FRENCH FOUR AXLED ARTICULATED LOCOMOTIVE.

We select from the *Annales des Ponts et Chaussées* the accompanying illustrations of a new locomotive recently invented and constructed by M. Rarchaert. It is a tender engine, weighing, complete, 34 tuns, and resting on two American trucks, which are connected with the frame by pivot bolts, so that they follow the bends of the road in a horizontal plane. Measured in a straight line, the extreme wheels of the machine are separated, axis from axis, a distance of 13·1 feet; and the space between wheels of the same truck is 3·9 feet. These dimensions reduce to the ratio of about 10 to 3 the rectilinear length of the apparatus which measures, so to speak, its stiffness; and the minimum radius of curves around which the machine travels freely, is found to be below 96 feet.

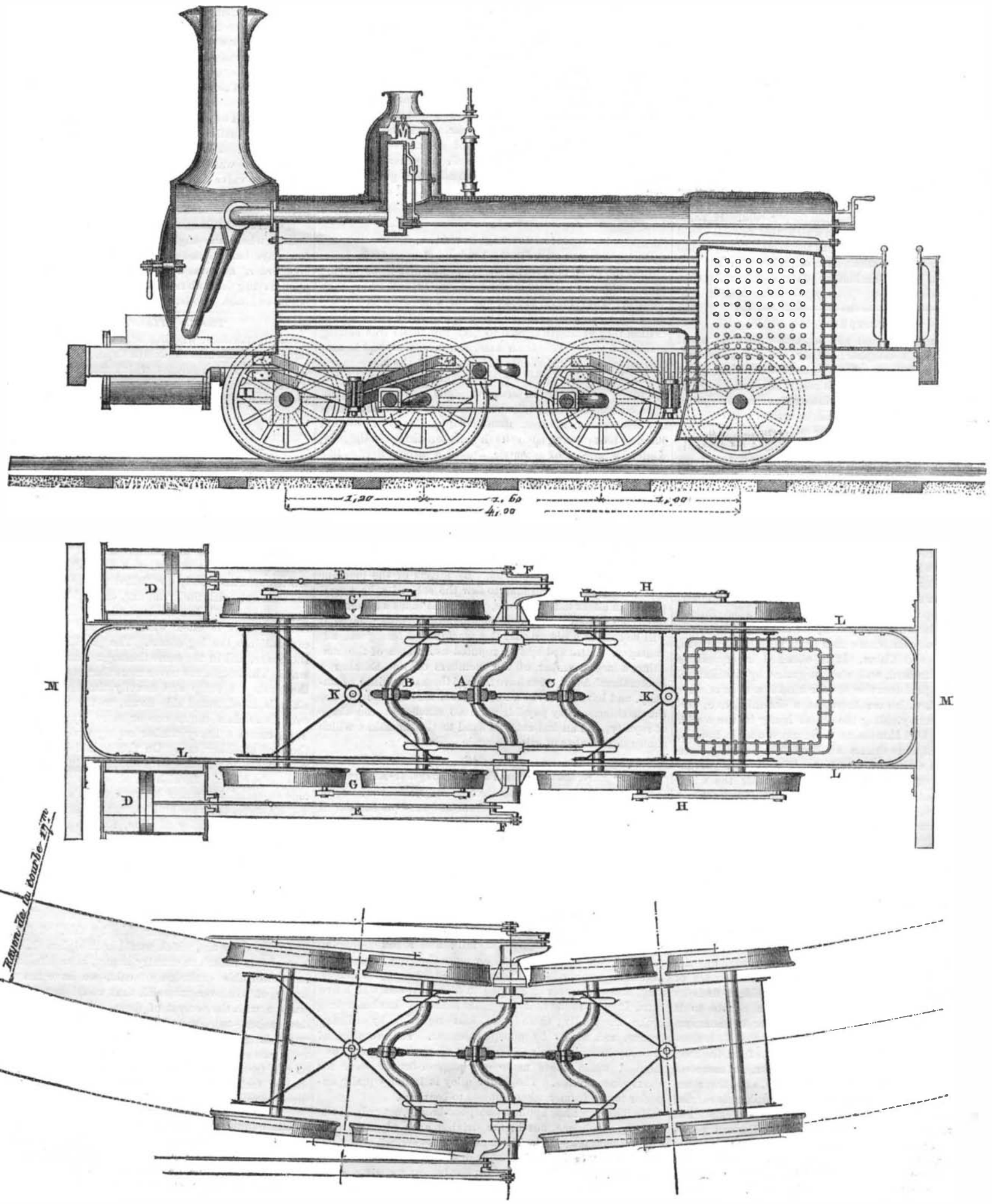
The wheels are 3·5 feet in diameter. The maximum speed developed is thirty miles per hour, and the tractile force is estimated at 4·17 tuns. The transmission of motion from cylinders to driving wheels constitutes the essential feature of the device. Instead of directly attaching the piston rods, E, to cranks on one of the motor axles, and then transmitting its rotation to the others, the former are caused to act upon a false axle, A, hung in the center of the frame longitudinally, which always retains the same position in relation to the cylinders. The extremities of this false axle carry cranks, F, to which the piston rods connect, and, beyond these, arms set at right angles, which work the valve rods. The middle portion of the axle is made in the form of an elbow similar in shape to the working axles, B C, to which it imparts motion by the arms, A B and A C. The latter, as the false axle is situated some inches above the center of the driving wheels, form in combination a triangular rod. The advantage of this arrangement is that the false axle has a double purchase on either of the driving axles, that is, directly by means of the straight rods which connect it with each, and indirectly by the rod which actuates one axle, transmitting its motion to the other through the medium of the connection between the two, the lower arm, which, in the upper figure, forms the base of the triangular attachment. A moment's thought will show that there is in this mechanism practically no dead center.

In order to insure the transmission of power in spite of the play of the trucks around their pivot bolts, spherical bearings are arranged for the connecting rods upon the axles, so that the latter conform readily to the angular deviations due to the passage of curves. In fact, the bending of the machine can produce no effect upon the proper application of the power, because the transmitting mechanism is concentrated in a central position, where the length of the parts undergo no sensible alteration. Ordinary coupling rods, G and H, connect the wheels of each truck. K K are the pivot bolts and L M, longitudinal and cross pieces of the frame.

Experiments conducted in France with this locomotive have proved it an excellent machine for freight traffic on secondary lines, the construction of which necessitates many sharp curves, thus saving the expense of making extensive cuttings to avoid the latter. The form of the ground can thus be more closely followed and the road built at a considerably decreased cost. The engine is stated to have drawn a train of 16 cars, loaded to a weight of 11 tuns each, up a slight grade, at the rate of 13·2 miles per hour.

Mineral Oils for Gas.

Within the last 10 or 15 years, many patents have been taken out for processes or apparatus for the destructive distillation of mineral oils, but up to the present time no process has been sufficiently successful as to secure for itself any general recognition. In Germany and the United States, some of the attempts made to use crude petroleum have met with comparative success. The one which the author believes to be the best is the invention of a German chemist, Dr. Herch. The apparatus consists of a circular retort set in the usual manner. The retort is fitted with a mouth piece and lid at each end. The front mouth piece is connected to a large cylindrical chamber or receiver by a



FRENCH FOUR AXLED ARTICULATED LOCOMOTIVE.

taper pipe, which is substituted for the ordinary ascension pipe. At the back of the retort is placed a small cylindrical vessel or chamber fitted with a cover and stuffing box. In the interior of the chamber a weighted piston or plunger is placed, the rod of which passes through the stuffing box. To the upper end of this rod a cord is fastened, which passes over a series of compound pulleys, the end being connected with a train of clock work machinery. From the bottom of the box or chamber in which the piston is placed, a small tube or pipe is connected with the lid at the back of the retort, and thence a small taper tube projects into the interior of the retort. The process of manufacturing the gas is as follows: The chamber or cylinder in which the plunger is placed is filled with the petroleum or mineral oil until the plunger has risen to the top. The cord is then coiled over the pulleys, and the end attached to the clock work. As soon as the retort is sufficiently hot, the pendulum of the clock is set in motion, and the cord is gradually uncoiled. This liberates the plunger or piston, and thus the liquid in the cylinder is forced through the small connecting pipe and taper tube into the retort, where it is distributed in a very thin sheet over the heated surface. A considerable quantity of the vapor is thus converted into gas, and is conveyed by the large taper pipe into the vertical receiver. Here the gas and vapors are separated by the cooling effect of the receiver, the permanent gas passing to a suitable gas holder; the condensed vapors, in the shape of tar or oil, fall to the bottom of the receiver, and are drawn off and returned to the first cylinder, when a fresh charge of oil is put in. The process is exceedingly ingenious, but the author is not able to say what the result of the experiment has been in a commercial point of view. In the United States, many forms of apparatus have been tried, but most of them have failed on account of the great difficulty of getting rid of the rapid deposition of soot or solid carbon on the surfaces of the retorts, or the materials placed within the retorts to effect decomposition. It is found in practice that a comparatively thin layer of this finely divided carbon materially interferes with the process of decomposition, and the result is that, when an apparatus has been at work for only a short time, it happens that the make of gas is reduced 50 per cent. If some arrangement could be invented by which this deposit could be prevented, there is no doubt that the mineral oils would be found most useful substitutes for cannel coal in the production of gas of high illuminating power.—*Journal of Gas-Lighting.*

Camphor.

Perhaps the most common and popular medicinal agent for household use is camphor, a drug which has been regarded as a cure-all by mothers, grandmothers and great great grandmothers down through many generations. The "camphor bottle," holding a solution of the agent in rum or dilute alcohol, is found upon a shelf in almost every dwelling; and if among the younger or older members of the family an ankle is turned, or a limb bruised, or there is head ache, or tooth ache, or ear ache, or belly ache, down comes the camphor bottle, and the suffering member is well dosed. Camphor is a powerful agent, and in moderate doses is capable of doing much mischief. It is a matter of wonder that so few instances of injury result, considering its wide spread, empirical employment.

Camphor is brought to this country in a crude or impure state, and here it is subjected to the process of distillation to render it fit for employment. There are several important refineries in the country, one of which is at Rumney, N. H. A correspondent of *The People* presents the following interesting facts regarding camphor and this refinery:

The camphor of commerce comes from Formosa, Sumatra, Borneo, Japan, and China. It is obtained in crystalline masses already formed, and also in grains by distillation. The tree which produces the former kind is a near relative of our basswood, which we know as a charming tree, perfuming the air and yielding the finest honey in the world. It grows on the Diri Mountains in Sumatra, and in Borneo. It towers upward more than a hundred feet, and has been known to attain a girth of fifty feet. The spirited persuasion of the axe draws from this forest monster the white treasures secreted in the longitudinal fissures in its heart wood, sometimes, though rarely, in a layer as large as a man's arm, but more frequently in small fragments to be carefully extracted by some sharp pointed instrument. It is not an abundant bearer. Twenty pounds is a rare yield for a great tree; ten pounds is a good harvest from one of medium size, and many are felled and split that furnish no camphor. This, however, is not an entire waste, since the wood is easily worked and is never attacked by the voracious myriads of Eastern insects which destroy all other varieties except the teak and calambuco. House and ship timber are made from it, besides many articles of furniture, and the aromatic trunk is extremely valuable to the housekeepers of our colder climate. This kind of camphor seldom finds its way to Europe and America. The Chinese ascribe to it marvellous medicinal properties, and pay for it enormous sums, thereby securing the entire yield.

Common camphor is obtained by distillation from the root, stem, and leaves of certain species of *lauraceæ*, but more especially from the *laurus camphora*. Of this, also, there are two varieties. The Chinese or Formosa camphor is carried in junks to Canton and there packed in square chests lined with lead, whence it is sent to the different Eastern ports, where we procure it. It is of a grayish color with a grain like sugar, and usually unattractive in appearance. The Dutch or Japan camphor is prepared in Batavia, is packed in tubs securely matted, is pinkish in hue, and coarser than the Chinese. Both kinds need purification before using.

Camphor is slightly soluble in water, but yields freely to alcohol, acetic acid, ether, and the essential oils. A pretty experiment may be tried with it, which the young people will find amusing. Scatter a few pieces of clean camphor upon pure water, and they will whirl and sail about, keeping up the dance sometimes for hours. Drop among them some greasy matter and the merry little performers will stop on the instant.

An Ice Cutting Ferry Boat.

The Erie railway has completed a new ferry boat, with iron hull, for the ferry from New York to Jersey City. The boat, which was designed by Mr. Theodore Allen, naval engineer, and built by John Roach & Son, of New York, is of the following general dimensions: Length between perpendiculars, 180 feet; length on deck, 193 feet; beam over hull, 36 feet; beam over guards, 64 feet. The hull has been designed to give great stiffness, with unusual strength to resist ice. The longitudinal framing is much heavier than is generally used in iron vessels of this size, and at the ends the plating of the hull is made thicker, and intermediate frames and breast hooks are added, with the intention of rendering it so strong that, even when the full force of the engine is exerted, it will be perfectly safe to drive the vessel into the thickest fields of fresh water ice. For additional safety there is, about twenty-five feet from each end of the vessel, an iron watertight bulk head. The boat is driven by a beam engine of 46 inches diameter of cylinder and 11 feet stroke of piston, driving paddle wheels of 22 feet diameter; the steam is supplied by a boiler of the drop return flue type, the engine is handsomely finished, the engine room neatly painted, and the floor laid with encaustic tiles of neat design. In addition to the usual steam pump for feeding the boilers, there is a large size Woodward steam fire pump, with hose connections in hold, on main deck and hurricane deck. A vertical tubular boiler of sufficient capacity, in which steam can be quickly raised, is provided for use when the boat is not running, thus affording great protection in case of fire, both for the boat itself and also for the company's wharves and property.

Sole Sewing Machine.

During a recent strike in the boot and shoe trade in Edinburgh, the masters experienced great difficulty in supplying their customers with their orders as quickly as they were wanted. They began to look out for a machine that would do stitching in a satisfactory manner, and after some consideration they at length agreed to give the Blake sole sewing machine a trial. This is an American invention, and is now extensively used in London, and in some of the large towns in England; and there are not fewer than seven of the machines in operation in Glasgow. The boot or shoe is laid upon a revolving "horn," which is heated by a small lamp, in order to keep the wax upon the thread in a semi-liquid state, so that it may fasten the thread more firmly in the sole; while, by means of eccentric wheels, a strong needle, like that used in crocheting, is forced through the thickest sole, and brought up again by means of a little lever. The machine is capable of being worked either by steam or by hand power, and can sew 300 pairs of boots in one day, while the work, it is said, is even better done than it can be by hand sewing, inasmuch as the waxed threads are drawn more firmly together than it is possible to draw them by the mere force of the hand. By means of the machine it is quite possible for a man to sew the sole of a boot completely in about half a minute, whereas it takes a shoemaker nearly an hour to do the same amount of work; hence it will be seen at a glance that the machine confers great advantages. Attracted by the reputed usefulness of the machine, a large number of the members of the Edinburgh Bootmakers' Association have formed themselves into a company, and have procured a license from the inventor to use the machine. They pay 5d. per 1000 stitches in the shape of royalty, and an indicator is fixed to the machine, which shows the number of stitches made.—*Iron.*

Gear Wheels and Shafts of Phosphor-Bronze.

M. Gillieaux, of Charleroi, and M. Blondiaux, of the Thy-le-Château Society, have, from the first production of this alloy, employed it in the construction of rolling mills, and the following are the results of three years' experience:

This bronze has been employed for the great bearings of plate and general rolling mills, and for conical gearing in universal rolling mills. The motive power of the steam engine that drives the rolling mills in which it is used is of 170 horse power to 200 horse power, and the speed of the rollers about sixty revolutions per minute; the engine drives a sheet iron mill, a universal mill, and a rough-shaping mill, and is not at a standstill for more than one hour and a half in the twenty-four. The rollers are 1·90 meters (6·23 feet) long, and 0·62 meter (2·03 feet) in diameter, and weigh five tuns. It was found that the gears made of hard cast iron broke frequently; these were first replaced by ordinary bronze, and finally by phosphor-bronze. The duration of ordinary bronze wheels did not exceed, on an average, five months, while those made of phosphor-bronze wear for about nine months. The latter alloy is found equally superior to the former when applied to bearings.

M. Blondiaux has applied phosphor-bronze, not only in the making of pinions, but in the driving axes of mills, with great advantage; in the latter case the superiority seeming to depend not in the hardness but in the very great resistance of the alloy, the arbors in phosphor-bronze twisting much less than those made of forged iron, and not being liable to break like those of cast iron.

The Hartford Steam Boiler Inspection and Insurance Company.

The Hartford Steam Boiler Inspection and Insurance Company makes the following report of its inspections in the month of June, 1873:

During the month, 1,131 visits of inspection were made, and 2,084 boilers examined, 1,929 externally and 622 internally; while 220 were tested with hydraulic pressure. The defects discovered were 850, of which 207 were regarded as dangerous. These defects were in detail as follows:

Furnaces in bad condition, 35—4 dangerous. We have often called attention to the fact that manufacturers, in providing themselves with boiler power, do not look beyond present wants. If their business increases and new machinery is added, they instruct their engineer to run at an increased pressure, and the boilers are often forced beyond their safe ability. The severe firing necessary burns and contorts the furnace sheets. This practice furnishes many of the cases designated in these reports as "furnaces out of shape." Abundance of boiler power and slow combustion is true economy. Fractures, 45—19 dangerous. Many of these arise from the same cause as that which occasions furnaces out of shape: too small steam room and heavy firing. Burned plates, 45—7 dangerous; blistered plates, 152—29 dangerous; cases of deposit of sediment, 144—22 dangerous; incrustation and scale, 139—18 dangerous; external corrosion, 53—11 dangerous; internal corrosion, 25—13 dangerous; internal grooving, 15—7 dangerous; water gages defective, 25—9 dangerous; blow-out defective, 11—5 dangerous; safety valves overloaded and in unsafe condition, 27—12 dangerous; pressure gages defective, 117—16 dangerous. By dangerous, we mean unreliable, and consequently unsafe to run by. Their variations were such in some cases that the indicated pressure was so much less than the actual pressure that the limit of safety had been passed. Gages require frequent examination and testing. Boilers without gages, 46—1 dangerous. The latter was dangerous from the fact that the pressure was high, and the engineer depended entirely on the safety valve and "the sound of the steam as it issued from the upper try cock." Deficiency of water, 11—7 dangerous; cases of broken braces and stays, loose braces, pins out, etc., 58—24 dangerous. Some of these were found in boilers where the engineer had made an inspection only a few days before, and he "knew that every thing was in good order," and was a good deal put out because we insisted upon having the boilers cold, so that a thorough inspection might be made. Boilers condemned as unfit for use, 12.

The Log House of Norway.

A correspondent, who has been having a week of uninterrupted sunshine near the North Cape, gives us some description of Norwegian houses which may interest our readers. "You may suppose," he says, "that log houses were born on Plymouth Rock; but I find the most convincing evidence that they existed in Norway centuries, perhaps, before Plymouth Rock was known. A yet more interesting fact—at least to me—is that the fashion has not changed. Improvements there have been in many ways, but the log house of Norway is the most fashionable, perhaps because the most comfortable, house. In regions far removed from timber, and where stone and lime and clay abound, even there the log house obtains universal preference. During my trip up and down this long line of Norwegian coast, I have had many opportunities to examine the old as well as the new constructions. Let me tell you first of the old. The logs are squared and nicely dovetailed at the corners. Grooves are then cut, with the broad axe, on both the under and the upper surface. When the log is finally laid to its place, this double groove is filled with moss, and moss is afterward caulked into the log seams. The partitions are built with the house, and in the same thorough manner as the outside walls. The houses are never more than two stories high, and the roofs are steep and heavily timbered. A covering of slabs is fitted, round side down, to the roof timbers; and over these slabs comes one or more layers of birch bark. Then comes a heavy timber coping along the eaves and up the roof at either end. On this is laid sods of rich earth well packed to a thickness of about six inches, and these, in this moist climate, furnish an abundant grassy finish. The only essential differences between the old and the new Norwegian styles of house building are in the substitution of red tiles, and occasionally of slate, for the sod roofs, and the casing of the timber, which forms the body of the house, with thin boards, for looks' sake.

Within a year the town of Namsos, about one hundred miles north of Drontheim, was almost totally destroyed by fire; and it is now in course of rebuilding. Here, notably, the work of building is going on upon a considerable scale, and the two modes appear side by side. A few finished buildings there are, which would hold high rank, among the best of our American country homes, in architecture; while in comfortable exclusion of cold, we have not a country house, of whatever material, that would bear a rigid comparison with the poorest of them. Double glazing of window sashes—outside and in—the packing of every window and door frame with moss, and a careful papering of every room, are some of the means taken to prevent any circulation of the frosty air. For winter comfort, combined with the utmost facility for every conceivable ornamentation, commend to me the Norwegian log house. B."

THE puddlers in the Phœnixville (Pa.) Iron Works struck for higher wages on the first of April and the company laid not a straw in their way. Now after having lain idle nearly four months, they go to work at their former wages, and only on condition that they have nothing more to do with the Union

American Asphaltum.

Under this heading, Professor S. T. Peckham, of Buchtel College, Akron, Ohio, communicates to the *American Chemist* an article in which he takes issue with several of the statements previously made by Dr. Newberry on the same subject and in the same periodical. Professor Peckham has already published several papers on this topic, and has personally examined, over a considerable period of time, the bituminous out-crops of Lower California. The latter, he states, may be roughly estimated as covering an area of 75 miles in length by from 5 to 40 miles in width, and they probably contain more asphalt than any surface of equal extent in the western hemisphere, except the Pitch Lake of Trinidad.

Bitumen occurs there of every variety, from green petroleum of the consistence of olive oil to solid asphaltum heavier than water. There are millions of tuns of asphalt, some of it pure, but the largest portion contains from one to ninety-nine per cent of all sorts of impurity, chiefly soil, shale, gravel,sand,and organic matter,both animal and vegetable. The maltha passes by imperceptible degrees, from dense oil, through tar, to a mass resembling mortar in consistence and heavier than water. There are thousands of barrels of maltha and a few barrels of petroleum; but there is not a particle of asphalt or any other natural bituminous product in that region, that is a residuum from the evaporation of petroleum.

Maltha, or tar of varying density, has been obtained at from ten to four hundred and sixty feet from the surface—a depth too great to admit of the slightest action of the sun's rays. Nor could the evaporation be due to solfataric action, since, where such action was most apparent, on the south side of the sulphur mountain, were obtained the least dense and most slightly altered petroleums. Without a single exception, every outflow of bituminous material, whether natural or artificial, proved that the change from petroleum to maltha and asphaltum is due to the action of atmospheric oxygen, either direct or transmitted by rain water. The only natural springs of petroleum that I saw or heard of in that region were the Canada Laga and Pico Springs. The first issued from an almost perpendicular cut in strata overlaid by several hundred feet of shale. The second issued from shale that was overlaid by unbroken bands of sandstone and conglomerate, affording ample protection. The tunnels in which petroleum was obtained were invariably driven into the nearly perpendicular face of a cliff or mountain side, into strata that were well protected by hundreds of feet of overlaying rock. Tunnels of the same length, driven on strata that were not thus protected, invariably yielded nothing but maltha or oil more or less changed. On the plains northwest of Los Angeles, an artesian boring, that penetrated sandstones interstratified with shale, yielded maltha at a depth of four hundred and sixty feet. Professor Peckham goes on to deny the fact that maltha at the bottom of wells is the result of evaporation, and cites various facts and testimony in support of his position. As regards the Canada asphalt beds, he maintains similar views and does not believe that the origin of albertite, grahamite, or any such substance, has the remotest connection with petroleum of any description, or that these asphalts bear any relation to still residues. He continues that he never saw a residue of Pennsylvania petroleum that was not coked that did not contain paraffin, or a particle of California petroleums, malthas or asphalts, or any substance distilled from them, that did contain a trace of paraffin or any other solid matter.

The distillates from California bitumens, of the same specific gravity as those from Pennsylvania oils,have a different color and odor, and cannot be burned in the same lamps without smoking. They evidently contain a larger proportion of carbon. It is needless to add that none of these substances derived from petroleum bear any relation to coal tar residue.

It is important that the relations of these substances be properly understood, and that the language of science be cleared of the obscurity in which, from the time of Boerhaave to the present, this subject has been involved. We might just as well now as ever, concludes the writer, deny the existence of maltha or mineral tar,as distinguished from petroleum, as talk about the "petroleum springs" of California and the "far west." Does it really add anything to the value of a tar spring to call it a petroleum spring, or to a hill side smeared with maltha to call it a "petroleum cascade?" Just as well call a barrel of tar "spirits of turpentine," and insist that a purchaser should take either at random.

Waterproof Paint for Canvas.

The following is a cheap and simple process for coating canvas for wagon tops, tents, awnings, etc. It renders it impermeable to moisture, without making it stiff and liable to break. Soft soap is to be dissolved in hot water, and a solution of sulphate of iron added. The sulphuric acid combines with the potash of the soap, and the oxide of iron is precipitated with the fatty acid as insoluble iron soap. This is washed and dried, and mixed with linseed oil. The addition of dissolved india rubber to the oil improves the paint.

The Meteoric Shower of August 10.

We have reports from observers at Mont Clair, N. J., who noted fourteen meteors, seen within forty-five minutes, between the hours of eight and nine in the evening of August 10. General direction of movement, from N. E. to S. W.

A correspondent at Keyport, N. J., reports the observance of brilliant meteors there on the evening of the 10th.

A correspondent at Milwaukee, Wis., reports quite a number of meteors seen on the 10th. But the largest number were seen on the evening of the 9th.

Inventions Patented in England by Americans.

[Compiled from the Commissioners of Patents' Journal.]

From July 22 to July 31, 1873, inclusive.

BELL PIANOFORTE.—U. C. Hill, New York city.
BOILER AND GOVERNOR.—G. Merrill, New York city.
DOOR BELL.—J. B. Sargent, New Haven, Conn.
DRYING KILN, ETC.—J. A. Locke, New York city.
ENGINE AND PISTON.—G. Merrill, New York city.
FILTERING PROCESS.—T. R. Sinclaire, New York city.
MECHANICAL TOY.—W. A. P. La Grove (of Brooklyn, N.Y.), London, Eng.
PACKING WATER COLORS.—C. T. Raynolds & Co., New York city.
PURIFYING GAS.—W. H. St. John, New York city.
SEWING MACHINE ATTACHMENT.—H. M. Hall, Philadelphia, Pa.
SILK SPREADING MACHINE.—J. Sault, South Manchester, Conn.

Recent American and Foreign Patents.

Improved Sawing Machine.

Harry M. Stow, Milan, O.—The object of this invention is so to improve the construction of the saw guide that the stroke of the saw may be rapidly changed and adapted to the requirements of the cutting operations. The increase and decrease of the stroke is produced by simple means, and easily regulated. The invention consists of lever connections, acting on the front and pitman end of the saw shaft, to be operated simultaneously or separately, as desired.

Improved Music Leaf Turner.

George W. White, Brooklyn, N. Y.—This invention consists in a series of leaf turning arms arranged loosely on a pivot at the top of a support adapted to rest on the book rack of a musical instrument. On said pivot is a wheel with an arm which acts against all the leaf turning arms on one side and swings them around to the side from which the leaves are to be turned, when a lever at the bottom of the support, connected with a segment gearing with said wheel, is pressed down by the player. There is another wheel on said pivot for throwing the arms in the outer direction one at a time, to turn the leaves, when a similar lever at the bottom of the stand, connected with said wheel by a toothed segment, is pressed down. This last wheel is thrown back by a spring, and the first one is turned back by the last when it throws the first arm. The invention also comprises a spring clip for the arms to clip the leaves and hold them, so as not to slip out when the arms swing, which is so constructed that it can be opened readily for engaging the leaves by pinching it between the thumb and finger.

Improved Cake Pan.

John B. Firth, Brooklyn, N. Y.—This invention consists of cake pans on frames, in which the pans shall be secured in place firmly and neatly, and in such a way that they can be conveniently cleaned and washed, and that they will not be liable to become loose.

Improved Portable Fence.

Theodore L. Wiswell, Olathe, Kansas, assignor to Ray Amasa Wiswell, of same place.—The object of this invention is to improve what is known as the "worm fence." Triangular shaped posts govern the position of the panels and the shape of the fence. These posts do not extend into the ground, but the rails are fastened to them by a single bolt or pin at each end, so that they will turn on the bolts or pins, and thus give the fence a degree of flexibility for crossing uneven ground. The panels are connected together with iron staples. Two of these staples are usually employed, one near the top and one near the bottom. Keys are driven through them, by taking out which the fence may be taken down, removed, or packed away.

Improved Reciprocating Winnower.

Henry Keller, Sauk Center, Minn.—The lower grading screen is made in two parts. The upper sections are elevated above the planes of the lower ones, so that the wind from the fan can act with much better effect on the grain, both for separating the oats and other light matters at the upper end of the upper sections, and the screenings at the point where they are separated. The upper section of the lower screen is made shorter than the upper section of the upper screen, to give the oats a better chance of dropping down. The lower section of the lower grading screen does not extend quite as low down as the end of the upper screen does, and delivers its grain between the partitions of the grain box and the side of the screen box. The upper screen delivers its grain on the other side of partition which separates the grain box from the fan chamber.

Improved Evener for Thread.

John B. Meldrum, Paterson, N. J., assignor to the Barbour Flax Spinning Company, of same place.—This invention is an improvement in the class of thread eveners formed of vertical jaws adjustable toward or from each other; and the improvement consists in adapting the jaws to be adjusted independently and also simultaneously, as occasion may require.

Improved Corn Planter.

Edward Parmentier, Clinton, Ill.—The drive wheels revolve upon and carry the axle with them in their revolution by clutches held up by springs and operated by levers. By suitable mechanism, the said levers may be struck and operated to withdraw the clutches from the wheels by the rear end of the tongue when the furrowing and dropping devices are raised from the ground. To the lower ends of the conductor spouts are rigidly attached the openers, the rear parts of which are widened and have an opening formed in them directly beneath the discharge opening of the spouts, so that the seeds may be deposited in the bottom of the furrow before said furrow becomes partially filled by the soil falling inward from its sides. The forward part of the lower edge of the openers are inclined or rounded upward to enable it to pass through the soil and over obstructions more readily. The openers enter slots in the shoes, which are drawn along the surface of the ground, pushing back obstructions and smoothing the said surface. The openers may be adjusted to project below said drags according as the seed is to be deposited at a greater or less depth in the ground. To the outer sides of the drive wheel are attached rings, which are grooved to receive flanges formed upon bars, the centers of which ride upon the outer ends of the journals of the axle, and which are made of such a length that their ends may come in contact with and mark the surface of the ground as the said wheels revolve. The markers are connected with the wheels, so as to be carried around by and with the said wheels in their revolution by set screws, so that the bars may be conveniently adjusted to mark the ground directly opposite the hills.

Improved Horse Hay Rake.

Watson C. Martindale, Philadelphia, Pa.—This invention consists in an improved horse hay rake, which is so constructed that the teeth may be raised to discharge the hay by the advance of the machine, and may be disengaged automatically and allowed to drop back to the ground when the hay has been discharged. By suitable construction, as the machine is drawn forward, a rod will be revolved. When a sufficient amount of hay has been collected, the lever pawl is thrown into gear with the ratchet wheel. This stops the revolution of the rod so that as the machine continues to advance the rod and axle are carried forward, which raises the teeth and discharges the hay. As the rod and axle are carried forward the projecting end of the lever pawl strikes an inclined arm attached to the foot board, which disengages the pawl from the ratchet wheel and allows the teeth to drop back to the ground, ready to again collect the hay.

Improved Cane Stripper.

Robert C. James, Denison, Texas.—This invention is an improvement in cane strippers of the class in which a pair of drawing rolls are arranged in combination with a fixed and movable spring stripping blade. A single stack is passed through each hole in the table to the rollers below by the attendant, so as to be seized by them and pulled through while the stripping blades are bearing against them on one side and pressing them against the hole on the other, which strips off the leaves and other substances suitable for fodder, and prevents them from going into the kettle, and saves a large amount of skimming.

Improved Brake for Railroad Cars.

James Temple, Mooresburg, Pa.—This invention relates to a novel and effective brake for railroad cars, designed to operate to a more advantageous degree than brakes of the description upon which the improvements are based. The invention consists in the employment of a longitudinal bar carrying at or near its ends arc-shaped brake shoes.

Improved Heel Trimming Machine.

Elisha U. Jones, Woodhaven, N. Y.—This invention has for its object to furnish an improved machine for trimming shoe heels. The crank, by means of which motion is given to the machine, is attached to a shaft which revolves in bearings in the frame. To the shaft is attached a small bevel gear wheel, which engages with the large bevel wheel attached to a vertical shaft. To the upper end of the latter is attached a wheel, the edge of which is made in the form of a double cam, to allow the arm that carries the knife to move inward at the proper times. A screw rod limits the movement of the knife and serves as a guide rod to hold the coiled spring by which the knife is held out to its work. The knife is made with a finger, which projects in front of its cutting edge and rests against the edge of the guide, which rests upon the top of the cam plate and is secured detachably to the upper end of the vertical shaft. The guide is made of the exact form to be given to the heel, and must be changed with every change in the form or size of the heel. A short hook rod on the arm enters a groove formed in the under side of the cam wheel, which groove is so formed as to cause the knife to move forward quickly to cut the elongated sides of the heel, and slowly while cutting the short curve of the rear part of the heel. A clutch grasps the top of the last directly over the heel, so as to hold the shoe heel firmly upon the guide plate while being turned and trimmed. In using the machine, the shoe is placed in position, and the crank is operated to give it a half revolution; the shoe is then removed and the revolution completed to bring the machine into position to receive another shoe.

Improved Water Wheel.

Oliver J. Bollinger, York, Pa.—This invention relates to that class of water wheels with which hinged or pivoted gates are used; and has for its object to remedy the difficulties arising from the manner in which the studs are fo ned and secured to the gates. The invention consists in the lug of a pivoted or hinged gate of a water wheel, made with a vertical hole to receive the stud, and a transverse hole to receive the wedge key; and in the cross head stud, made with a transverse notch to receive the key for securing it detachably to the lug of the pivoted or hinged gate of the water wheel.

Improved Method of Restoring Tinned Sheet Iron.

William E. Brockway, New York city, assignor to William L. Brockway, of same place.—The vast number of tin cans used for preserving articles are considered worthless when emptied of their contents, and are thrown away by the million; but the iron which is tinned and used for these cans is of the first quality, or much tougher than ordinary sheet iron, and much better adapted for many purposes when restored, especially for binding trunks, and for many similar purposes where pieces of large superficial measurement are not required. The object is to utilize these cans now thrown to waste; and this invention consists in the process of restoring the iron to its original state, but in small sheets, and thereby utilizing it. Tin melts at about 450°, but will not entirely leave the iron until subjected to a higher temperature. The iron is therefore subjected to a temperature of about 1,000°, or to a cherry red. This cleans off the tin and anneals the iron, rendering the latter very pliable, and adapts it for many purposes where toughness and pliability are essential. When the iron is taken from the oven the pieces are passed between rollers, which press upon it just sufficient to straighten it and prepare it for market.

Improved Rock Drill.

George E. Nutting and Joseph C. Githens, New York city, assignors to A. C. Rand of same place.—This invention has for its object to furnish an improved steam rock drill, which shall be so constructed that the valve may be shifted at the proper time to cut off the steam, and at the same time admit the steam in front of the piston, so that it may cushion itself upon steam and diminish the jar or shock, and in which the piston may turn, and thus turn the drill as it makes its up stroke. To the end parts of the valve stem are rigidly attached two disks, at a distance apart equal to the distance required for the throw of the valve, and an additional thirty-second of an inch, more or less. Upon the stem upon each side of the valve are placed pistons of such a length as to give the valve and two pistons a play of about a thirty-second of an inch upon the stem, between the disks. The diameter of the disks is made enough less than the diameter of the end parts of the valve chest to allow the steam to pass the said disks freely. By suitable construction,as the piston comes to the upper part of the cylinder, the lower port is uncovered and the steam passes through it into the lower end of the steam chest, below the lower disk. As the steam enters the lower part of the steam chest it forces the disks, pistons, valve, and valve stem upward until the upper disk strikes its stop and stops the forward movement of the stem and disks. The steam now passes around the edge of the lower disk and forces the pistons and valve upward until stopped by the upper disk. This movement allows the steam in the end part of the steam chest to exhaust through the exhaust. The exhausts are so arranged as not to be fully closed until the valve pistons and disks have nearly completed their stroke. By this construction the valve and its attachments and the piston will always move in the same direction, which lessens the jar, and consequently the wear, of the mechanism. A simple friction device is so arranged as to rotate the piston as it rises, but to allow said piston to descend without turning. The lower end of the piston rod is made hollow to receive the drill bit, and is slotted longitudinally to divide it into three or more parts so that the drill bit may be securely held and may be conveniently detached when desired.

Improved Stitching Gage for the Blind.

William H. Richardson, Fort Smith, Ark.—This invention consists of an improved stitching gage for the blind, formed of bottom, front, and rear plates. In the upper part of the front plate is formed a horizontal slot through which the stitching is done. The upper edge of the rear plate is about upon a level with the lower edge of the slot in the front plate, and in the said plate are formed two vertical slots to receive the buckle bars to enable the work to be held firmly against the slot in the front plate. In the center of the bottom plate is a hand nut, through the screw hole of which passes a screw the upper end of which is rigidly attached to the platform, upon the lower edge of which the work rests when stitching straight work. The platform slides up and down along the inner side of the front plate, and is kept in place by grooved flanges. To the outer side of the front plate is attached a horizontal bar to prevent the gage from setting too deep in the jaws of the stitching horse. To the outer side of the front plate is detachably attached a ratchet bar which has as many teeth to the inch as the work should have stitches to the inch. Upon the outer side of a slide, where the awl is to be inserted, is formed an inclined projection, against which the tapering forward end of the ferrule of the awl strikes, and thus pushes the slide forward one tooth each time the awl is inserted. In using the gage, when the work has been stitched the length of the slot, the work is moved forward until the awl strikes the other end of the slot, the slide is moved up to it, and the gage is again ready for work.

Improved Cotton Planter.

Robert E. Bowen, George's Creek, S. C.—This invention relates to the construction of cotton planters with a view to enable them to be easily and cheaply manufactured, while their efficiency is maintained or increased. It consists in improving the ordinary shaking hoppers, which have arms moved up and down by side studs on a wheel, so that the seeding operation may be easily and conveniently stopped and resumed.

Flame Extinguisher for Lamps.

William D. Lindsley, Wathena, Kansas.—This invention consists in making a very durable and compact joint of both spring and extinguisher with the movable arm of the latter by bending and riveting the end of the arm.

Improved Box Scraper.

Charles Ellis, George W. Ellis, John D. Ellis, Philadelphia, Pa.—This invention consists in a certain construction of stock and scraper, and means of attaching the same to each other, and to the handles, whereby a convenient and handy tool is produced.

Improved Windmill.

Samuel Shannon, Shellsburg, Iowa.—This invention relates to improvement in the class of windmills having vanes so pivoted that the force of the wind tends to turn them around it; and consists of a double crank shaft and a reciprocating sleeve on the post, on which the wheel frame is pivoted and around which it swings, so contrived that a connection is made with a pump rod, or two or more, if desired, on the side of the post, and the red or rods worked thereby without hindrance to the turning of the wheel frame and without any cramping or side draft.