American Trees in Autumn.

Now that deciduous trees and shrubs are once more beginning to attract the attention which they so well deserve, and which was diverted from them when conifers became such favorites, instead of the monotonous somber green of the pines and their allies we may expect to see more frequently the delicate tints of early spring furnished by the swelling leaf buds or opening blossoms, the manifold shades of green during the summer months, and the brilliant coloration assumed in autumn by many of the fine deciduous trees from North America and Eastern and Northeastern Asia, which were much more generally known at the commencement of the present century than they are now.

If planters would but note the wondrous autumnal changes in the foliage of many deciduous trees, and plant accordingly, they could easily create such effects as would as much surpass the ordinary haphazard style as a picture by a "Turner" would be superior to another painted by a schoolgirl. With care, too, the summer tints might be made to thoroughly harmonize, so that at all times the individual beauty of a tree might be enhanced by judicious contrast. Trees with totally different habits might also be chosen, so that, even when leafless, the tracery of the branches would be a source of artistic enjoyment. My remarks are, however, confined to autumnal tints and to trees and shrubs which are most noticeable at the present moment. Many of these are somewhat uncommon, all are strikingly handsome, and even the common one deserves to be more generally known and appreciated.

For truly gorgeous coloration in autumn, some of the American oaks bear off the palm. Perhaps the most beautiful is the quercitron oak, of the eastern United States (Quercus tinctoria), the fine, deeply-lobed foliage of which, in autumn, exhibits a lovely combination of dark, glossy green, crimson, and reddish brown, the green occupying generally the central portion of the leaf. Quercus rubra (the red oak) and its varieties are especially noteworthy; in these the redder tints of the decaying foliage are more unalloyed with other shades, so that in the sunlight the leaves brighten up and glow as if they were on fire. Q. alba (the white oak) is a noble tree with large leaves, brownish red being the prevailing shade in autumn. The chestnut oak (Q. prinus) and its varieties, with their large, chestnut-like leaves, are hardly less beautiful than the quercitron and red oaks, and assume autumnal colors in which bronze and reddish purple predominate.

Totally different in color and habit of growth are the hickories, two of the most showy in autumn being the pignut hickory (Carya porcina) and the small fruited hickory (C. microcarpa), from the eastern United States; both have walnut-like foliage, and the large leaves of the first die off a uniform rich golden yellow. The yellow wood (Cladrastis tinctoria), from Kentucky and Tennessee, is one of the handsomest of the flowering trees of the locust kind; in early autumn it is clothed with large pinnate leaves of a fine orange yellow. The bird cherry (Prunus padus), particularly when planted in open ground, has leaves tinged with rosy red when dying, and one of the prettiest effects I have ever seen was a fine group of bird cherries with a background—a few yards away—of dark, glossy, evergreen shrubs.

The June Berry (Amelanchier canadensis), although not possessing the delicate tints of the last named, wonderfully enlivens the autumn shrubbery with its red-brown leafage. The red mulberry (Morus rubra), from the eastern United States, is very conspicuous in October on account of its sulphur-colored, prettily lobed leaves; it is a small tree, and, with a background of dark green such as that afforded by the evergreen oak (Quercus ilex), is most striking. The blue beech (Carpinus americana) is a small tree from 10 feet to 20 feet high; its decaying leaves exhibit a charming combination of green, golden yellow, light red, and crimson. The South European Acer opulus furnishes us with a mixture of purplish, orange scarlet, and brown tints. The cherry birch (Betula lenta) of the northern and northeastern United States makes a fine object when covered with clear, golden yellow foliage, which is especially attractive in sunlight. The black or sour gum, or pepperidge—for under all three names is Nyssa multiflora known in its native haunts, the eastern United States—has fine, bold, glossy leaves, assuming in early autumn a brilliant orange-scarlet color; an accidental combination of this with a specimen of Ptelea trifoliata, with its lemon-yellow, pinnate foliage, produces a very happy effect.

The Silver Leaf Maple (Acer dasycarpum), which, on account of its rapid growth and beautiful foliage, is much planted as a shade tree in the United States, is one of the finest of deciduous trees. In early spring it is covered with myriads of reddish flowers; then its handsome leaves, green above, silvery white below, turn in autumn to a golden yellow. The red maple (Acer rubrum), more compact in form and less rapid in growth than the preceding, is also very ornamental in autumn, and in spring its deep red blossoms render it conspicuous and beautiful. The sugar maple (Acer saccharinum) is one of the noblest of American trees, and is much valued both for its wood and for the beauty of its form and foliage; in summer its leaves are a light green, but in autumn are a clear yellow. The tulip tree (Liriodendron tulipifera) is one of the largest and most beautiful of North American trees; as an ornamental tree it is at any time hardly surpassed, but in October, when its foliage is suffused with a rich golden glow, it is especially striking, a fine specimen making quite a feature in the landscape. The brilliant autumnal colors of the sweet gum (Liquidamber styraciflua) are too beautiful to be passed over without notice; rich orange-scarlet, crimson, and yellow give place in some individuals to a dull purple, the long-stalked, star-like leaves, when well covered, being especially handsome. This tree retains its rich leaf coloring for some weeks.—*Q., The Garden.*

APPARATUS FOR THE RECOVERY OF TAR AND AMMONIA FROM BLAST FURNACES.

One of the most important questions of the present day in connection with blast-furnace practice is that of the recovery of tar and ammonia from the furnace. This was evidenced at the recent meeting of the Iron and Steel Institute, at Glasgow, by the interest shown in the paper on that subject by William Jones. In that paper reference was made to the apparatus for dealing with this subject designed and patented by Mr. John Dempster, of the firm of R. & J. Dempster, of Newton Heath, Manchester, and which is now in operation at Messrs. R. Heath & Son's works, near Stoke-on-Trent, being the only works which has yet attempted the recovery of tar and ammonia from blast-furnace gases in England. This apparatus is illustrated in our present issue, where Fig. 1 represents a perspective view of the works, our illustration having been engraved from a photograph. Fig. 2 shows a plan of the works, the various details of the plant being indicated thereon.

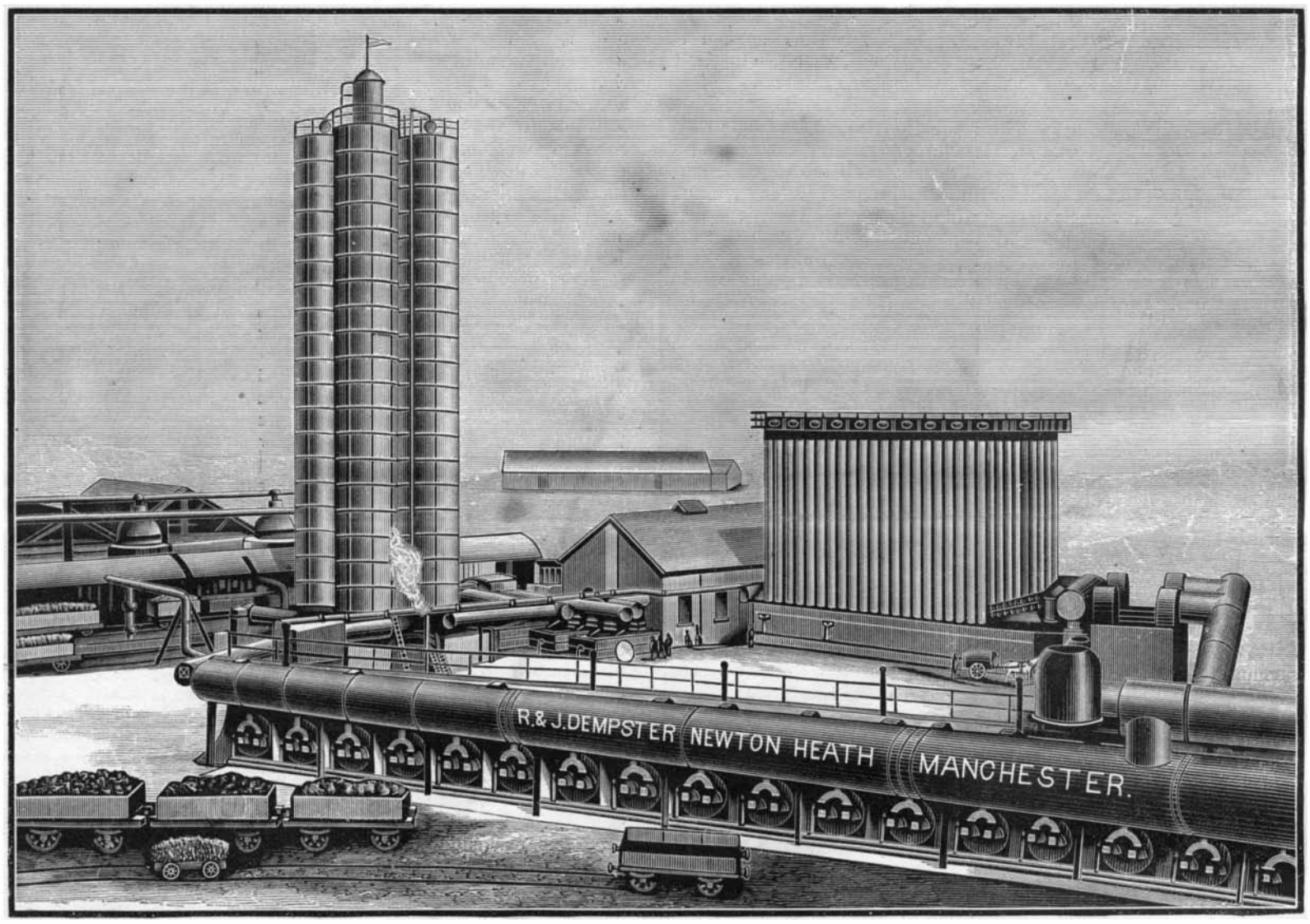


Fig. 1.—APPARATUS FOR THE RECOVERY OF TAR AND AMMONIA FROM BLAST FURNACES.

Mr. Dempster, being a gas engineer and constructor of gasworks, has adopted apparatus generally used in ordinary gasworks, but adapted to the special requirements of blast-furnaces. The blast-furnaces of Messrs. Heath are situated close to the forges, mills, and collieries of the firm, and the gases from the furnaces raise steam for these. Therefore, Mr. Dempster had to keep in mind that these gases were valuable, and that he must use every economy in reference to them. The gases are conveyed first to the ammonia still, and the flues of this still are made three times the size of the other pipes, Mr. Dempster's object being to cause the gases to flow slowly round the still, and, by reducing the speed, to allow the dust to fall to the bottom of the flue, where, by an arrangement of scrapers, he collects this in a well at the end of the still. The well can be shut off from the flue by dampers, and the dust removed without having to stop working the still. The temperature of the gases being much higher than boiling point, the NH_3 from the liquor is driven off without any expense for fuel. The still is 40 feet long and 7 feet diameter, and holds about twenty-four hours' make of liquor, and the ammoniacal liquor is continually being pumped in, and, having baffle plates in the still, it flows on to the other end and out. As the still holds twenty-four hours' make of liquor, the liquor is twenty-four hours under the influence of the heat, and all the NH_3 is driven off. By an arrangement of valves the gases can be shut off from the flues of the still if required. The gases then flow on to what Mr. Dempster terms dust boxes, owing to their purpose being to arrest the remaining dust that

may have passed the flues of the ammonia still, but they are really washers. They are two wrought iron vessels, each vessel being divided into four compartments, and in each compartment a plate with serrated edge depends from the top and dips into the liquid; the bottom of the vessels slope toward the front. The gases are thus caused to pass four times under water, and it is found that most of the tar is given off at these vessels, and that they answer the purpose of arresting the dust. These vessels are arranged so that either can be shut off for cleaning (if this should ever be required) while the gas is passed through the other.

The gases at the outlet of the dust boxes are found to be very much reduced in temperature, and are then brought down to the temperature of the atmosphere by two pipe condensers. These condensers consist of 100 wrought-iron pipes, 40 feet long and 20 inches in diameter, placed in five rows of twenty each upon a cast-iron box, which contains the necessary division plates for shutting off each row from the other, while allowing the condensed matters to flow underneath. This cast-iron box has also a sloped bottom similar to the dust boxes. Valves are fixed at the end of each row of pipes, so that any row can be shut off; and by taking off the blank flanges from the top, each pipe can be cleaned if this should ever be required. Arrangements are made at the top of these pipes so that cold water is directed on to them, and thus the condenser is rendered very effective. The gases are then drawn through the exhausters, which consist of four of Root's blowers, driven by a pair of horizontal engines. The blowers have valves fixed at the inlet and outlet, so that they can be shut off for repairs if necessary. Following the exhausters come four washers, the gas dividing through the first two, and then again dividing through the other two. These are arranged in pairs, with valves, so that they can be shut off and cleaned if required without stopping the whole of the apparatus. The interiors of these washers are fitted with four plates with holes varying in size and getting smaller toward the outlet, the last plate of the last washers having holes $\frac{1}{16}$ inch diameter. The object of these is to take out the last traces of tar before the gas gets to the scrubbers, and this they do very effectually.

The gas then enters four round scrubbers 100 feet high and 12 feet diameter, which are filled with about 300 tons of wood boards, and on the top of each of the first three scrubbers is an apparatus for distributing the liquor over the boards. This apparatus is self-acting, each scrubber having a large steam pump which pumps the ammoniacal liquor through all four scrubbers alternately. The last one has clean water pumped through it, though in much smaller quantity than through the others. This scrubber takes out the last trace of ammonia, and the gas then passes on to the boilers. The scrubbers, being set in a square, stand very firm; in the center between them is a spiral staircase. The scrubbers are made in rings of plates 5 feet deep, and in each ring of plates is a flap valve, held to its face by a heavy weight, so as to give immediate release in case of an explosion. These valves also act as manholes to the scrubbers, being 18 inches in diameter. Mr. Dempster has also placed these valves in numerous places about the apparatus, so that each section of pipe or apparatus shall have safety explosion valves. Between the scrubber and the boilers is introduced a box, which is partly filled with water, and has a plate dipping into it, so that the gas can be forced through the water. This is only intended to be used when the plant may have been standing and is being again put into operation, as, if the gas should be sent on to the boilers too soon, any explosion would only strike back as far as this box.

This apparatus has been at work about two months, and from its first being put into operation has continued to give every satisfaction. The whole arrangement was so well considered beforehand that no alterations have yet suggested themselves as being required. The firm are now erecting plant to deal with the tar, it being the intention when the present plant was designed to sell the tar to the neighboring tar distillers. The price of tar, however, has fallen so low that it is considered most profitable to distill the tar on the premises, and thus save any cost of carriage. Mr. Dempster claims as the advantages of this apparatus, first, that he does not consume any of the gases in working the plant, nor does he injure the quality of the gases in any way, no vapor being carried along with the gas, or any acid vapors; and secondly, that he gets his ammonia liquor up to a good strength of NH_3, and that the labor is very small, two men for day and two men for night being all that are required to work it. The cost of this apparatus is, we understand, about £6,000 per furnace. The sulphate of ammonia, paraffin wax, heavy paraffin, and light oils recovered by this process from the blast furnace gases at Messrs. Heath's works are of excellent quality, as evidenced by the samples inspected by us. The products from the tar given off from the furnace gases are stated to be more valuable than the products obtained at the present time from the ordinary gasworks tar.—*Iron.*

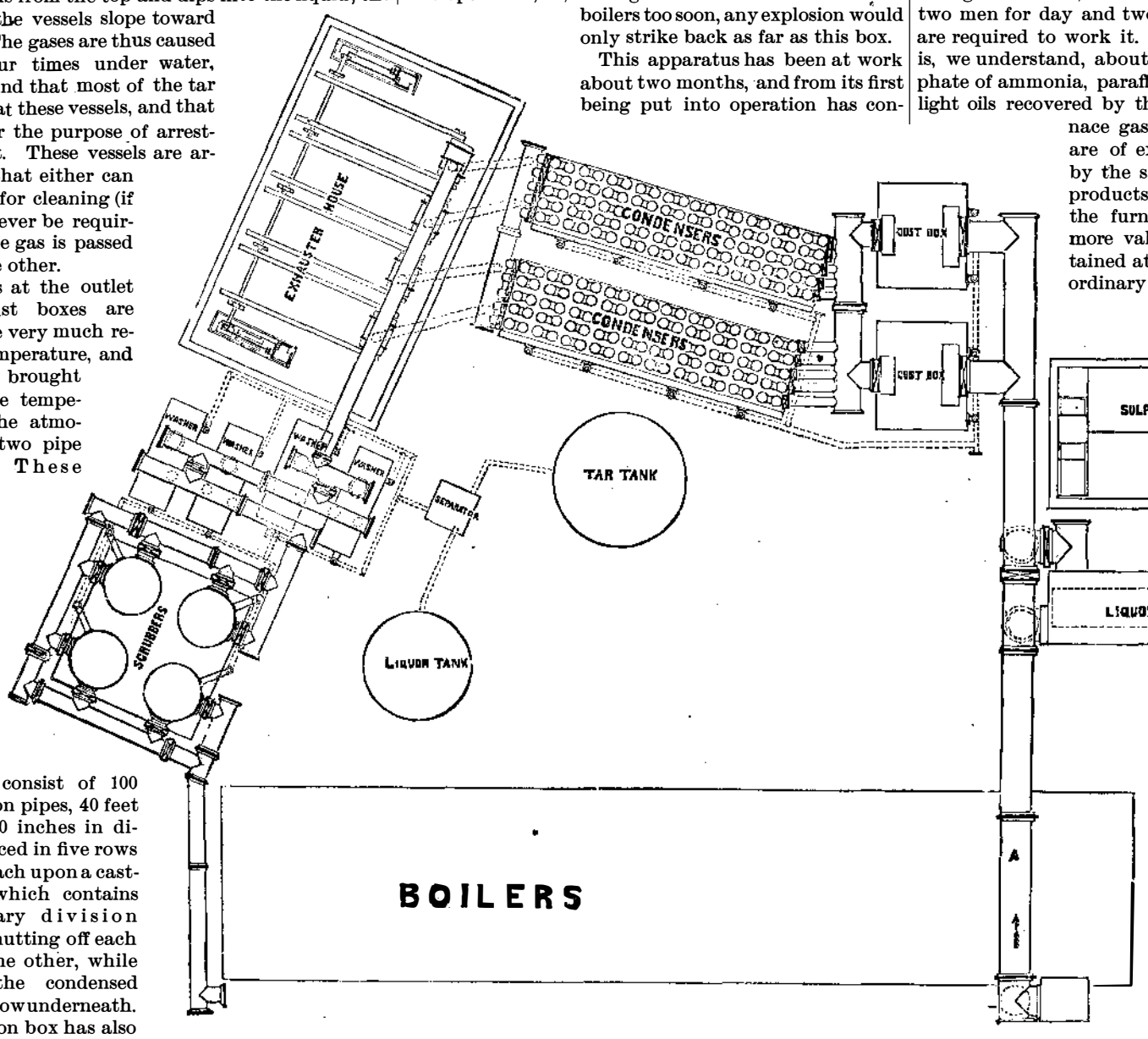
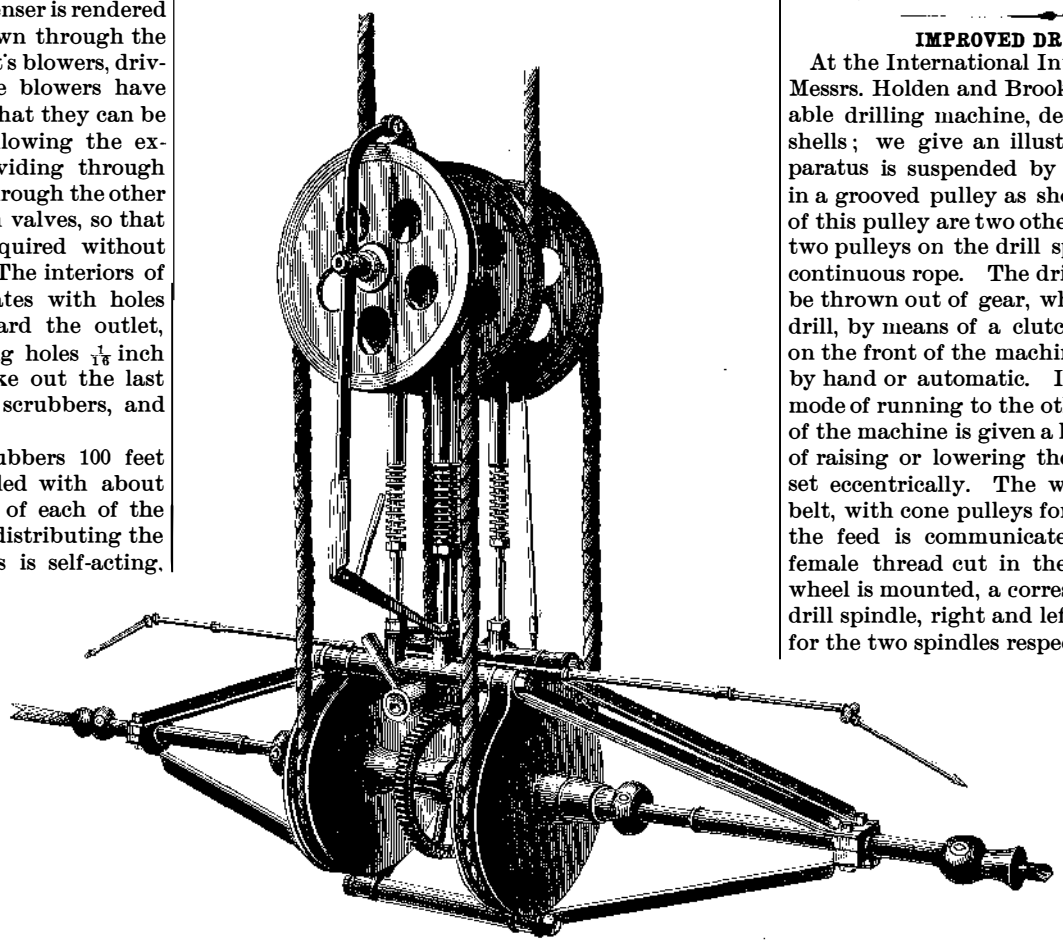


Fig. 2.—PLAN VIEW.—APPARATUS FOR RECOVERY OF TAR AND AMMONIA.

A NEWSPAPER correspondent describes the American watch manufactory at Waltham, Mass., and in speaking of the astonishing minuteness of some very essential parts of the watch says: "A small heap of grain was shown to us looking like iron filings or grains of pepper from a pepper caster—apparently the mere dust of the machine which turned them out; and these, when examined with a microscope, were seen to be perfect screws, each to be driven to its place with a screw driver. It is one of the statistics at Waltham worth remembering that a single pound of steel, costing but 50 cents, is thus manufactured into 100,000 screws, which are worth $11."

IMPROVED DRILLING MACHINE.

At the International Inventions Exhibition, London, Messrs. Holden and Brooke, of Salford, exhibit a portable drilling machine, designed to work inside boiler shells; we give an illustration of this tool. The apparatus is suspended by its driving rope, which runs in a grooved pulley as shown. Mounted on the shaft of this pulley are two other pulleys, one of which drives two pulleys on the drill spindle below, by means of a continuous rope. The driving pulley of this series may be thrown out of gear, when it is required to stop the drill, by means of a clutch operated by a lever shown on the front of the machine. The feed may be either by hand or automatic. In order to change from one mode of running to the other, the small handle in front of the machine is given a half turn. This has the effect of raising or lowering the worm, as the worm shaft is set eccentrically. The worm gearing is driven by a belt, with cone pulleys for different rates of feed, and the feed is communicated to the drill spindle by a female thread cut in the sleeve on which the worm wheel is mounted, a corresponding thread being on the drill spindle, right and left handed threads being used for the two spindles respectively. As the drills run in opposite directions, they can both be ground right-handed. A feed of 9 inches can be given to each drill; and for variations in the diameter of boiler shells beyond this compass and up to 8 ft. diameter, intermediate lengths of spindle have to be introduced. The spiral springs shown on the vertical distance rods are for the purpose of keeping the stretch on the driving rope, so that the pulleys will not slip with heavy work. As rigged for work, the driving rope from the countershaft runs over a guide pulley mounted in a sliding frame. This pulley is counterbalanced, and in this way the whole machine may be raised and lowered with facility by one man.—*Engineering.*



IMPROVED BOILER DRILLING MACHINE.