THE MANUFACTURE OF STEAM ENGINES AND AGRICULTURAL IMPLEMENTS.

The celebrated manufacturing town of York lies in the famous agricultural region of the Codorus Valley, in Southern Pennsylvania, between Philadelphia and Baltimore, and is about five hours by rail from New York city. Its most important industry is the manufactory of steam engines and agricultural machinery known as the Pennsylvania Agricultural Woks, owned and managed by A. B. Farquhar. These works were founded by Mr. Farquhar a quarter of a century ago, and additions have been made from time to time until they now fairly rank as one of the most complete and extensive establishments, for the production of machinery and implements, not only in the United States but in the world. The works were designed especially for the manufacture of improved machinery and agricultural implements, with tools adapted to every part of the work; and having the benefit of abundant skilled labor at moderate cost (owing to low rents, good markets, and healthy location), and being contiguous to the vast lumber, iron, and coal regions of the country and in easy access of the great cities of New York, Philadelphia, and Baltimore, the proprietor is enabled to offer superior advantages to those needing first class agricultural tools and machinery.

The works cover a number of acres, and embrace machine, engine, and boiler shops, bolt and nut factory, planing and saw mills, foundries for brass and iron, forging, shearing, and polishing rooms, besides warehouses, lumber yards, etc., all complete in itself. Among the specialties are steam engines, saw mills, thrashing machines, plows, agricultural steels, cultivators, grain drills, corn planters, horse powers, etc., in almost endless variety. Some idea of the magnitude of the operations may be formed from the fact that

pounds, and of steel fully 10,000 pounds, and of lumber from 50,000 to 100,600 feet.

The business shows an annual average increase of from fifteen to twenty per cent, necessitating frequent additions to both buildings and machinery. This is a direct result of the principle governing the whole concern-only the best material and most skilled labor are employed, and everything sold is fully warranted; not a single detail is risked by bad work, and if a mistake or defect occur it is promptly made good. The utmost pains are taken at every point to turn out only work of the highest order. As a natural consequence the trade now extends over the habitable globe, and at the time of our visit orders were being filled for nearly every State in the Union, and shipments being made to remote corners of the world. Large additions to the works have been made within the past year, and machinery of the most improved pattern known to the trade has been introduced for the manufacture of each part of the work.

The best relations exist between proprietor and employes, and there has never been a strike in the works. The super-

intendents and workmen take almost as much interest in the the same brand as that used by the Pennsylvania Rail- noticed remedy is one that is applied by the Pratt & Whitsuccess of the business and quality of the machinery turned out as the proprietor.

No traveling men are employed, the business relying on quality for its maintenance and increase. It is the aim of the proprietor to give full value to all purchasers and to make it a benefit to them to deal with him, and as proof that his efforts in this direction have been successful he points with just pride to his immense and rapidly increasing business. The works ran full handed during the entire period following the financial depression of 1873.

The most competent experts are employed in the several departments, and large sums are expended in order that they may post themselves concerning the wants of different sections and keep the manufactures up to the highest standard of excellence. Many medals from the world's fairs of Europe, our Centennial and State fairs, attest the high regard in which the machinery is held.

plows and implements.

 ${f \Lambda}$  bird's eye view of the principal factories is shown in its lightness of draught, rapidity and economy of work. Owour engraving, each department being arranged with special ing to its self-regulating blast, which cleans the grain ready relation to the business pertaining to it. Although it is imfor market, the chain elevator which cannot be choked, steel in line or level. possible to give a conception of the size and completeness of shafts and spikes, it possesses advantages of the highest the works, some idea may be formed when we say that the order.

rapidly increasing Southern trade necessitated the opening of the branch store and factory known as the Central City Iron Works, in Macon, Ga., now one of the most complete in the South. The large export trade is handled from the store in New York city.

Among the well-known specialties manufactured at these works are the Farquhar Ajax traction and portable engines (the fire-boxes are steel, and the boilers have a remarkable record, not one having ever exploded); the vertical boiler with submerged tubes, arranged with wheels when desired; the Farquhar separator with self-regulating blast, saving every grain; saw-mills with patent feed, set works and dogs of most improved kind. Among the leading implements manufactured here are the Penna, drill and corn planter, with perfect force feed and phosphate attachment, and Farquhar's celebrated wheel or sulky plow.

Farquhar's Ajax Traction Engine has several important patented advantages. The boiler is made of steel, and is so constructed that it is impossible for the crown-sheet to become exposed, even on the steepest grades. A steam guiding attachment enables the engineer to steer with ease, by the simple movement of the lever. The wheels are of a most improved pattern, strong, durable, and of a handsome design. Springs are placed in the hubs of the wheels, acting as a cushion between the engine and gearing, and supporting the weight and avoiding jarring when passing over an obstruction. A neat cab covers the platform, protecting the engine and engineer from storms or hot sun.

The Ajax Portable Engine is of the center crank type, and possesses strength combined with simplicity. The pedestals and cross-head guides are cast solid with the bedplate, thus making it impossible for the engine to work out of line or give. The cranks are made of the best the weekly consumption of iron now averages over 150,000 steel. The fire-boxes of the boilers are made of steel, of up by ordinary farm laborers. Corn shellers adapted to hand



#### FARQUHAR SULKY PLOW.

road in their locomotives. The rest of the boiler is made of the best charcoal iron.

The Vertical Engine is very popular, being light, convenient, and cheap, and is as good as the horizontal where light power, from two to six horse, is required where used for thrashing grain or other portable purposes. The boilers are provided with two trunnions and wheels. The tubes are submerged. The engine and boiler are carefully made to insure durability and strength.

In the Farquhar Improved Saw Mill the patent feed, set works, and dogs and head blocks are all of improved form; the sawshaft is steel. It is stated that some of our large lumbermen have found it economical to throwout their old mills and substitute this.

The Farquhar Separator is so well known as to need but little description. It was awarded the first premium and medal at the Centennial and Paris expositions on account of

In addition to the works located at York, the large and is strong and durable, and can be doubled in a portable form. The teeth are prevented from getting loose by being fastened with nuts and washers. Harrows constructed upon other plans, but all showing the same degree of good workmanship, were noted.

The Farquhar improved cotton planter is very simple and perfect in its operation, dropping the unrolled seed with remarkable regularity and in any desired amount. The Keystone corn planter will plant from ten to twelve acres of corn per day, dropping kernels in drills or in hills, at any desired distance apart, and sowing at the same time, if needed, any kind of pulverized fertilizer. The Pennsylvania force-feed fertilizer grain drill will not only sow the grain evenly, but, what is an equally important feature, it will distribute the phosphate with the same precision, doing the work without any loss of either seed or fertilizer.

The Farquhar Hoffheins mower and reaper possesses many points of excellence. The frame being of solid iron and very compact holds the shafts securely! in position and is supported by two ground wheels, either or both of which drive the machinery. The self-rake, moving automatically, will make the bundles at regular intervals, their size being regulated by means of a treadle convenient to the driver's foot. The height of cut can be regulated while the machine is in motion; the guards can be thrown down, so as to run under the fallen grain, or elevated to pass obstructions.

Farquhar's climax horse-power, for thrashing, ginning, and general farm use, is triple geared, the strain being divided so as to prevent breakage or wear. All the gearing is connected by one strong iron frame; the levers are so arranged that the strain of the team is thrown upon iron braces, and can be taken off or put on in a moment without loosening a bolt. All the boxes are self-oiling. This horse power is strictly portable and can be quickly and easily set

> or horse power, farm mills, standard grinding mills for corn, wheat, and other grains. fodder cutters, cider mills, farm and freight wagons, etc., are turned out in almost endless variety.

> We have not the space to even enumerate them. All the various parts of the agricultural implements and the steam engines and boilers-including bolts, nuts, thrasher spikes, wrenches, plow irons, and forgings of all descriptions, and valves, cylinder lubricators, water gauges, air cocks, steam whistles, inspirators, etc.are turned out at these works.

> Further particulars of this manufactory and the work it produces may be obtained from the large illustrated catalogue, which will be furnished upon application by the proprietor, Mr. A. B. Farquhar, York, Pa.

# Lathe Pulley Faces.

Machinists have often noticed the edge wear of belts on pulley steps of lathe cones, caused by the riding or the rubbing of the belt on one step against the rise of the next higher step; and this creeping up notwithstanding the swell or crowning of the face of the pulley step. A recently

ney Company, Hartford, Conn., on all their lately built lathes-a remedy as simple as it is effectual. The crown of the pulley face is not in the center, but cn the "off" side, or toward the next lower step, away from the adjoining rise. By practice it has been found that this diversion from the center is too slight to affect the eye, the off on a step of  $2\frac{5}{8}$  inches for a  $2\frac{1}{2}$  inch belt being only one-eighth of an inch ; but it is an effectual remedy.

The crowning of the faces is effected by equally simple means. Machinists generally know the Slate taper attachment to lathes, which guides the tool carriage independent of the traverse screw, in turning or in boring tapers. The arrangement for producing the swell is on the same principle, the transverse screw being removed and the upper portion of the carriage with the tool post being held by a flat spring at the back of the lathe against a former, a slightly swelled strip to correspond with the intended crowning of the face of the pulley step. This is the last turning operation on the lathe cone, the former chips being

total floor space approximates half a million square feet. Farquhar's Wheel or Sulky Plow does work better, cheaper, The view on our title page gives an idea of the arrangement quicker, and with infinitely more ease than the walking plow. of the shops, some fifteen in number, and some of the lead-Its special advantages are simplicity of construction, effecting machines and implements. The buildings are all conive work, steel beam. It has a positive self-lifting attachstructed of brick and iron, with slate or metal roofs. A ment, adjustable hub box, light, strong, and handsome wheel, complete system of water mains, hydrants, and hose pipe and may be easily and readily adjusted from two to three protects the works from fire. The wood-working shops horses. It is constructed wholly of iron and steel. It has are supplied with a system of perforated pipes, so arranged sliding axles, is light draught and is most durable, although that the entire structure may be deluged with water by weighing less than the others in use. In construction, adturning one wheel. The factories are all lighted by electric justment, and ease of management it is superior.

lights. Tracks connect the different buildings with the five Many other improved implements were being turned out railroads centering at York. The very best work can be in great quantities when we visited the works. We have furnished at the lowest price, since all parts of the machinery only space to speak of a few which particularly attracted and implements are made here-the nuts, washers, bolts, attention. The Geddes hinge harrow is one of the best steam fittings, etc., belonging to the engines, and the hanin use. It draws from the center, is easy on the team, dles, beams, castings, steels, bolts, etc., belonging to the and being hinged it works as well on uneven land, and is easily lifted when in motion, to discharge weeds, etc. It potassium nitrate with a trace of magnesium nitrate.

Railroad to Alaska and Ferry at Behring Strait.

A railroad around the world, or something nearly of that nature, is evidently in the mind of one of our correspondents, who suggests the employment of our surplus revenue in building the line from Oregon to Alaska, and that then the Russian government would be likely to extend the line through Siberia to Pekin. This having been done, it requires not much further stretch of the imagination to see, with the mind's eye, the long rails stretching out under the shadows of the Himalayas until they make connection with the proposed line in the Jordan Valley, and thence with the European system.

A CORRESPONDENT in the Government Engineering Laboratory, College Howrha, Bengal, writing in reference to the discoloration of brick walls, says that in three samples of white incrustation he found the substances to be mainly