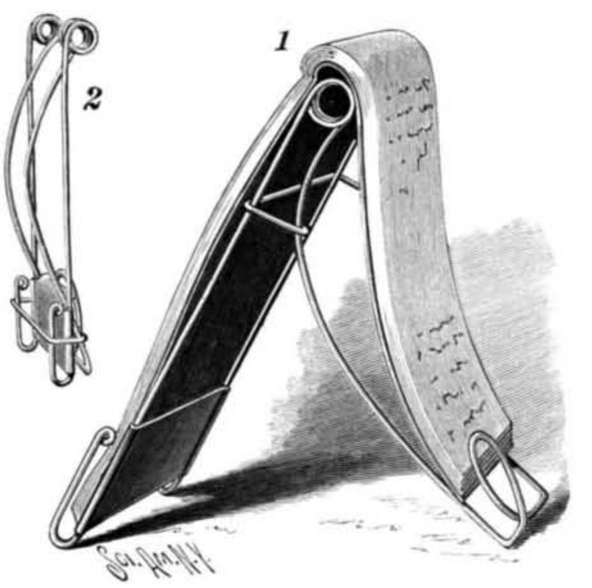
A HANDY NOTE BOOK HOLDER.

The cut shows a simple little note book holder invented by W. T. Ives, of No. 41 Tompkins Place, Brooklyn, N. Y., and designed primarily for stenographers in copying their notes. It will also hold letters and many kinds of books very nicely. In the illustration Fig. 1 represents it with a note book in place for copying, Fig. 2 representing the device



IVES' NOTE BOOK HOLDER.

folded. It is practically made of a single piece of wire coiled to form a spring connection between the front and rear standards. The front standard wires are turned up at the base to keep the leaves of the note book from flying up, while the wires of the rear standard are connected at the base by a single coil, to form a clip which holds all or a part of the leaves firmly. A keeper, which slides easily on the rear standard when the tension of the springs is released, regulates the inclination of the book. When not in use, the device folds into a small space, and can be conveniently carried in the pocket. It weighs but two ounces, which is a great improvement over the heavy, bulky holders on the market to-day.

A HORSELESS FIRE ENGINE.

There is now being constructed for use by the Boston Fire Department a horseless steam engine, of great size and power, having a contract capacity of 1,350 gallons of water per minute, but the builders, in view of recent tests, are confident that this engine will throw 1,850 gallons of water per minute. For some time past the fire commissioners of nearly all the great cities have had under consideration the question of adopting a specially powerful steam fire engine for use in portions of the city in which the great office buildings are located. A fire in one of the upper stories of the tall office buildings renders the ordinary methods of fire fighting futile.

From experience gained in recent fires, it became evident that one of two things must be done, if the constant menace of a disastrous fire were to be avoided. Either a limit must be placed on the height of buildings, or more powerful engines, capable of throwing higher streams of water, must be obtained for use in the districts containing the lofty structures. The heaviest fire engine for horses weighs 10,000 pounds, and requires three horses to get it about the city It has a guaranteed capacity of 1,100 gallons per minute. A heavier engine would be almost unmanageable, if horses were used as a means of moving it about from place to place, and in the narrow streets of Boston and lower New York it is even difficult for an engine with three horses to make rapid progress, and the liability of some of the horses becoming injured is also very great.

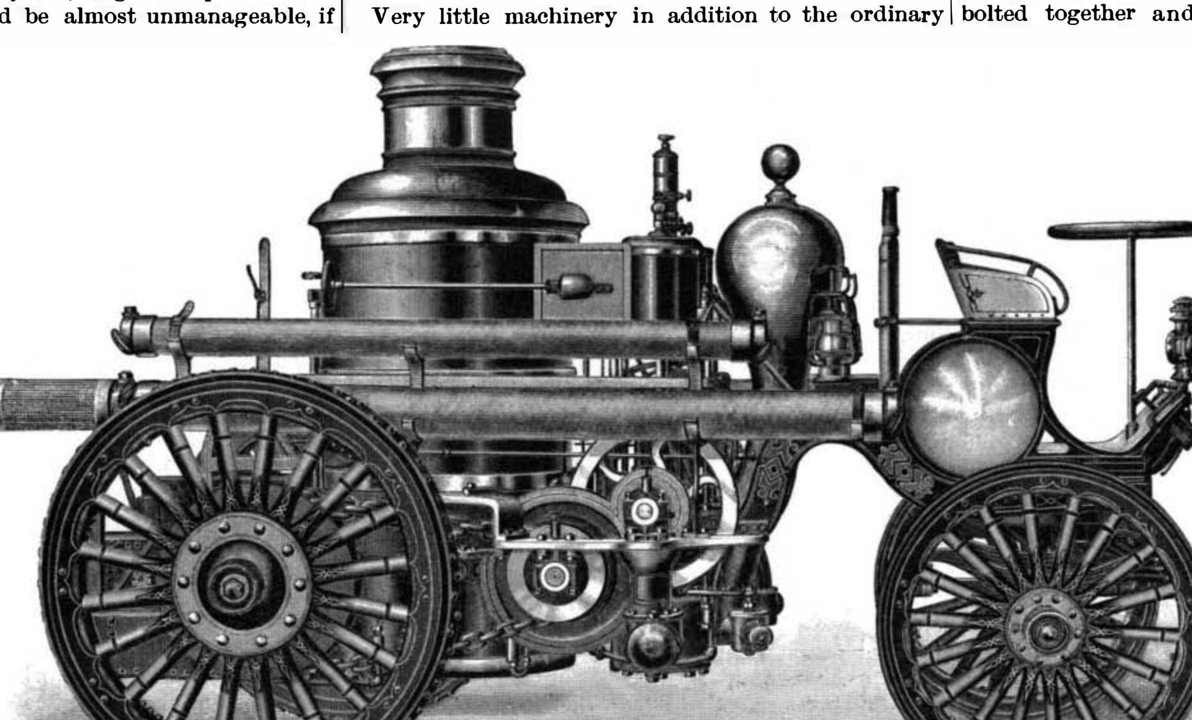
In view of these facts, it was decided by the Boston Fire Department that a "double extra first size self-propeller," as it is called, should be ordered, having steam for a motive power. There have been many attempts in the past to build and put into practical service steam-propelled fire engines. Among the first was one constructed in 1840 by Capt. John Ericsson, of Monitor fame. In the main his engine was a success, but the opposition was so strongly against it that, after a brief period of service, the engine was abandoned.

The horseless fire engine which we illustrate is built by the Manchester Locomotive Works, Manchester, N. H., and is one of the Amoskeag type. From the ground to the top of the engine is 10 feet; its length over all is 16 feet 6 inches, and the width over all is 7 feet 3 inches. The weight equipped for service is 17,000 pounds. The boiler is upright and tubular in style, with a submerged smoke box, and is expanded at the lower end to increase the grate surface. It is made of the best quality of steel plate, with seamless copper tubes, and is thoroughly riveted and stayed. It is jacketed with asbestos and has a lagging of wood which supports the metallic jacket. The connections with the steam cylinders are simple and have the advantage of being entirely unexposed to the air. The steam cylinders are cast in one piece. They are firmly secured to the boiler and framing and are covered with a lagging of wood, with a metallic jacket on the outside. The main shell of the pump is in one solid casting. It is a double acting and vertical pump and its valves are vertical in their action. The pump is arranged for receiving suction hose on either side and has outlets on either side for receiving the leading hose. The connection between the steam cylinders and water cylinders or pumps may be made by the old and familiar link motion and link block, or the equally familiar crosshead and connecting rod plan, both giving excellent results for ordinary steam fire engines; but in the self-propelling engine, where the engine power is transmitted to the driving wheel through the main crank shaft, which is not the case when this power is transmitted to the pumps, the crosshead and connecting rod plan has many advantages, and is therefore adopted for self-propelling engines. A self-propelling engine of the type we illustrate, made for the city of Hartford, Conn., at its first trial threw through fifty feet of leading hose, 3½ inches in diameter, horizontal streams as follows:

1½ inch nozzle	348	feet.
1¾ inch nozzle	338	"
2 inch nozzle	319½	"

The manner of handling the self-propellers is very simple. The chief engineer rides on the fire box of the engine and has directly under his hand the various levers and wheels which start, stop and regulate the speed of the machine. The assistant engineer rides on the driver's seat, and by means of the large steering wheel he steers the machine in exactly the same manner as the rear wheels of the long ladder trucks are governed through a system of bevel and worm gearing. The engine can be turned around in an ordinary street with ease.

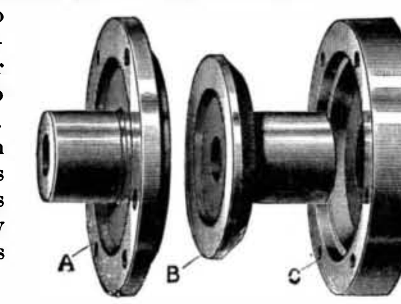
Very little machinery in addition to the ordinary mechanism of a fire engine is required to operate the self-propellers. The road driving power is applied from one end of the main crank shaft to an equalizing compound, and two endless chains running over sprocket wheels on each of the main rear wheels permit these rear wheels to be driven at varying speeds when turning corners. The driving power is made reversible, so that the engine may be driven forward or back at the will of the operator. When it is not necessary to use the power of the engine for driving purposes, the driving mechanism can be disconnected by the removal of a key, so that the pumps may be worked with the engine standing still. An extra water tank is carried at the rear of these engines to supply the boiler until connections can be made with a hydrant. The self-propeller can travel on a fair level road at a maximum rate of twelve miles an hour. It can climb any ordinary grade; in fact, any one that a team of horses can climb with a heavy load.

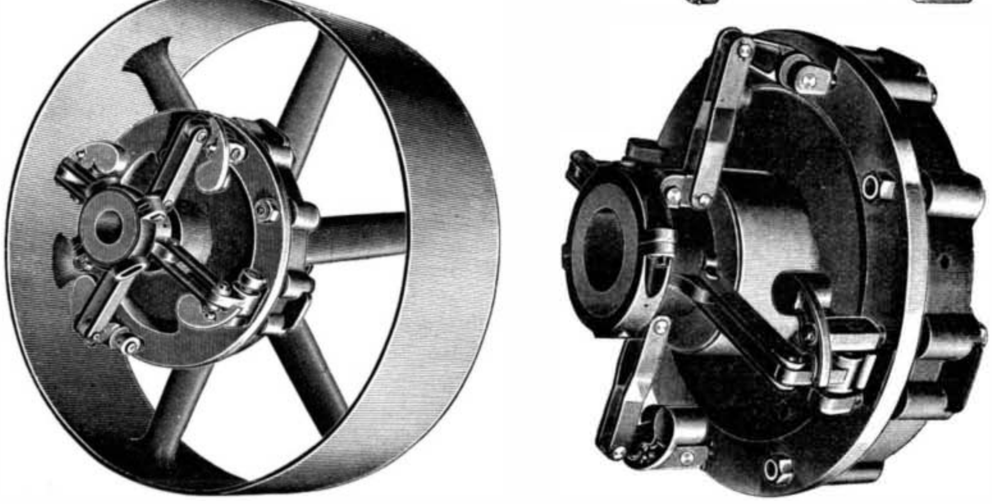


A HORSELESS FIRE ENGINE.

AN IMPROVED FRICTION CLUTCH SYSTEM.

The illustration represents a strong and simple clutch, made in sizes to positively transmit any number of horse power up to two thousand. It has been adopted, and its high efficiency is approved, by large numbers





WORRALL'S FRICTION COUPLINGS PULLEYS AND GEARING.

of representative users for main lines of shafting, countershafts, pulleys, dynamos, generators, motors, fire pumps, and all classes of machinery. Perhaps its strongest recommendation is its capacity for long, continuous hard service, without repairs. It is manufactured by the American Twist Drill Company, of Laconia, N. H., and has self-adjusting and centering friction disks, and the friction may be applied to pulleys on main shafts, dispensing with loose pulleys on machinery and countershafts, stopping all pulleys, countershafts and belts when dynamos or other machines are not in use. It is operated with the engine running at full speed, and will gradually start or stop any connected shafting and machinery without sudden strain upon belts or gears. Holes are drilled through all parts of the friction, that it may be quickly bolted together and converted into a solid coupling in event of any accident to the clutch mechanism. The friction surfaces are flat, and when clamped together form a vacuum, having the pressure of the atmosphere in addition to that of the levers to force them together, each part of the friction being keyed solid to the shaft upon which it runs. Simple methods of adjustment are provided, and all parts of the clutch and shafts are automatically centered when in use, there being no friction upon the shipper or shaft bearings. When the shipper sleeve is thrown out to stop the clutch, the balance weights, shown in the engraving, overcome the centrifugal force exerted on the levers at high speeds. Any size iron or wood friction pulleys may be used for light power and moderate speed, by simply placing the pulley on one of the coupling hubs, or the friction disk may be applied direct to pulley hubs, but this plan should never be used for high speeds or heavy powers. The clutch applied to a quill upon which a pulley can be mounted, or as a cut-off coupling, will do heavy work, and may be run up to speeds of five thousand revolutions a minute.

British Strikes and Lockouts in 1895.

The annual report of Mr. J. Burnett, of the Labor Department of the British Board of Trade, on strikes and lockouts, "shows that there were 876 disputes resulting in stoppage of work during 1895, and these involved 263,758 workpeople, as against 1,061 disputes and 324,245 workpeople in 1894. As regards results, 303, or 34·6 per cent, of the disputes ended in favor of the workpeople, as against 35 per cent in 1894; but in these successful disputes 24 per cent of the persons affected during the year were involved, against 22·1 in the preceding year. The aggregate number of days lost in 1895 was 5,542,652, compared with 9,322,096 in 1894 and 31,205,062 in 1893. The average duration per head of disputes in 1895 was 21·6 days, as against 29·5 in the preceding year. The value of the aggregate number of working days lost, worked out as wages, would amount to about £1,120,000, compared with £2,000,000 in 1894. The percentage of persons concerned in the disputes of 1895 which were settled by conciliation or negotiation was 74·8, as against 56·7 in 1894."

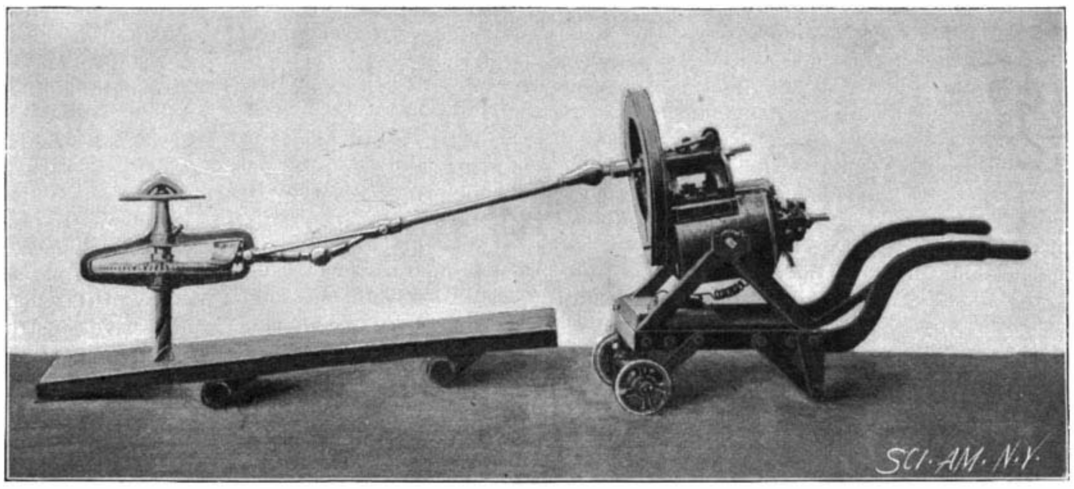
The Effect of Shading the Soil.

According to Lancaster (Ciel et Terre, March, 1896, xvii, p. 22), some experiments have been made by A. Buehler, which may be summarized as follows, says the Monthly Weather Review: Four broad plats of ground were selected, situated near each other; one was left freely exposed to the sun and wind, while the three others were shaded by horizontal wooden trellises placed around each plat and about 40 centimeters above the ground. The sunlight was cut off from the ground by the shadow of the trellis to a different extent for each plat, viz., one-quarter for plat No. 2, one-half for No. 3, and three-quarters for No. 4. In each plat, at 5 centimeters below the soil, a thermometer was buried; there was also placed in each plat an evaporometer and a vase of sheet iron filled with clay in which 1,000 grammes of water had been poured. Observations were taken every three hours, with the following results: The shaded soil experienced less cooling by radiation at night time and less warming by sunshine in the day time. The plat, No. 4, three-fourths of whose area was shaded, showed a temperature 10 per cent lower than the unshaded plat, No. 1; the lowering of temperature was most decided at noon and 3 P. M. As to the nocturnal cooling, the differences between the various plats were only 2° C. at the maximum, which explains why plants under a trellis are less exposed to frost than plants that are not thus protected. During rainy weather the differences in temperature were very small, rarely more than 1° C.; the shaded plats had a temperature a little higher than the unshaded, but during dry weather the shaded plats were warmed up more slowly. The relative evaporation from the plats was as follows: No. 1, unprotected, 100 per cent; No. 2, one-quarter covered, 88 per cent; No. 3, one-half covered, 71 per cent; No. 4, three-quarters covered, 62 per cent. Evaporation was most rapid from noon to 3 P. M. The observations all relate to a soil that is not covered with vegetation. If the soil had been cultivated, the temperature and the evaporation would have been diminished still more.

IN France, wagon tires vary from three to ten inches in width, usually from four to six, depending upon the weight of the load. Were such tires compulsory in America, the present good roads movement would receive a tremendous impetus.

A PORTABLE ELECTRIC DRILLING MACHINE.

In these days of labor saving machinery there are few fields in which greater ingenuity has been shown than in the manufacture of portable machines for boring, drilling and similar shop and yard work. The great convenience of the modern portable power-driven tools has rendered them specially valuable in ship building, boiler making, and other kindred manufactures. We have been favored by Mr. F. Kodolitsch, managing director of the Austrian Lloyds Steam Navigation Company's Arsenal of Trieste, with photographs of a type of very compact portable electric drilling machine which has been at work at the Arsenal in Trieste for over three years, and has given great satisfaction. It will be seen from the illustrations that the motor, with its gearing, is pivotally suspended in a yoke, which is carried on a suitable hand truck or carriage. At the arsenal of the Austrian Lloyds Company, where 2,000 hands are employed, it is rarely that any holes are drilled with the obsolete ratchet. A network of electric wires extends over the yard, and each shop is provided with a number of special drilling machines, with the necessary electrical connections. When any holes have to be drilled in a piece of work, the portable drill is wheeled to the spot, and the wires attached. In this way the time formerly occupied in carrying the work to the drilling machine is saved.



ELECTRIC DRILL, SHOWING MOTOR, JOINTED SHAFTING AND DRILL.

As instances of the economy of these machines, we are informed by Mr. Kodolitsch that where ten flexible shaft drills were formerly used in the boiler shop, four electric boring machines now do the same amount of work, with less hands than were formerly necessary. In the fitting shop they have saved much time and money in the handling of heavy work. An instance of this occurred when a marine condenser weighing twenty-four tons was planed on one side, the necessary holes being simultaneously bored on the other side with portable drills. The seats for the air pumps were finished at the same time with a boring bar driven by one of the electric boring machines. This heavy piece was put on the planing machine as a rough casting and completely finished ready for erection before it was removed. Another instance of the handiness of these machines for special work occurred when the cast steel blades of a propeller were covered with Muntz metal sheets. Hundreds of holes had to be bored in the cast steel for receiving tap screws for holding the lining, and few of these holes were in the same direction. By the use of a drill running 180 revolutions, driven by a one horse power motor, all the holes necessary for lining one blade of a propeller eighteen feet in diameter were bored by one man and a boy in two days.

PORTABLE ELECTRIC DRILLING MACHINE AT WORK ON STEM OF LARGE STEAMSHIP.

It is in the shipyard, however, that these drills have proved extraordinarily useful. In addition to the work of boring holes, they are used for countersinking, cutting out side-lights, scuttles, hawsepipe holes, boring out stern post bushes by means of boring bars, and for replacing plates out of the outside bottom of grounded ships.

The machine has also been successfully adapted for expanding boiler tubes in water tube boilers, and Messrs Yarrow & Company, of London, have several of them at work. It is stated that on actual trial where seventy tubes a day could be expanded by steam power at these works thirty tubes per hour were expanded by the use of the portable expander.

Award of Royal Society Medals.

At the anniversary meeting of the Royal Society, the president, Sir Joseph Lister, announced, says the Electrical World, the award of the second Royal medal to Prof. Boys for his researches on measuring minute forces, by his invention of the mode of drawing quartz fibers, and by his discovery of their remarkable property of perfect elasticity. Prof. Boys used a combination of thermo-junction with a suspended coil in a galvanometer of the usual D'Arsonval type, a combination first devised by D'Arsonval himself, and by this means Prof. Boys developed the idea in the micro-radiometer, an instrument, according to Sir Joseph Lister, rivaling the bolometer in the measurement of small amounts of radiation. In the case of the Rumford medal the council made a new departure by awarding the medal in duplicate. As stated by President Lister, many physicists have studied the luminous and other effects which take place in a vacuum tube, but the extension of the field of inquiry to the external space around it is novel and most important. This extension has been due to two men—Prof. Lenard and Prof. Roentgen. Although differences of opinion exist as to the exact meaning and cause of the phenomena discovered by Lenard and Roentgen, few will dispute the theoretical interest which these discoveries embody.

The Davy medal was awarded to Prof. Henri Moissan for having accomplished the isolation of fluorine in a state of purity, and for his researches at extremely high temperatures by the aid of the electric furnace. President Lister stated that it is impossible to set bounds to the new field of research which has thus been opened out, and the electric furnace has now become the most powerful synthetical and analytical engine in the laboratory of the chemist.

Eyesight of Iron Workers.

In the mining and foundry district of Bochum, Prussia, Dr. Nieden reports having treated during the years 1885-94, 5,443 patients engaged in such occupations, of whom more than 68 per cent were cases of injury to the eye in their calling—iron and foundry workers showing a large predominance in this respect over miners. Of 3,723 iron and foundry workers treated for eye injuries, 2,805 were for the left eye and only 1,639 for the right, or a relative proportion of 56 to 44; and as a similar proportion held good in each separate year, the conclusion arrived at is that in such work the danger to the left eye is really greater than that to the right. Even more marked, in fact, was the proportion in respect to the severe cases, the left eye being quite lost in seventeen cases, the right eye in seven. It is urged, therefore, that in iron workers the loss of the right eye should be calculated as the more serious, inasmuch as the individual then runs a greater risk of injuring the remaining eye than when he has lost the left.