PARIS EXHIBITION OF 1878.

OFFICIAL TRIAL OF PLOWS.

The trial of plows at the French Exhibition took place at Petit-Bourg, in the department of the Seine and Oise, about 19 miles from Paris, under the direction of Monsieur

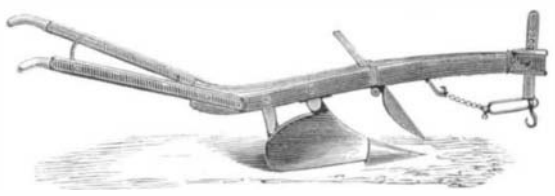

Fig. 1.—FRENCH WOODEN MOULD-BOARD PLOW.

Eugene Tisserand, the Director-General of Agriculture of France, on the 29th of July, 1878. M. Tisserand had charge of the experiments in the field at the Exhibition of 1867, and was Director of the Government farms during the Empire. The trials this year were held on the farm of M. Decauville, an area of several hundred acres being placed at the disposition of the Director, and the American plows were very politely accorded the place of honor in front of the principal tent and Quartier Générale.

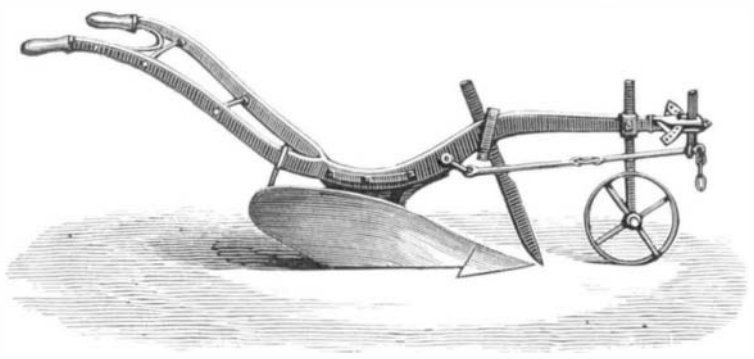

Fig. 2.—FRENCH ONE-WHEEL PLOW.

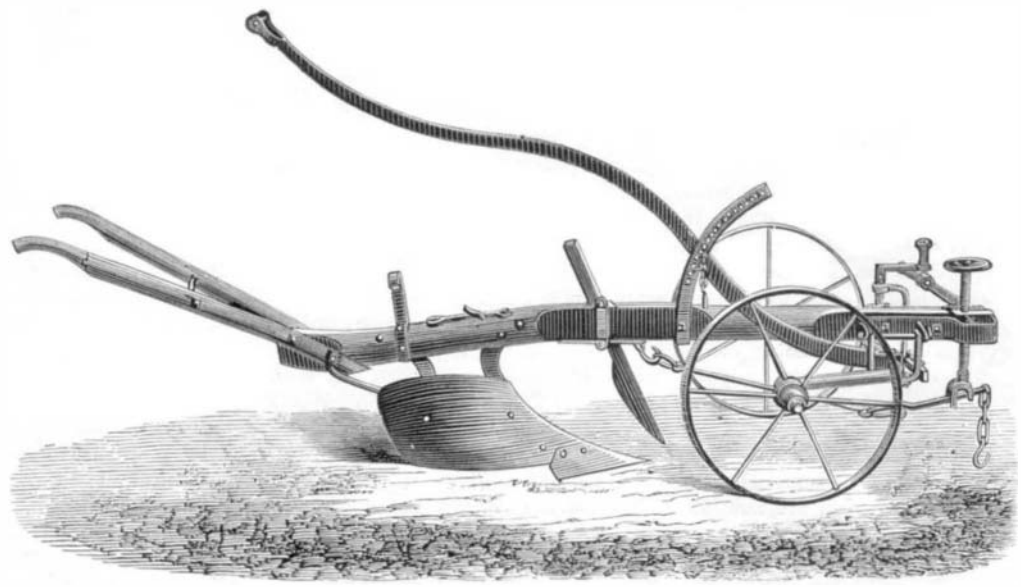

Fig. 3.—DOMBASLE'S TWO-WHEELED PLOW.

Fowler, of Leeds, England, had two sets of steam plows on the field, and Debains, of St. Remy, Département Seine et Oise, had one set. Both did good work, but I do not propose to refer to them at length here. Aveling & Porter's steam plows are to be tried at Gonesse on the 12th proximo.

The plows exhibited were five from America—a gang, sulky, and ordinary plow by Deere & Co., of Moline, Ill.; a plow by Gale, of Albion, Mich., and one by Speer, of Pittsburg, Pa. There were twenty-four French exhibitors, two from Italy, and one from Hungary. Some of the French exhibitors had as many as five plows of different descriptions, and the number in motion at once was about fifty-four. The ground for each was marked off by a furrow, and each was given a field to plow. The farm itself is level and devoid of trees and fences, except the fine avenue on the great Paris and Fontainebleau road, which runs through the tract, and is paved with square blocks, laid perhaps at the time when Francis I. lived in the spacious palace, and it is likely to last in good condition as much longer.

Owing to the land laws of France the soil is now generally owned in small tracts, and in the present instance M. Decauville rents it of nineteen different proprietors, but no signs of demarkation exist. He pays as rent the sum of 70,000 francs yearly to the different proprietors, and carries on the work in a manner unknown among us. There are about 300 acres of sugar beets on the farm this year.

American plows are preferred in France to the English, though, to judge by those exhibited in the French annex of agricultural implements, both are frequently copied. The true French plows, however, are in excess of those of either of the foreign nations mentioned, and there is an abundance of crude and heavy implements which may be termed Gallo-Roman, and probably not much unlike those used during the Roman occupation.

Wooden mould boards are not totally discarded yet. Manufacturers may do their best to introduce what they deem to be improvements, but after all they are obliged to make what the people are willing to buy. Such plows weigh from 80 to 240 lbs., and sell for from 30 to 75 francs; and a great many are sold for light and sandy lands. While the English plows have generally two wheels to gauge the depth, it is by no means so universal in France, and the cheap plows, which are made as low as 35 francs, are frequently wheelless. The French catalogues divide them into "without wheels," "with one wheel," "with two unequal wheels." Fig. 2 has a frame entirely of iron, and of an ordinary size weighs 132 lbs., and costs 85 francs. It is a very good implement and does excellent work. Its clevis arrangement is good both for draught and depth, and the draught chain is likewise commendable. The two-wheeled plow is the English form, with furrow and land wheels of unequal sizes, but the lever is French, and is used to lift the front end and tilt up the point so that the team will draw it out of the ground at the end of the furrow: a very good arrangement, and used alsoon the gang plows of France and of England, the plowman always walking at work. These plows are made heavy and are drawn by four horses or oxen.

No plow on the field did any better work than the Albion, Mich., plow, and in respect to turning the stubble under and leaving a clean land it surpassed the others.

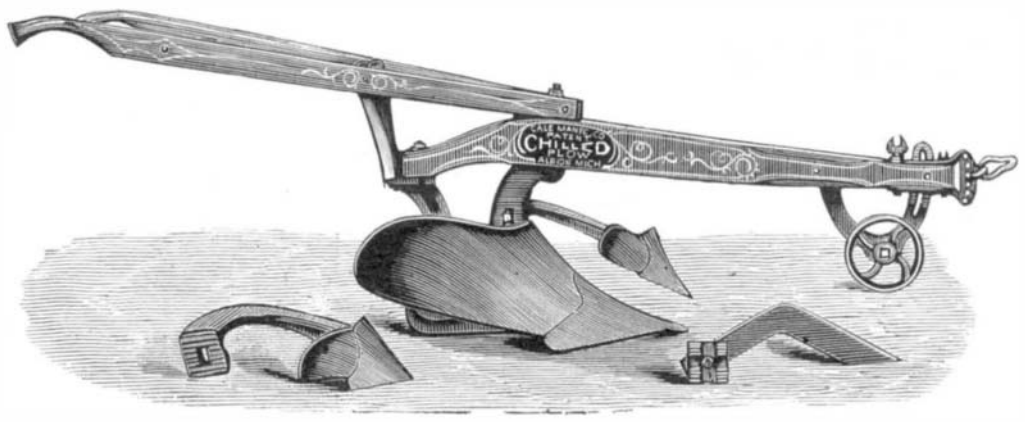

Fig. 4.—GALE'S MICHIGAN PLOW

Great interest was felt in the plows that had come so far to the trial, and perhaps the more that the English, who were so near and had an abundance of their plows in the Paris Exhibition building, had, for reasons best known to themselves, declined to come to the contest at Petit-Bourg.

In the next lot to the Michigan plow was one made by Speer & Sons, of Pittsburg, Pa. It was a fair representative of our common plow, made of good materials, and furnished at a very moderate cost; much cheaper to the dealers than the farmer has any idea of.

It must be noticed by all who travel by day in France that the usual plows have a fore-carriage which is intermediate between the team and the plow. Many extremely crude forms of this are to be seen, both in the fields and in the Exhibition, and were also at work at the trials at Petit-Bourg. Without attempting to give the cruder shapes, which might perhaps be taken as an exaggeration, the *charrue à chaine* is offered to exhibit the idea, and is one of the best of its class. Unlike the English two-wheeled plows, these wheels are of the same size, and as one runs in the furrow and the other on the land it looks as if the plow were tipped sideways, but the round beam adjusts itself in the socket of the fore-carriage (*avant-train*) and no harm results. These plows are made for four horses, and vary in price from 120 to 180 francs.

Fig. 7 shows a transition state, in which the nose of the plow is pivoted to the *avant-train*, instead of merely resting upon it and being drawn by a chain.

Another step and we assimilate to the modern English style. Fig. 8 shows Durand's single Brabant plow, in which the

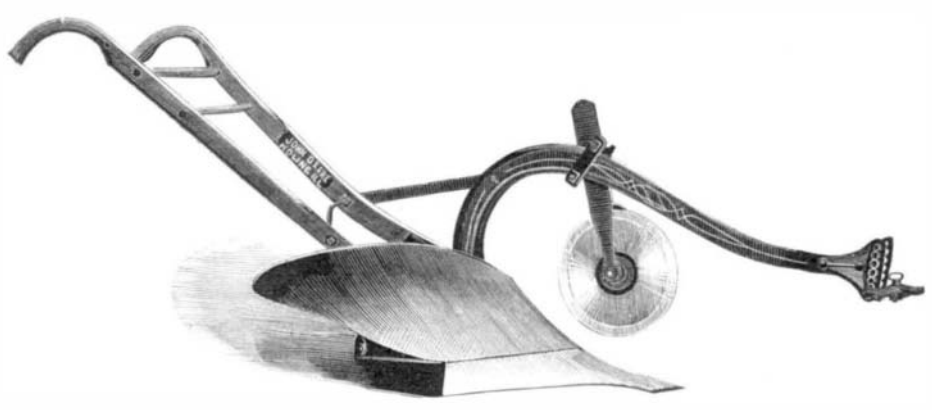

Fig. 5.—DEERE'S ILLINOIS PLOW.

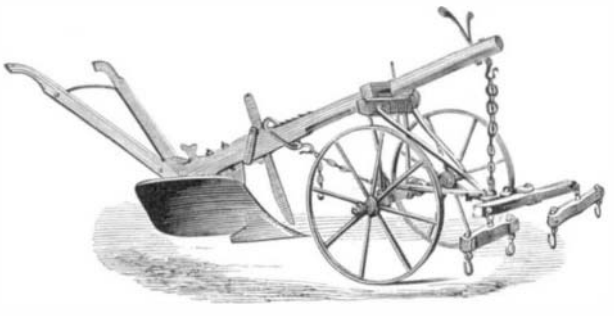

Fig. 6.—DURAND'S CHARRUE A CHAINE.

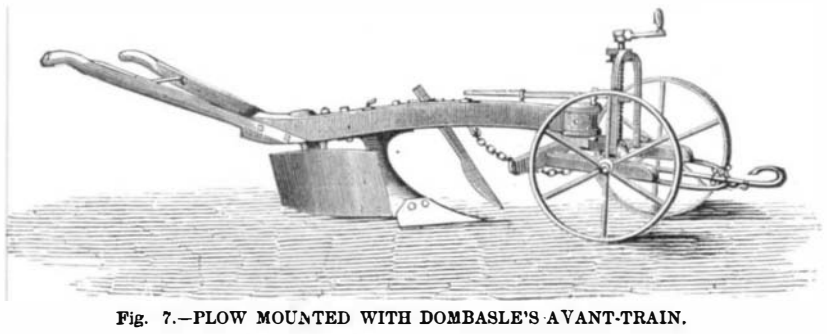

Fig. 7.—PLOW MOUNTED WITH DOMBASLE'S AVANT-TRAIN.

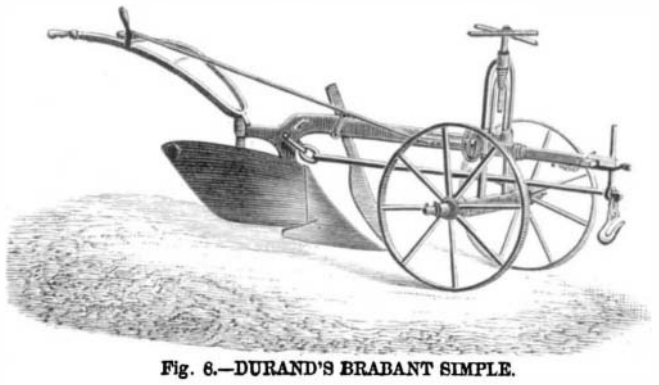

Fig. 8.—DURAND'S BRABANT SIMPLE.

avant-train simply sustains the beam, and the draught is by a rod. In the circular handed to the spectators it is described as "intended for depths either ordinary or profound. It replaces with great advantage all the ancient models of plows. It will travel alone upon the earth without having care to hold the handles."

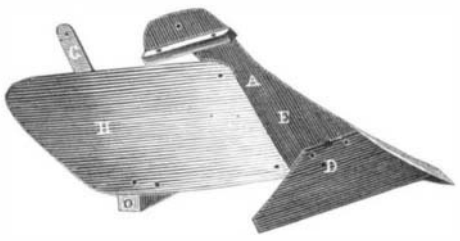

Fig. 9.—VIEW ON THE MOULD-BOARD SIDE.

We may as well dissect one plow, and this affords as favorable an opportunity as any. The plow manufacturers who may do me the honor to read these lines, and who may have a purpose to seek the French market, will thank me for matter which may inform them in advance of the degree of completeness of the French system of manufacture and of their methods of structure. I mention this as a reason for entering into careful detail in one instance, as I have no desultory purpose in view, but hope that my work may be useful in unfolding to those concerned the present status of a land that may become a good customer to our overloaded factories and shops.

The plow bodies are made applicable to any system of plows as well as to the *Brabant Simple*.

The makers advertise to furnish the parts of the body, which can be mounted on any plow by country shops, according to the local custom of the country.

They are made either in cast iron or chilled, and in 12 different sizes, from those adapted for 1 horse to those for 12 horses.

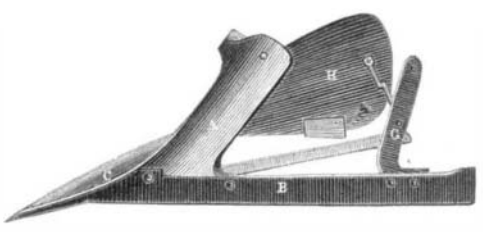

Fig. 10.—VIEW ON THE LAND SIDE.

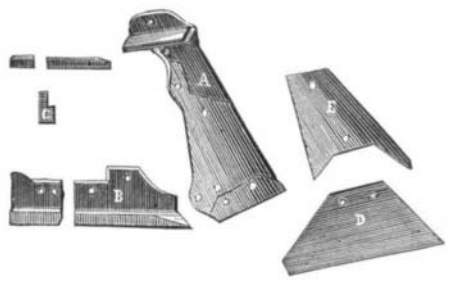

Fig. 12.—View of the Separate Pieces of the Plow Body, minus the Mould Board.

seldom use it for other purposes, was also exhibited. The English showed the same, but did not bring it to the trial. Speer, of Pittsburg, had a third form, in which shares are presented both forward and backward, and the beam revolves horizontally on a vertical pivot so as to bring either into action. Two mould boards are hinged to the breast of

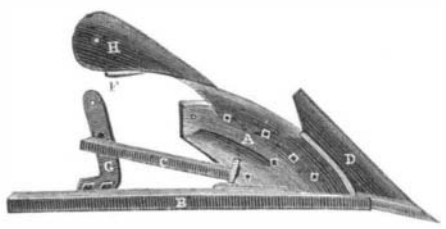

Fig. 11.—VIEW UNDERNEATH THE BODY OF THE PLOW.

the plow, and one or the other is brought into operation according to the requirement of the case. This also was not shown in the field experiments. The French are similarly constructed.

The Director-General, like many of us at home, regards the gang plow as the plow of the future in large farming operations, enabling one plowman or boy to do the work of two or more by adding to the capacity of the plow and increasing the number of horses to the required extent. Quite a number of French and one American gang plow were shown at the trials. None of the English.

It must be said that the opinion of the Director seemed to be general, and the greatest interest of the day was shown in the competitive trials of Deere's Illinois gang plow and the *bisoc* of Meixmoron de Dombasle, of Nancy, France. With the former the plowman rides, and with the latter he walks behind. It was difficult to give a determination between their respective values. In point of finished appearance the American plow was far ahead, and in the character of the material employed I should say it had the greater excellence. The riding feature was very curious to most of the spectators, and probably adds to the draught, which may tell when the dynamometer comes to be applied to them individually. During the day the French plow was worked with 6 horses and the American with 4; when they were started on a competitive trial, but 4 horses were allowed in each case, and the teams were changed

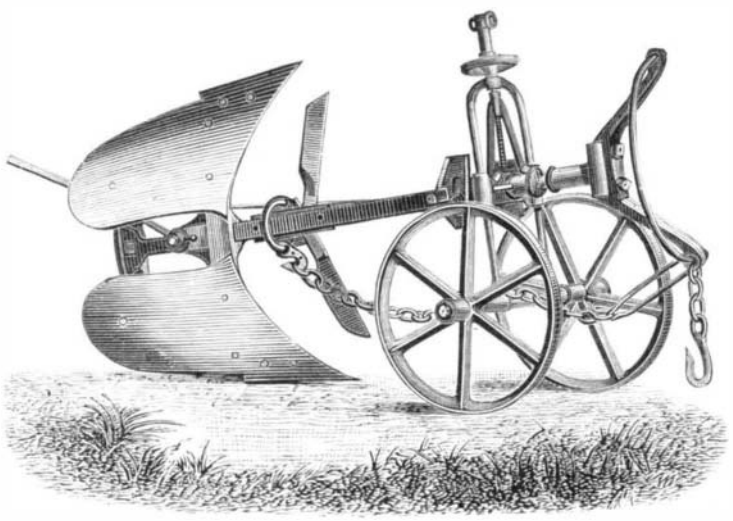

Fig 13.—BRABANT DOUBLE PLOW.

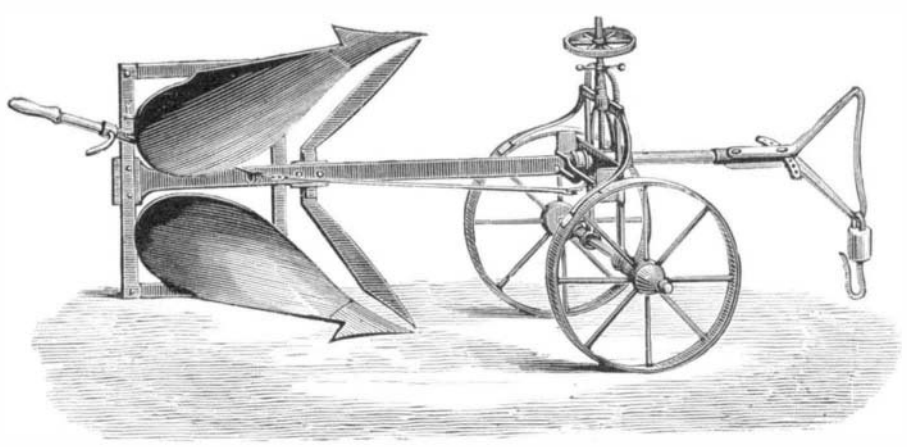

Fig. 14.—BODIN'S BRABANT PLOW.

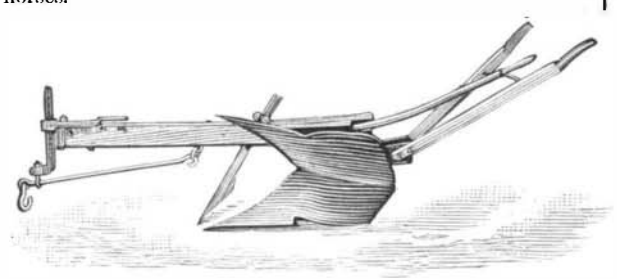

Fig. 15.—BRUET FRERES' TOURNE-OREILLE.

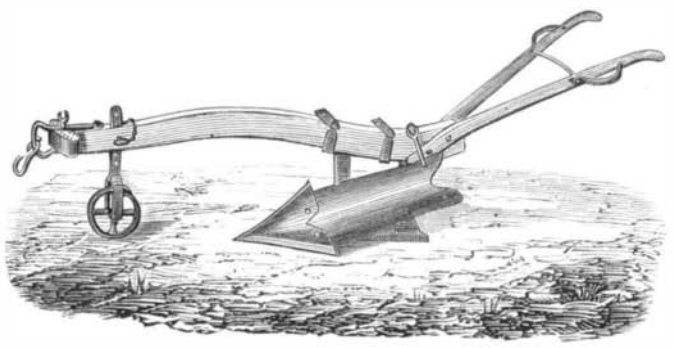

Fig. 16.—FRENCH TOURNE-OREILLE PLOW.

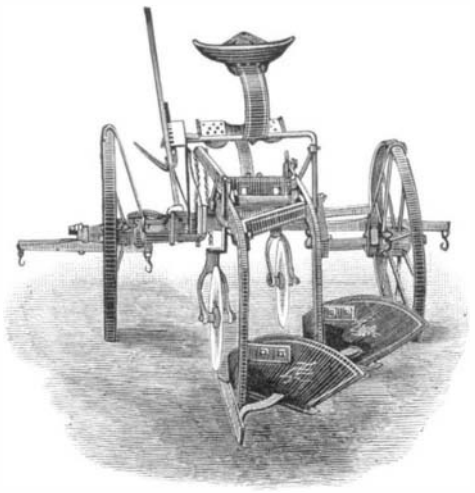

Fig. 17.—DEERE'S ILLINOIS GANG PLOW.

In Figs. 9 to 12, the portions of the plow body are shown. A is the standard, B the sole, C the corner piece, D the share, E the breast, covering the front of the standard, F is the heel piece to prevent wear of the mould board, G the rear standard, and H the helicoidal mould board.

The *tourne-oreille*, or Brabant double plow, has, as its name indicates, a turning mould board, so that at the end of a row it can be revolved on the beam (or the beam rotated), and converted from a right to a left hand plow or *vice versa*. This enables the team to return in the last made furrow, the near and off horses being alternately in the furrow. However clumsy it may look to us, it does excellent work, and if a whole community insists upon beginning to plow at the side of a field and plowing it furrow by furrow clear across to the other side, not plowing in lands, why of course they must have an implement to suit that mode of working, and here it is.

The Brabant plow is made of all sizes from the small plow adapted for one horse to the large one drawn by 5 yokes of oxen. They vary in weight from 165 to 770 lbs., and in cost from 140 to 300 francs. The depth of furrow for which they are designed is from 0·60 meter to 0·330 meter, say from 6½ to 13 inches, though the latter depth was much exceeded at the trial.

There are many different patterns of this implement, but all preserve the main feature of being convertible into a right or left hand plow, either by turning with a sleeve upon the beam or the beam itself turning in a socket on the forecarriage, or hinged to the beam, as in Fig. 15, which has a wooden beam, and no *avant-train*.

Another form of what we call a hill-side plow, as we

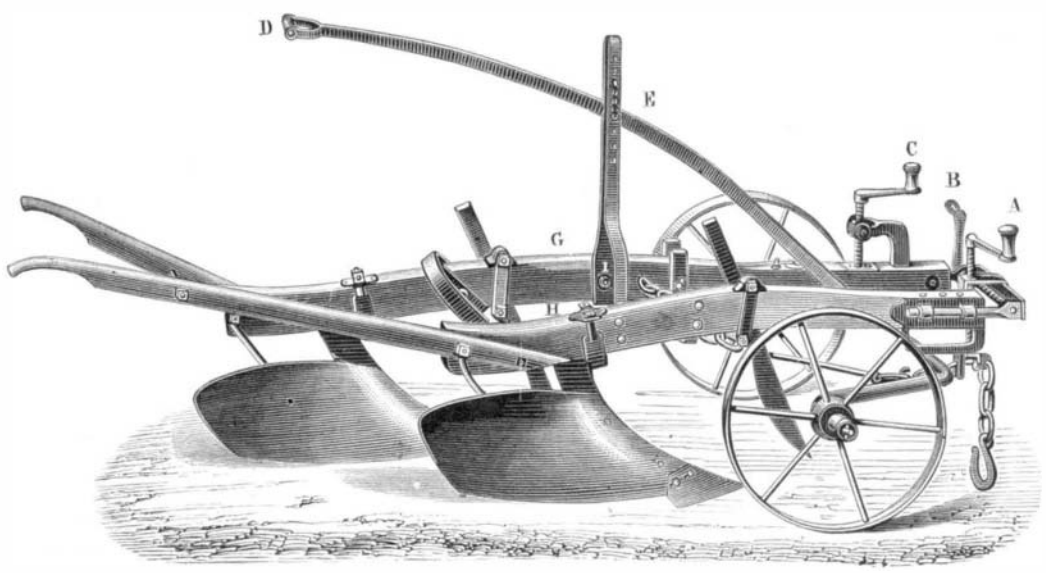

Fig. 18.—MEIXMORON-DOMBASLE'S BISOC.

when half the ground allotted had been plowed. At least that was the intention, but the teamsters in each case whipped up so cruelly that in mercy to the brutes—no, not the brutes, but the horses—the trial was concluded rather sooner than was intended.

Another episode more amusing than the suffering of the fat Percheron horses was afforded by the fact that when the teams were changed and the teamsters, the latter tried to work in the interest of their former employers. The team of the French plow balked for a little while, and the man with the team on the American plow ran ahead of his horses for fear the French plow might be beaten. They also managed to smuggle both the whips to the French side, and slashed away, while Mr. Deere had only his umbrella to poke up the four horses on his plow.

This was only some by-play of the French teamsters and was soon stopped. There are no fairer people in the world than the French judges, but the workmen could not forbear trying to take advantages.

The Meixmoron-Dombasle *bisoc* is made of three sizes; the largest works to a depth of from 0·15 to 0·20 m. (6 to 8 inches); a land of 0·55 to 0·60 m. (22 to 24 inches) in the width, with 4 to 6 horses in ordinary land and 6 to 8 horses in hard ground. The smaller sizes use from 2 to 6 horses. The *grand bisoc* with cast iron standard and steel mouldboard weighs 544 lbs. and costs 290 francs.

The lightest size weighs 268 lbs. and costs 175 francs.

The Deere plow weighs 670 lbs. and costs 425 francs.

The Dombasle system, as is apparent by the cut, consists in rigging two plows to a single fore-runner with an inflexible bar which determines the latitude. In that respect it resembles our gang plow. The English system is to make an angular frame of iron, and the same plan has also been adopted in France, and several of the manufacturers had implements of this description on the ground.

There does not seem to be anything to urge against the principle of these, and they work well, but the plow Fig. 18 was preferred. In each case the long backwardly extending lever raises the forward end, so that the plows come out of the ground as the team reaches the end of the land, ready for turning.

The Gilpin sulky plow made by Deere & Co., of Moline, Illinois, was an object of much attention. So much regard has not usually been paid to the comfort of the workman. Our horse rakes usually have seats, and it is no uncommon thing to ride on our grain drills. It is not so here.

Besides the plows for executing the usual work, at this *concours* there were ridging, subsoil, trenching, and mole plows, implements for digging potatoes, pulling up beets; harrows, rollers, clod-crushers, potato planters, grain and seed drills.

The ridging plows, *buttoirs*, were stocked with wooden or iron beams, and are much used in the potato and beet culture; the rows of these are so close that the *buttoir* will ridge up against the plants on both sides going once in a row. These plows weigh 120 lbs. and cost 85 francs.

The subsoil plows are those which work behind an ordinary plow to break up the hard pan, but not to elevate it above the surface mould. Quite a number were exhibited, of which Fig. 22 is fairly representative. The price is 45 francs.

The trenching or ditching plows exhibited at Petit-Bourg were of two kinds. One had a deep cutting share, a sloping breast, and a curved board which directed the excavated soil on to the land at the side of the ditch. This is shown in Fig. 23.

The other one is adapted for cutting drains in natural prairies. The sloping cutter and the curved share cut the sod, which is lifted and thrown equally on each side of the ditch. The plow has an ordinary *avant-train*, not shown in the figure.

The *sous-sol*, or underground plow, known to us as the mole plow, from the mode and effect of its work, is used as with us as a mode of effecting drainage of soils where water stands too persistently. Several of these were shown, but do not differ except in details.

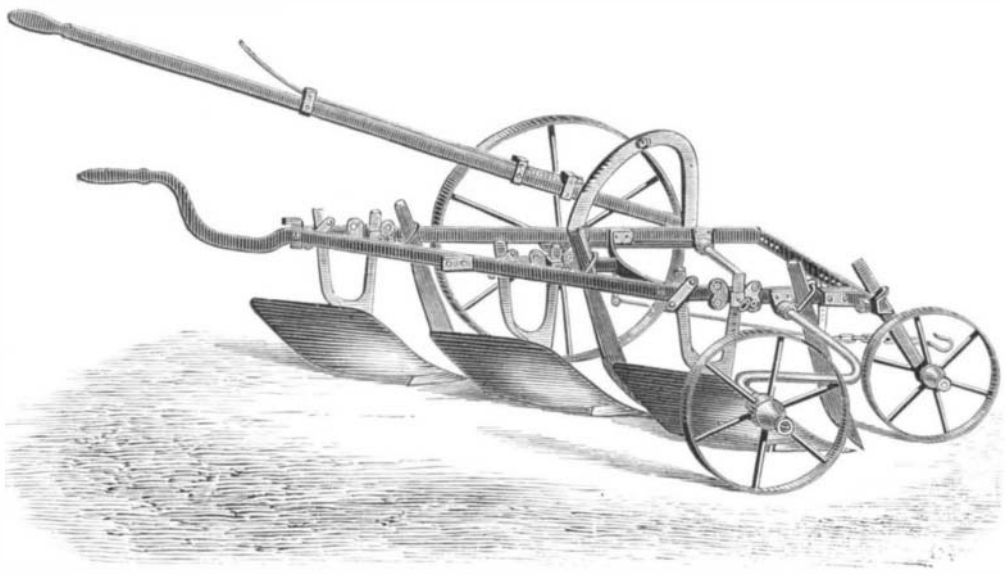

Fig. 19.—DALAHAYE-TAILLEUR'S CHARRUE A TROIS-SOCS.

The potato diggers were of single and double effect. One has but one set of lifting fingers, the other has two grids. The first runs beneath the hills of potatoes and lifts them, the soil falling between the bars of the grids, leaving the potatoes on the surface. The second grid repeats and completes the operation.

Comparatively few people out of France have any adequate idea of the extent of the culture of the beet root. It furnishes nearly all the sugar used in France and a large proportion of the alcohol. The neighborhood of Paris is distant from the principal regions concerned in this culture, and the field of 300 acres of beets on the farm at Petit-Bourg, where the trial of plows took place, is regarded as but a patch. At Marmont, where the trials of reapers, binders and mowers were held the week previous, there may have been about 250 acres in beets. One item in passing: 85 acres of beets on M. Charlton's farm at Marmont yielded last year 115,000 francs' worth of alcohol, tax paid. The tax on the yield of alcohol was over 1,000 francs per acre. The farmer and the government between them realized the amount stated from 85 acres of beets. Several special implements have been made for the beet culture—plows which turn up the soil to a depth of 15 inches; subsoilers, which pulverize a further depth of 6 inches in the bottom of the first furrow; light plows for throwing the soil to or from the plants alternately in the process of tending the crop; double mouldboard plows for throwing the earth against both rows while passing once down the balk; machines for tearing the roots out of the ground, leaving them on the surface, to be picked up in baskets and carried to the carts, or, as in the case of M. Decauville's farm at Petit-Bourg, to the miniature cars on the narrow gauge railway which runs around the principal fields and enables a horse to draw several tons, while the baskets do not need to be lifted more than 3 feet to empty them into the cars.

A beet puller, such as shown in Fig. 28, will deplant two and a half acres per day, and is converted into a potato digger by detaching the fork, 1, Fig. 29, and attaching the grid, 2. The point of excellence in an instrument of this kind is that it shall not cut the beet, and that it shall raise it and turn it over, and not wrench it out in such a manner as to break off the tap root and cause it to bleed. The price of the machine, made in three sizes, is from 170 to 200 francs. The work of the harrow and rollers followed that of the plows, and some matters worth our consideration were shown, but the report will be too long if we consider them now.

Eleven exhibitors entered their grain and fertilizer drills, from France, England, Italy, and the United States. European nations still adhere to their plan of revolving wheels with little cups at the ends of their spokes ascending through the reservoir of grain and dropping a little tribute of seed into a cup, whence it reaches the ground through tin tubes in the rear of the share. It is the old plan used 1,000 years ago in India, and has long been superseded in the United States by various force feed arrangements. The European broadcast fertilizer sowers were several of them of good quality, but by far the best grain drill on the ground was the "Farmer's Friend," from Dayton, Ohio.

In conclusion, it is necessary to state that all the trials have taken place under the care of the Exhibition authorities, and the jury of Class 76 (agricultural instruments in the field) attended them officially, as an additional means of determining the recompenses of prizes and medals under the general regulations. There was no compulsory attendance of exhibitors, but the field was thrown open for all who volunteered to compete.

The Agricultural Society placed 12 objects of art at the disposal of a jury specially constituted, and including the members of Class Jury 76, to reward "exceptional merit" which they might find in the machines exhibited. These were independent of the recompenses of the Exhibition proper, as announced in the "Règlement Général," dated in 1876. Six of these trials have been held: Mowers, reapers, and binders. Steam and other plows, with other instruments for working in the soil; Hay presses and implements of the homestead; Thrashing machines; Lawn mowers; Lawn and road sprinklers.

I do not delay this letter to give either the dynamometrical indications of the draught of the plows, or the decisions on the objects of art, as the trials are not quite through; nor the prizes and medals obtained by the machines which joined in the trials, because these, though known to me as juror, are not yet public.

EDWARD H. KNIGHT.

Paris, August 10th.

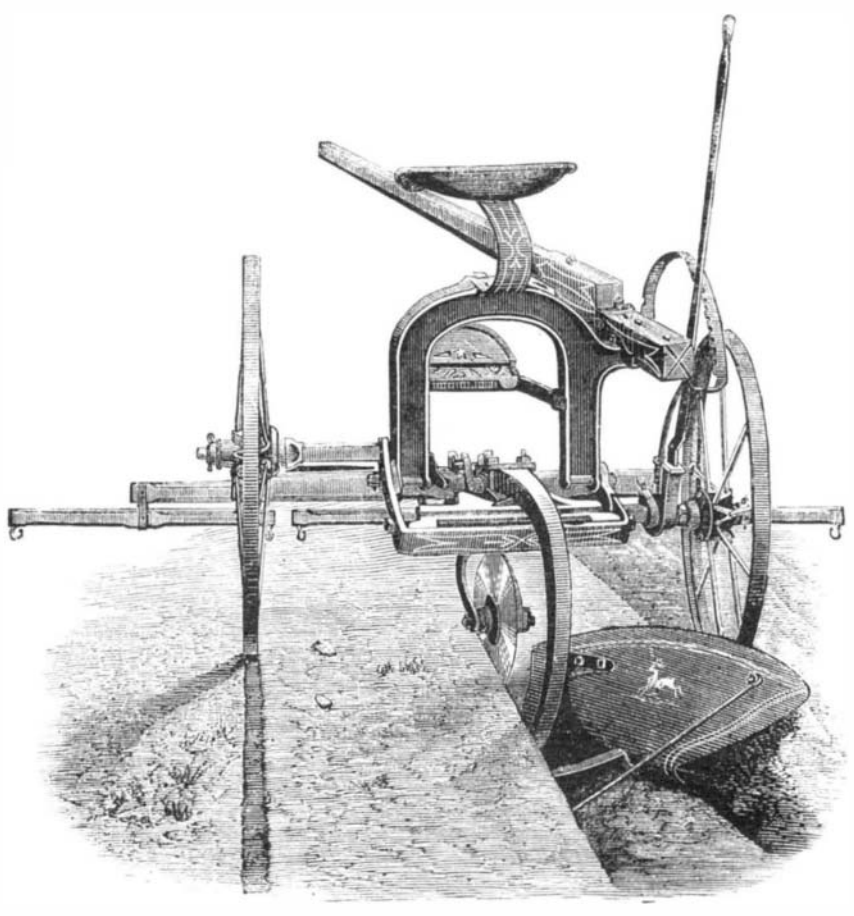

Fig. 20.—GILPIN SULKY PLOW, MOLINE, ILL.

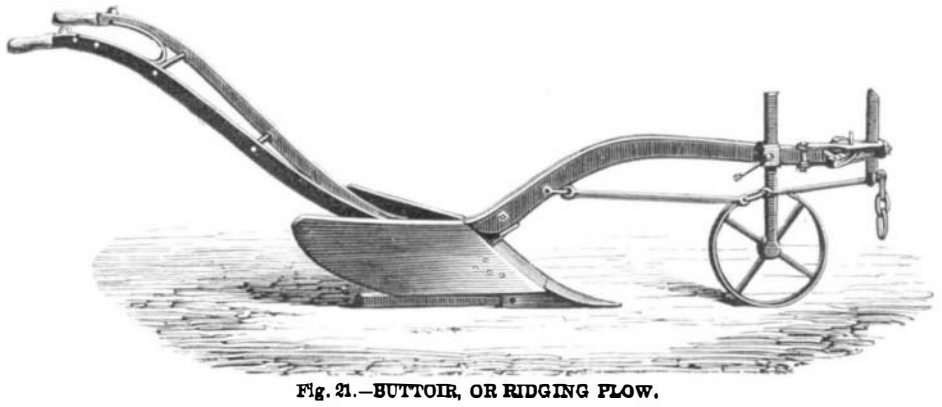

Fig. 21.—BUTTOIR, OR RIDGING PLOW.

Fig. 22.—GARNIER'S SUBSOIL PLOW.

Recent Inventions.

Mr. William Humphrey, of Jackson, Mich., is the inventor of an improved Washstand or Lavatory for factories, prisons, etc., by which a large number of washbasins are conveniently arranged for use, and all filled and discharged at the same time, so that a large number of persons can wash themselves at the same time.

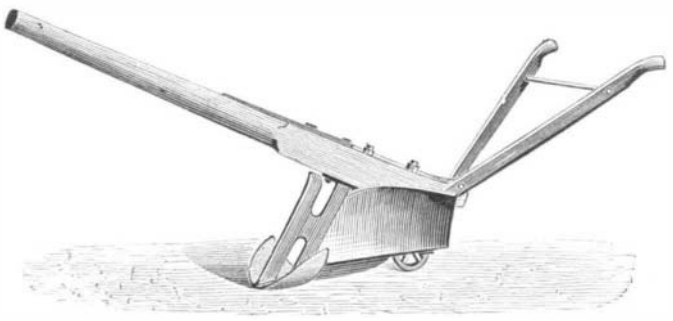

Fig. 24.—BILLOT'S TRENCHING PLOW.

Mr. John W. Porter, of Westport, Conn., has devised an improved Mill Spindle, which is so constructed as to prevent vibration, so that the stones will run truer and will grind the grain evener, making more and better flour than is otherwise practicable.

Messrs. Denison L. Howard and Thomas D. Atkinson, of Nottawa, Mich., have patented an improved Apparatus for separating Gold from sand and dust or powdered rock. It is so constructed as to effect the separation of the gold without using water.

A novel Apparatus for Demonstrating Military Tactics has been patented by Col. William H. Brownell, of Brooklyn, N. Y. The object of this invention is to provide a device for illustrating the principles of military tactics, and especially for the demonstration of Upton's tactics.

Mr. Thaddeus O. Kilburn, of Washington, Minn., has patented an improved Bolting Reel that is more especially designed for the cleaning and dusting of middlings, but that will also work with great efficiency for other bolting, as by the reel the sliding of the meal is facilitated and a superior bolting obtained.

Mr. William W. Stetson, of Henry, Ill., has patented an improved Double-acting Force Pump, by means of which a large amount of water can be raised. The principal feature of the invention is the peculiar arrangement of the valves.

Mr. Joseph W. Holmes, of Wheatville, N. Y., has patented a novel Apparatus for Accurately Determining the Solar Time in any latitude or longitude, the true meridian, the sun's declination, and the latitude of any place; and consists in a quadrant or segment of a circle, graduated to degrees and subdivisions thereof, mounted on a horizontal axis; and in a graduated circle fixed upon the quadrant or segment

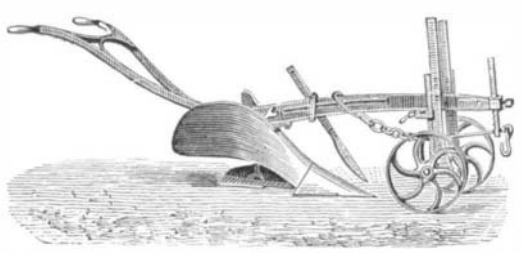

Fig. 23.—TRENCHING PLOW.

and at right angles to its plane; and in a graduated circle pivoted on one of the arms of the quadrant or the axis of the quadrant or segment, and parallel with the fixed circle; and also in a graduated arc mounted on the face of the pivoted circle, and provided with a traversing arm having a vernier and apertures for casting the sun's image, for surveying or other purposes.

An improvement in Breech-loading Firearms has been patented by Mr. John T. Morrison, of Fort Concho, Texas. This invention relates to improvements in breech-loading firearms, such as carbines, muskets, rifles, etc. With this improvement the firearm may be manipulated with greater facility and safety, either on horseback or not, as the loading of the cartridge as well as the ejecting of the shell is performed easily and rapidly with the right hand, while the barrel may be swung on its pivot in the hollow of the left arm without detaching the firearm, when used as a carbine, from its sling, or without removing the left hand from the reins in governing the horse.

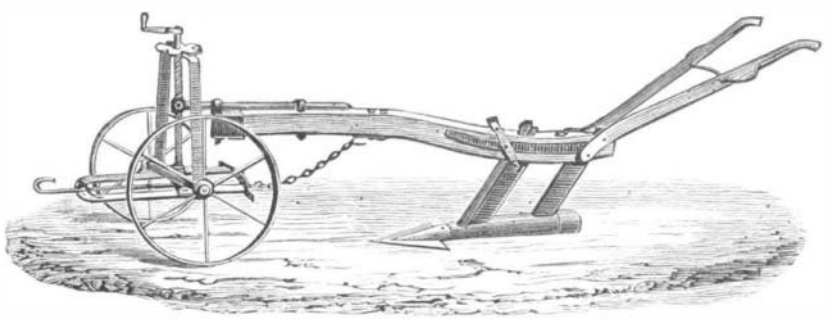

Fig. 25.—MOLE PLOW.

Mr. Edward P. Follett, of Rochester, N. Y., has devised an improved Attachment for the Burners of Lamps, Kerosene Stoves, etc., the use of which will insure a more thorough combustion of the oil, and will produce a steadier, whiter, and larger flame than is possible with ordinary burners of the same size.

Mr. Benjamin R. Tenney, of Poughkeepsie, N. Y., is the inventor of an Attachment for Coal Scuttles and other vessels, which will enable them to be used for sifting the unburned coal from the ashes in the room where the coal was burned, and even upon a carpet, without allowing any fine ashes to escape into the room.

Mr. William R. Macdonald, of Allegheny, Pa., has patented a Combined Heating and Ventilating Apparatus, that may be used either solely as a heater, or as a heater and ventilator, or, for summer use, as a ventilator alone, the same supplying the heat in the customary manner, but drawing off the vitiated and foul air from apartments, water closets, soil pipes, etc., and conducting it away, supplying pure air in place of the same.

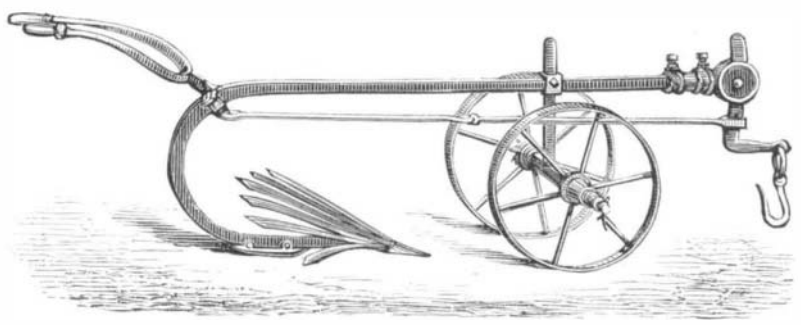

Fig. 26.—POTATO DIGGER (*Arrache pommes de terre*).

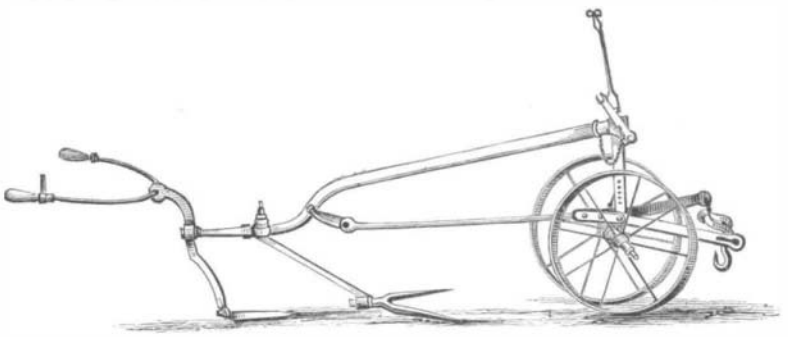

Fig. 28.—BEET-ROOT PULLER (*Arrache Betteraves*).

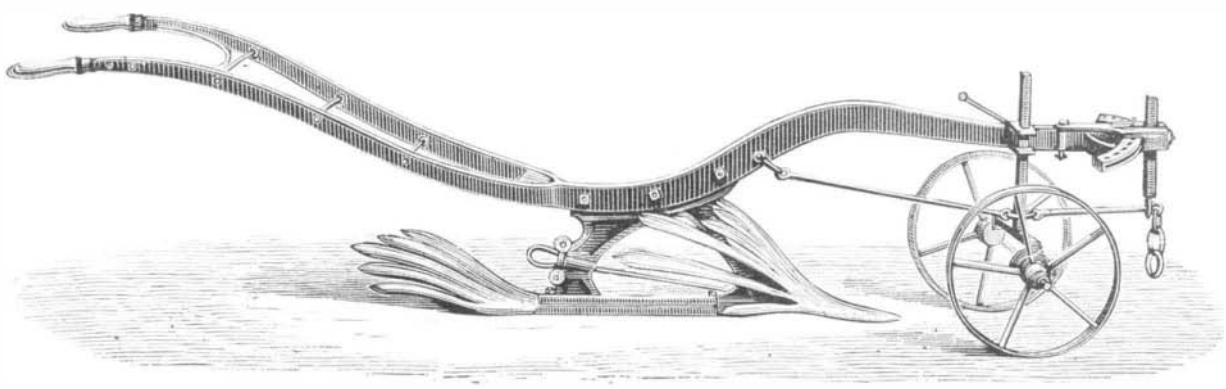

Fig. 27.—POTATO DIGGER (*Double-effet*).

The Thread Telephone.

N. R. Huntley, engineer at the Connecticut River Railroad shops, Springfield, Mass., who succeeded in operating a twine telephone across the river, a distance of 1,426 feet, has been further experimenting, and is now able to talk freely and plainly across the river, a distance of 2,450 feet, or within 190 feet of a half mile. For boxes, or mouth-pieces, he uses the same tin ones as with his previous experiment, except that for the silk disk he substitutes thin button iron. To make the experiment more complete and seemingly more difficult, he has run his line in a zigzag way, making numerous angles, but finds that it is no less effective than if perfectly straight. For hangers he uses heavy wire pins, on the ends of which he

Fig. 29.—1. *Soc à fourche pour arracher les Betteraves.* 2. *Griffe à arracher les pommes de terre.*

fastens small non conductors of glass, the line being fastened to these by a loop of twine about half an inch long. Without these non-conductors the sound passed off at each support. Mr. Huntley has not the least doubt of his ability to use these lines at a distance of a mile, and perhaps further, and is also confident that for ordinary use, such as carrying on conversation between neighbors and friends, they will be brought into general use.—*Boston Advertiser.*

New Engineering Inventions.

Messrs. Elias R. Clark and Robert Hamilton, of La Fayette, Ind., have patented a Feathering Paddle Wheel, which is so constructed that the paddles will leave the water edgewise so as not to lift the water, which will hold the paddle vertical while acting upon the water, and which will cause the paddles to act upon the water as long as they remain it.

Mr. William Roberts, Jr., of Calumet, Mich., has patented an improved Signaling Apparatus, whereby the engineer can be notified when and where a car has arrived at the shaft, so that the skip can be run to that level and the car hoisted to the surface without delay. A vertical upright signaling rod, extending from the surface of the ground to the bottom of the shaft, is used. This rod is supported in suitable bearings, and is provided with levers, so it can be raised and lowered by the workmen at the levels. Means for locking the signaling rod at each level are provided, and the rod has indicators for showing the signals.

Mr. William H. Lynn, of Freeport, Ill., is the inventor of a simple and effective Starter for street and other cars drawn by animals; and it consists in a sector lever pivoted in supports attached to the car frame, and connected by a chain with the draw bar. The said sector lever is provided with a pawl, which engages a ratchet wheel on the car axle, and is provided with two springs, which throw it into and out of engagement with the ratchet wheel.

Mr. Milton Logan, of Foxburg, Pa., has patented an improved Car Coupling, which consists in a novel arrangement and combination of hook headed draw bars and levers for operating the same, whereby provision is made for coupling and uncoupling the cars by raising and lowering said draw bars; and the invention also consists in a novel construction of an extension buffer, to be used when necessary, and to be placed out of the way when not in use.

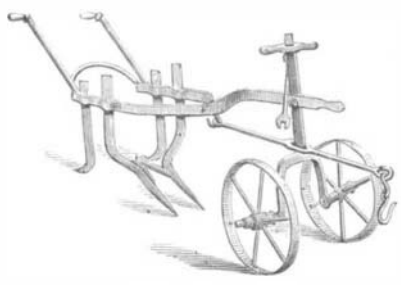

Fig. 30.—BEET-ROOT PULLER.

Mr. John F. Taylor, of Glenville, Conn., has patented an improvement in Steam and Hydraulic Presses. This improvement consists in adding to the press an auxiliary steam cylinder, having a still larger ram, for reducing the bulk of the matter in the press before applying the heavier pressure created by the smaller rams. The piston of the auxiliary steam cylinder is operated by the exhaust steam from one or both of the cylinders, before described. The object of the invention is to effect economy of fuel in working hydraulic presses, and to accomplish the work by means of smaller steam cylinders than have been hitherto employed.