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## THE VESTIBULED CAR PATENT DECISION.

Twenty or thirty years ago the passenger cars of the Housatonic Railway, running northerly from Bridgeport, Conn., were equipped with flexible hoods, covering and inclosing the ends of the cars. In the sides of the hoods were entrance doors. When the hoods were in use and the ordinary end doors of the cars thrown open, the train formed as it were one long, continuous car, forming, in fact, what is now known as a vestibuled train. These vestibuled vehicles of the Housatonic road were specially advantageous for the summer ventilation of the cars. Air tunnels were extended from the front of the locomotive to the first of the hooded cars, into which poured a mass of pure air, free from dust and cinders; the fresh air passed through the entire train, being discharged from the rear car. These vestibuled cars were used for several years with much satisfaction to the public, but somehow or other they were finally given up and remained as it were a lost art until the Pullman Car Company revived them, added improvements, obtained patents thereon, and introduced the now well known and highly appreciated Pullman vestibuled cars. The success of these palatial structures induced other companies to adopt the hoods, among them the Wagner Company, whereupon the Pullman Company brought suit for infringement, asking the court for such a broad interpretation of their patent, claims as should shut out all other car companies from using vestibuled cars in any form. These monstrous claims, it appears, have been allowed by the United States Circuit Court, Massachusetts, Judge Colt presiding.

The suit was brought by the Pullman Car Company for infringement of George M. Pullman's patent of May 14, 1889, against the Boston and Albany Railroad Company, but the real defendant is the Wagner Palace Car Company.

The Court, in answer to the ground of the defense that the patent is void for want of novelty, says: "Considering the amount of thought in the country directed toward improvements in railway mechanism, whereby greater safety and comfort may be secured to the traveling public, it hardly seems possible that the Pullman vestibule system, in view of what it has accomplished, and the immediate recognition of its merits, was the result of the exercise merely of mechanical skill, and therefore not patentable under the laws of the United States. Leaving out the Sessions patent, I can discover nothing in the prior state of the art which anticipates the Pullman patent, or which should render it void for want of patentable novelty."

The Court then took up the Sessions patent, which was a patent granted to H. H. Sessions on November 15, 1887, and which, it is contended by the defendants, describes what is now claimed as the Pullman invention. Sessions is general manager of the Pullman Company, and he applied for his patent two weeks before the Pullman application was made. Judge Colt said that the fact that these applications were filed at about the same time goes to show that Sessions thought he had invented something and that Pullman believed he had invented something; and his honor, after examining in detail the claims of the two patents, said:

"The problem Sessions set out to solve was to diminish certain evils incident to a train of cars, namely, to the starting and stopping of them, and to a swaying which arises under certain conditions when the cars are moving. On the other hand, what Pullman undertook to do was to overcome the difficulties incident to a vestibule connection between cars, and he accomplished this by means of 'flexible or adjustable joints to permit a sufficient movement between individual passenger cars,' which he declares is the invention he desires to protect. I cannot, upon a comparison of the two patents, taken in connection with the evidence of Sessions, hold him to be the prior inventor. It seems to me that it would be an act of injustice for the Court by inference to incorporate the Pullman invention into the Sessions patent, and thus prevent both inventors from deriving any benefit from this improvement, because it is manifest that if we destroy the Pullman patent, Sessions can derive no benefit from the Pullman invention, because he nowhere describes or claims it in his patent."

The Court, in conclusion, said, "Upon the construction now given by the Court to the Pullman patent I have no doubt that the structure used by the defendants is within the patent. It may not work perfectly, but it contains the substance of the Pullman invention. Let a decree be drawn for complainant as prayed for in the bill."

Concerning the decision in his favor Mr. Pullman is reported as saying: "As I understand the matter, the decision covers every point involved in the litigation, and is a complete victory for us. It will mean that no other company can lawfully use a vestibule."

"The decision completely knocks out the Wagner Car Company," said the general counselor. "They will not be able to use any sort of a vestibule."

The public will be at a loss to understand how it is that an invention which was in practical use years ago can now be revived by another inventor, and new patent claims granted to him so broad in scope as to

shut out everybody else. In the majority of such cases, especially when the parties are ordinary private individuals, the courts generally take care to limit the interpretation of new claims to the precise improvements set forth, which is as it should be. But when the plaintiffs are rich and powerful, like the Pullman Company, or the Bell Telephone Company, then our courts are apt to blunder, and wield their judicial power to strengthen and support these grasping and gigantic monopolies. Evidently this is not as it should be.

## INTERESTING EXHIBITS AT THE AMERICAN INSTITUTE FAIR.

The 59th annual exhibition of the American Institute opened, in this city, on October 1, and is now in progress. It is to continue until November 29. In most respects it is in full operation, and the floor space is well filled with interesting exhibits.

Woodworking machinery and products are well represented. The Pyrogravure Decorative Wood Co. shows some exceedingly pretty panels and other parts in different woods. These have designs upon them in full relief. Some of the designs are quite ornate, and the exhibit suggests very excellent ideas for home decoration. Various other exhibits are in the line of house finishing.

The Burlington Venetian Blind Co. show their sliding blinds, Hill's patent, and mosquito nets and Venetian blinds. The latter, with slats connected to vertical tapes, take the place of roller shades. Copied from an old European structure, they have been improved to accord with American practice. The well known Norton door spring and check is shown, together with the Prescott trackless sliding door. This door works by a very ingenious species of parallel motion, so that it is suspended from a single pin. The whole is adjusted in place without touching the plaster of the partition which the door enters. It cannot, of course, run off to one side, as there is no track nor rollers. A very simple wedging arrangement is provided, which fixes the door laterally. The Barnard door holder, a very simple substitute for striking pin, with the added function of keeping the door open, is shown by the same agent.

The Monumental Bronze Co., of Bridgeport, show their white bronze monuments, with their slightly roughened surface, almost resembling stone. Their manufacture has already been described in these columns. In fine iron casting, T. Shriver & Co., of this city, have an interesting exhibit. Their specialty is in the line of dies for silverware, jewelry, paper hangings, cane and umbrella heads, and the like, and the quality of the castings is very fine.

Another small exhibit, yet one of great interest to the metal worker, is that of the Spring Garden Metal Works, of Philadelphia. By a secret process, the invention of Mr. Ellwood Ivins, they produce tubing of all sizes and of great lengths from the most diverse materials. From the finest Stubs steel the minute tubing for hypodermic syringe needles, one hundredth of an inch in diameter, is produced in long lengths. Some of the specimens in the exhibit were coiled up and resembled exceedingly fine wire. Gold and aluminum, as the opposite extremes, are made into tubing of all sizes. The larger gold tubing is used for watch case work, in making the rim in which the crystal is set. From a long tube successive slices or rings are cut, which, from their great accuracy in respect to thickness, are worked by means of dies into the best possible rims. Stem tubes for watches are also made, with such unerring accuracy as to thickness of walls that the fitting is perfect from the start, and no time or labor is required to make corrections. The inventor states that his invention is applicable to the production of uniform tubes of all sizes and forms, and of all metals, from the size of a fine hair up to a three foot water pipe, and that there is no weld, solder, or joint. The invention is evidently a most remarkable one, and capable of widely extended uses. The ready production of perfect tubes out of such difficult working metal as aluminum is one of the peculiarities of the process.

In the production of heat the United States Fuel Company shows various applications of sestalit, a fuel that is burned in portable heaters for general domestic uses. It needs no chimney or special ventilation, and the stoves in which it is consumed have no smoke pipes. A rival to gas or charcoal for heating purposes is shown in the Stickney kerosene oil burner and plant for heating soldering irons. The oil is fed through a jet, and is burned by the agency of a blast of air. In gas stoves, the American Meter Company, of this city, has an interesting exhibit. One of their open heaters has a backing of peculiarly indented bricks, with small cast iron gratings or fingers in front of them. The gas is burned with a blue or non-luminous flame, and brings the iron fingers and the surface of the fire brick to full incandescence, so as to produce the effect of a strong anthracite coal fire. Their well known cooking stoves and luminous flame open heater are also shown.

The artificial production of cold is illustrated by the exhibits of L. Dermigny & Co. The exhibitor supplies a freezing apparatus for the production of ice and ice

cream by the solution of salts. A special refrigerating salt is supplied to be recovered after use by evaporation. The ice produced is illustrated by models made of paraffine wax, which have a very natural appearance. Naphtha, gas, and steam engines are shown in considerable variety. The Gas Engine and Power Company, of this city, have a number of their familiar naphtha launches on the floor. These have proved so convenient that the same company are now making a naphtha engine pump, constructed on the general lines of the launch engine, to be used for general pumping purposes. These engines can be run without any license, and require no special skill or training on the part of the one in charge.

Among gas engines proper the Rollaston, White & Middleton, Hartig, Koerting, Otto, and Crown Compression engines are shown. A novelty in some points is presented by the Cycle gas engine. By a very peculiar combination of levers the four phases of work are repeated once for each revolution of the shaft. This includes the impulse, exhaust, suction, and compression. This feature insures great regularity of rotation. To vary the power the proportions of the mixture are changed. Under all circumstances each single revolution of the shaft includes the impulse and other phases.

The Electro-Metallizing Company, of this city, had some very interesting examples of electro-plating of natural flowers and leaves. By plating upon these with silver or copper very beautiful objects for decoration of lamps or vases are produced. Roses, carnations, ears of grain, and natural leaves are among the objects. To get rid of the leaf or flower forming the core, it is burned out, and if desired, lead or an alloy is poured into the hollow metal. Another electric exhibit is the Mason primary battery for supplying lamps and motors. The inventor's patent battery zinc and his exciting fluid constitute the characteristic features of this battery.

Some interesting food products are shown. Mailard's chocolate is displayed in good style. A statue of the Venus of Milo, made of chocolate, is a prominent object. It was shown at the Paris exhibition. It is seven feet high and weighs 1,985 pounds, containing enough material to make 30,800 cups of chocolate.

Armour's extract of beef, as put up at the well known Chicago factory, is on exhibit. This distinctively American product is produced in large quantities and has been used by the United States Army Medical Department, which is a good certificate of its quality. Another article adapted for the housekeeper is C. C. Parson's household ammonia. This well known fluid is now supplemented by the zommonia of the same inventor, which contains not only ammonia, but soap, so as to have a double claim to cleansing properties.

Among the photographic novelties is the slot machine for taking photographs. On sitting in position and dropping "a nickel in the slot" and executing some manipulations, a photograph of the sitter is passed out. Many other slot machines for weighing, etc., are shown. A number of phonographs are exhibited which work upon the same principle, giving a great choice of airs, songs, etc., to be listened to on the deposit of a five cent piece.

#### Rancidity of Fats.

The determining cause of the rancidity of fats has been a fertile source of conjecture, and water, air, albuminous matter, ferments and light have by different writers been credited with the sole or joint authorship of the mischief. Some fresh experiments, reported by Herr Ritsert (*Pharm. Zeit.*), seem to throw additional light upon the subject. The first experiments had for their object to determine the relation of micro-organisms to the rancidification of fats and to ascertain under what conditions sterilized fat becomes rancid. It was found that, notwithstanding the occurrence of most diverse micro-organisms in rancid fat, both aerobic and anaerobic germs die when added to fresh undecomposed fat, from which it was inferred that the change is not initiated by them. Indeed, it was also found that under the influence of sunlight, which killed the germs, the rancidity was produced more rapidly. Experiments were, therefore, made with sterilized lard (1) protected from access of air, but exposed to sunlight, diffused light, and kept in the dark; (2) with access of air, exposed to sunlight and kept in the dark; (3) in atmospheres of moist and dry oxygen, carbonic acid, nitrogen, and hydrogen. As a general result it may be stated that the condition favorable to the production of rancidity proved to be the action of light during contact with air, the change being induced more rapidly, the more intense the light. Thus it was found that sterilized lard, either moist or dry, when kept from contact with air in sealed tubes, remained free from rancidity after two months, even though exposed to sunlight and warmth. When Erlemeyer's flasks were filled with sterilized lard, stoppered with sterilized wadding, and exposed to sunlight, rancidity was evident at the end of a week; but if the contents of the flask were sheltered from light by a coating of black varnish, the lard remained sweet after

two months, even when the flasks were only partly filled. In order to ascertain to which constituent of the atmosphere the change is due, the quantity of oxygen, nitrogen, hydrogen, and carbonic acid absorbed by sterilized lard under similar conditions was noted, and the effect produced upon the fat. Oxygen, both dry and moist, was absorbed freely in the light, the fat becoming strongly rancid in one month; but none was absorbed in the dark, the fat remaining quite fresh. Nitrogen and hydrogen both remained unabsorbed, whether exposed to the light or kept in the dark, and the lard did not become rancid. Carbonic acid, dry and moist, was absorbed in the light and to a less extent in the dark, but the lard only acquired a tallow-like taste and no odor.—*Pharm. Jour.*

#### Koch's Remarks upon his Probable Cure for Tuberculosis.

"I have proved the following substances to be remedies which hinder the growth of tubercle bacilli in tube cultures (to mention only the most important): A number of ethereal oils; among the aromatic compounds,  $\beta$  naphthylamin, paratoluidin xylydin; some of the so-called tar dyes, namely, fuchsin, gentian, violet, methyl blue, chinolin yellow, aniline yellow, auramin; among the metals, mercury in the form of vapor, silver and gold compounds. The compounds of cyanogen and gold were especially conspicuous, their effect surpassing that of all other substances; even in a dilution of one to two millions they checked the growth of tubercle bacilli. All these substances, however, remained absolutely without effect if tried on tuberculous animals. In spite of this failure I have not allowed myself to be discouraged from prosecuting the search for growth-hindering remedies, and I have at last hit upon a substance which has the power of preventing the growth of tubercle bacilli, not only in a test tube, but in the body of an animal. All experiments in tuberculosis are, as every one who has had any experience of them has sufficiently discovered, of very long duration; my researches on this substance, therefore, although they have already occupied me for nearly a year, are not yet completed, and I can only say this much about them, that guinea pigs, which, as is well known, are extraordinarily susceptible to tuberculosis, if exposed to the influence of this substance, cease to react to the inoculation of tuberculous virus, and that in guinea pigs suffering from general tuberculosis, even to a high degree, the morbid process can be brought completely to a standstill, without the body being in any way injuriously affected. From these researches I, in the meantime, do not draw any further conclusions than that the possibility of rendering pathogenic bacteria in the living body harmless without injury to the latter, which has hitherto been justly doubted, has been thereby established."

#### Progress of the Gas Engine.

A Manchester contemporary says Messrs. Crossley Bros., of Openshaw, the well known gas engine makers, have made a new development in the manufacture of large gas engines. This is in the form of the completion of a new 30 horse power single cylinder "Otto" gas engine, possessing a capability of working up to 100 horse power. All the latest improvements are included in the engine, which is erected on the horizontal plan, and is intended for the Wandsworth Projectile Company, of London. This engine is, however, by no means the largest manufactured by Messrs. Crossley. The double cylinder "Ottos" are now well known among manufacturers and others for possessing many advantages over the ordinary steam engine. Engines of this character are made capable of running up to from 100 to 200 horse power. The firm has now in hand several large installations, requiring from 100 to 500 horse power in each case. One of the latter installations will consist of several double cylinder engines, and will be used for driving the machinery of a large flannel manufactory. The use of gas engines for this work is a new departure; for it has hitherto been supposed that these engines were not powerful enough for driving machinery on a large scale. The order will be the largest that has ever been placed for engines of this description. With the engines laid down by Messrs. Crossley Bros. is connected the Dowson patent economic gas system, which, in conjunction with the engine, brings down the fuel consumption to less than 1½ lb. per indicated horse power per hour. This result has perhaps elsewhere never been arrived at, even by the best and most modern Lancashire mill engines. The machinery in Messrs. Crossley's works has for several years past been entirely driven on this system; and the actual cost of working has never exceeded the above figures. Extensive use of the engines is also made at the works of Sir William Armstrong, limited, at Elswick. There are about 1,000 engines made by the firm at present working in Manchester; and Messrs. Crossley not unfairly assert that as a result they have practically aided in the important work of improving the state of the atmosphere of the district. With the production of the latest single cylinder engine, the firm are now able to provide some twenty-five varieties of engines.

#### Fun among Editors.

An amusing, if not instructive, triangular contest is now on between the *Engineer*, of London, and the *Railroad Gazette* and the *Engineering News*, of this country. An effort is being made by those distinguished journals to determine whether or no an American locomotive is better than an English locomotive. The argument as far as yet carried on appears to merit the dubious compliment which was paid to Aunt Sally's vinegar pie, "Very good what there is of it, and plenty of it such as it is." In the last issue of the *Railroad and Engineering Journal*, Brother Forney dishes up the whole discussion to date in the form of a delicious literary salad which, as the back of a dining menu would say, fairly tempts the palate with its piquant variety, and satisfies the robust appetite with its wholesome abundance. Forney predicts that when the *Engineering News* buckles right down to the contest and opens its guns in good earnest, the *Engineer* will wish it was never born, and that then, too, "the American locomotive will distend its nostrils, and declare itself victorious with a shriek which will be heard from Alaska to Patagonia, and which will penetrate either diametrically through the earth, or be wafted circumferentially around it to our antipodes, who, standing on their heads, may be able to comprehend the significance of the arguments." The inimitable Forney! None but he could have treated this international episode in so graceful and clever a manner. Here is another glint from his polished blade:

The *Engineer* shouts vehemently, "Our locomotives burn less coal than yours do." The *Gazette* answers, "What if they do, we pull more than you can." From across the Atlantic comes the interrogation to us, "What do your locomotives cost for repairs, anyway?" and the *Gazette* answers ruefully, "We don't know, but we intend to know;" and with real Yankee interrogative retaliation asks, "What do yours cost?" and their adversary replies, "We don't know either," and then they proceed to write long arguments based on what they don't know.—*The Railway Master Mechanic.*

#### A Notable Catalogue.

The new catalogue of the Frick Company, of Waynesboro, Pa., though nominally a circular for the information of customers, is of sufficient scope to be of general interest. The entire subject of ammonia plants for ice refrigerating, a specialty with this firm, is discussed at length. The merits and defects of different systems are considered, and with a very full exposition of the details adopted by the Frick Company and the reasons for their adoption. Some of the points of special interest affect the type of compressor pumps. This is chosen of the single acting type, in order to avoid the strain upon the piston rod stuffing box of resisting high pressure ammoniacal gas. All the heavy compression is done on the rear side of the piston. The subject of clearance is also treated. Many attempts at avoiding it have involved the use of oil in the cylinder. The Frick compressor relies on almost absolute contact of metal with metal, and in order to avoid all trouble, makes the outlet valve of equal area with the piston, so that it may be raised from its seat by the actual pushing of the piston itself. Through all the work similar interesting points of general practice are lucidly treated.

The book is very fully illustrated. Some of the more striking views are photogravure reproductions of large cakes of ice. A standard size produced by the Frick apparatus is eight by sixteen feet and fourteen inches thick. The illustrations show such cakes of ice suspended or supported on edge with men standing behind them whose forms are visible through the transparent mass. A point made in favor of this system, and called the plate system (the Smith patent plate system), is that the ice so produced splits much better than the ordinary artificial cake ice.

#### Deep Mining.

The mine at St. Andre du Poirier, France, yearly produces 300,000 tons of coal. The mine is worked with two shafts, one 2,952 feet deep and the other 3,083 feet. The latter shaft is now being deepened, and will soon touch the 4,000 foot level. A remarkable feature of this deep mine is the comparatively low temperature experienced, which seldom rises above 75° Fahr. In the gold and silver mines of the Pacific coast, at a depth of less than half that of the French coal mine, much difficulty is often experienced in keeping the temperature low enough to admit of working. In some levels of the Comstock lode the temperature rises as high as 120° Fahr.

#### The Value of Exercise.

In order to secure a long life and a green old age, somebody has said, and no one will dispute, bodily vigor should be sustained by regular, systematic exercise, avoiding all sudden strain and prolonged exertion as much as possible. Especially is this true of running, lifting, climbing, etc. And labor, while desirable in moderation, should never be prolonged till it produces exhaustion.

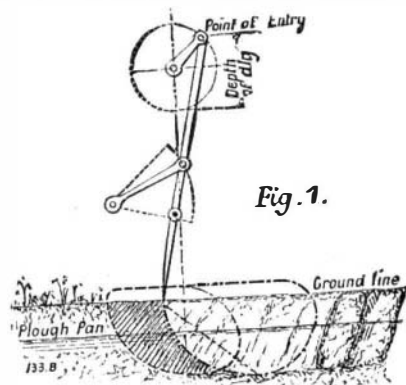


### The Electrical Production of Caustic Soda.

The principal chemicals used by paper manufacturers are caustic soda and chloride of lime, or bleaching powder, and these two substances constitute items of considerable expense in paper mills. For some time past it has been hoped that these two chemicals would be obtained directly and economically from common salt by the aid of electricity. Many attempts have been made in the past to effect this object, but we believe they have all ended in failure. This has probably been due to one or the other of two causes—namely, either a deficient knowledge of the laws regulating electric currents or badly constructed tanks and apparatus for effecting the decomposition economically. The practice has been to separate the products of electrolysis by porous plates or diaphragms, which offer considerable resistance to the passage of electricity and add to the general cost of useful work done, and are in other respects objectionable. At length, however, it would appear that caustic soda and bleaching powder can be, and indeed are being, practically and economically produced from common salt by the aid of an electric current. This desirable end has been attained by Mr. James C. Richardson, of London, whose process has been in operation on a working scale for several months past at one of the largest paper mills in the kingdom. The whole apparatus is automatic, the salt solution passing regularly and the caustic soda being drawn off at any strength up to 10 or 12 per cent pure caustic soda. The chlorine, which can also be used direct for bleaching, is absorbed by slaked lime, and bleaching powder is thus produced. We are not at present at liberty to give any details respecting this process, but we may mention that it is not simply a method of producing a bleaching solution by electrolyzing salt, but a commercial process of producing these two important chemicals. The porous partitions are altogether dispensed with in Mr. Richardson's apparatus, and in other respects it differs materially from that employed in previous attempts to effect the same object. It is stated that the cost, both electrically and commercially, is much below that of the ordinary Leblanc process of alkali manufacture, and that at least three times the amount of chlorine is

### STEAM DIGGING

"Steam digging" is the recognized expression for the art of forking land by steam power for the purpose of tillage, and its adoption has of late years been steadily increasing. According to the most modern practice, it is performed with an ordinary traction engine of which the digging apparatus forms a part. We illustrate Mr. F. Proctor's digging device, which is



manufactured by Messrs. Burrell & Sons, Thetford, and for which many advantages are claimed by its author. The device consists of: Three steel forks and fork handles, three-rocking levers, one wayshaft, and a three-throw crankshaft with its necessary bearings. Each fork is made up of steel tines, which are held firmly in a grooved clamp about 3 ft. in length and which is attached to the fork handle by a spring hinge somewhat similar to that which is used on the fork of a hay tedder. The crankshaft is fixed where the water tank of an ordinary traction engine is usually fitted.

The illustration, Fig. 1, shows the path which is traveled by the extremity of a fork tine of medium length, when the machine is stationary and when it is in motion, and also a section of the spit of earth which is sliced off and thrown back at each revolution of the crankshaft. The reciprocating action of the forks is governed by the rocking action of the under lever, but the action of this again is modified by the traveling

The width of this spit of earth is about 7 in., and the speed is regulated to turn over an average of 72 spits per minute.

In constructing a steam digger the greatest care should be taken to get the centers of the crank and way shafts in the correct relative position with each other. Machine proprietors have sometimes been tempted to alter their traction engines into steam diggers, but Mr. Proctor states that owing to the shaft centers being unsuitably arranged the work has proved unsatisfactory. Three methods are adopted for "taking a field":

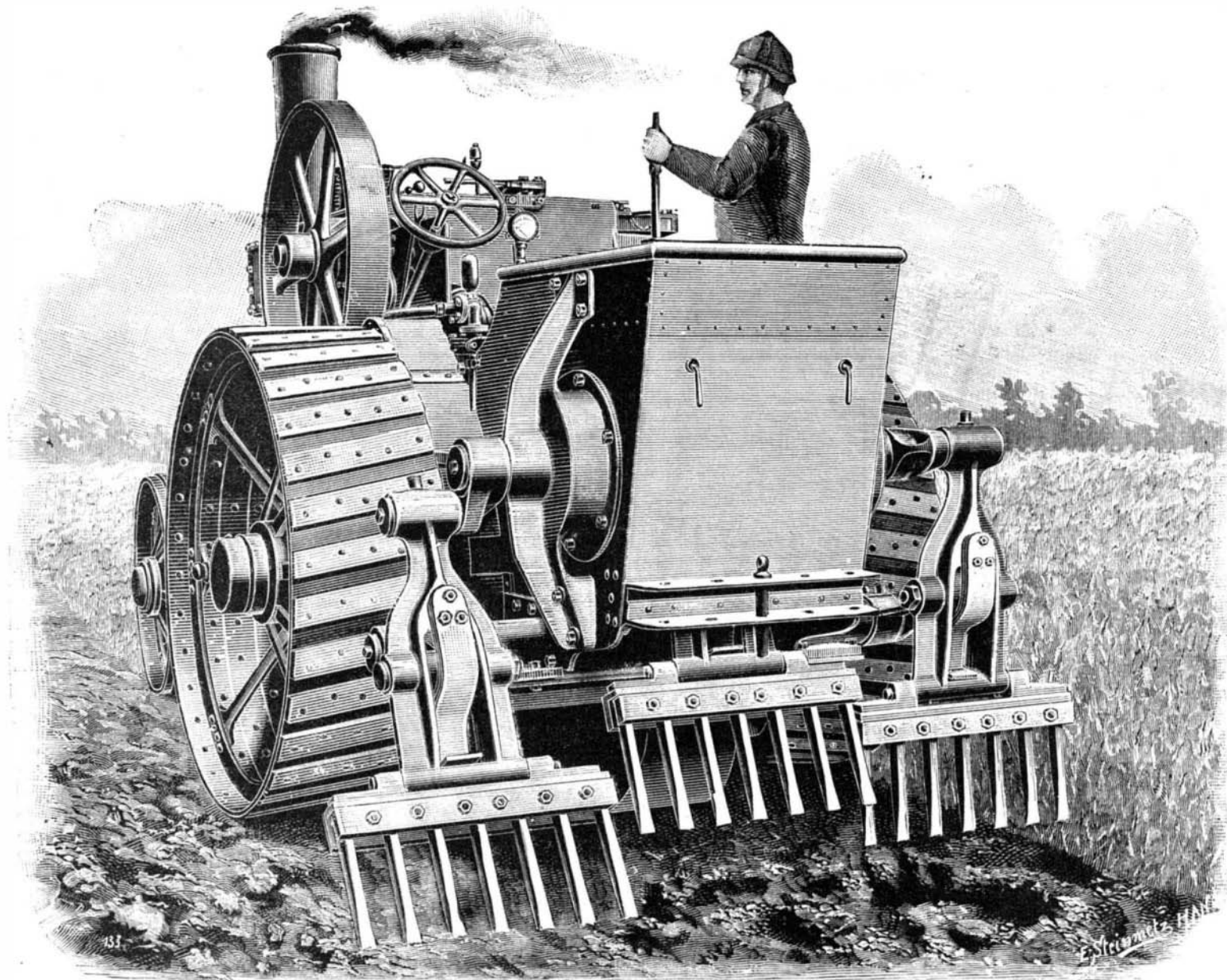
1. The machine travels round the outsides and then works inward similar to the path usually taken with the sheaf-binding harvesters.

2. Another plan is to start in the center of the field and describe with the machine a number of circularly ended rectangles till the whole field has been gone over.

3. In this case a straight up and down course is taken, and the machine is brought into the straight again by reversing the engine, much as is done with steam engines in reversing them by triangles. The time occupied in thus turning takes scarcely longer than that of an ordinary horse plow at the headlands, and it is the method which is most generally adopted.—*Engineering*.

### Passiflora Edulis.

A luscious fruit is that of *Passiflora edulis* (the Brazilian passion flower), which is much grown at Tan-y-bwlch Hall, North Wales. We have never seen, says *The Garden*, a finer mass of it than here, one house being devoted to it, and plants also permitted to cover the back wall of a large vinery with their free growth and flower. This *Passiflora*, apart from its value as an edible fruit, is very pretty when in bloom, and also when bearing freely its plum-shaped fruits. It has been fruiting freely since last June. The fruits are like very large egg plums, deep maroon in color, but varying in tone according to their several degrees of ripeness, and with a very tough and thick skin. The pulp inside is yellowish and not very pleasant to the eye, but the flavor is brisk, agreeably acid, some-



### IMPROVED STEAM DIGGER.

available from each ton of salt decomposed as against that process. Thus a larger quantity of bleaching powder is produced and the purity of the caustic soda ranges very high. The erection of enlarged plant is being proceeded with at the works where it is already in operation, and the adoption of plant is contemplated at the works of a few other leading paper manufacturers.

motion of the machine itself, for it will be seen by the illustration that the slope at which the forks enter the ground when the machine is traveling is more upright than when it is stationary. The inclined nearly straight line shows the path of the fork when the engine is stationary, and the steeper curved line when the engine is moving. The cross hatching indicates the shape of the spit of earth turned off at each stroke.

thing between a melon and a pear. It is used largely for dessert here, and preferred before fruits regarded generally as more luscious. Mr. Roberts, the gardener, has little difficulty with it, fruiting it freely on vinery walls, and yet the growth does not interfere with the vines planted in front. Here is a fruit which ought to be introduced in the United States. Perhaps the agricultural department will try it.