

**Mineral Oil and Electricity for Lighthouses.**

The annual report of the Lighthouse Board says that the substitution of mineral oil as an illuminant has been made in many of the fourth, fifth, and sixth order lights. All of these orders of lights would have been supplied except for the fact that it is found that the oil deteriorated when placed in the ordinary large oil butts in use, and many small cans have had to be made, into which the supply of each station is placed. The great superiority of mineral oil as an illuminant over all other oils has induced the board to try the experiment of using it in the lightships. The oil used for this purpose is 300° of the flash test. It is thought that such oil, used in the Funck lamp, will much increase the usefulness of the lightships, and a great saving in the cost of oil will be made.

The board is desirous of making experiments to test the relative merits of the electric light and other illuminants. These experiments must be made in some lighthouse and on a sufficient scale to exhaust the subject. There are many machines for generating electricity, several of them of American invention, and the board wishes to test the principal ones. An appropriation of \$50,000 is asked for the purpose of making these experiments.

An appropriation of \$50,000 is asked for the construction of a first-class lightship, fitted with a powerful steam fog signal, to take the place of the lightship now off Sandy Hook, entrance to New York harbor. This is regarded as one of the most important light stations on our coast; and as an immense commerce flows past it, it should be marked by a vessel having all the modern improvements, to make it a more certain guide to the mariner. Should an appropriation be granted, the present lightship could be moved to a less important station.

**The Earth's Day Increasing.**

In a recent lecture on "Eclipse Problems," Professor Charles A. Young, of Princeton, said, with reference to the observed increase in the rapidity of the moon's motion, that the discovery led at first to the opinion that the moon's orbit was growing shorter, and that ultimately the moon would come down upon us. More accurate calculation, however, shows that there is no danger of so disastrous a result. The moon is not coming nearer, but our day is growing longer, owing to the friction of the tides upon the earth's surface. The tides act like a brake, and slowly diminish the speed of the earth's rotation.

**THE DUPLEX AIR COMPRESSOR.**

Although compressed air cannot, under ordinary circumstances, compete with steam as a motive power, the machinery necessary to its use has been perfected to such a degree that it has been extensively applied to mining, quarrying, and engineering purposes, and it seems to be the only available motive agent for such uses. Compressed air as a motive power has been the subject of a great deal of practical investigation and experiment, and the losses arising from increase of temperature by the compression of the air and the cooling by expansion, also losses due to the resistance of the valves, and dead spaces at the ends of the compression cylinders, have all been reduced, if not avoided altogether.

The annexed engraving represents the duplex air compressor manufactured by the National Drill and Compressor Company, of 76 and 78 Center street, New York city. This machine, though quite plain in appearance, is of unusual strength and efficiency. We are informed that the performance of this engine is fully equal to that of the best engines in market. The dimensions of the compressor are as follows: Length of bed, 12 feet 6 inches; height of center of cylinders from floor, 18 inches; diameter of steam and air cylinders, 10 inches; stroke of pistons, 18 inches; length of connecting rod, 52 inches; diameter of wheel, 5 feet 6 inches; number of revolutions per minute, 133; cubic feet of free air compressed per minute, 436; weight of machine, 11,400 lb.

Steam is admitted to the steam cylinders by a slide valve having an automatic cut-off. The air cylinders are lined with composition, and kept cool by water which passes spirally around the cylinder from the center toward the ends. By this arrangement the air cylinder is kept cool without having water in the cylinder. The air piston is adjustable, and travels to within one thirty-second of an inch of the cylinder heads. The induction and eduction valves are made so that they can be removed without disturbing other parts of the machine.

The National Drill and Compressor Company build single and duplex compressors of different sizes, which may be run by direct connection with steam engines, as in the engraving, and others which may be run by belts or gearing from the shafts of water wheels or other motors; they also make a variety of rock drills and mining machines which are in use and well known in all parts of this country, and are widely and favorably known in foreign countries.

**A NEW TELEPHONE.**

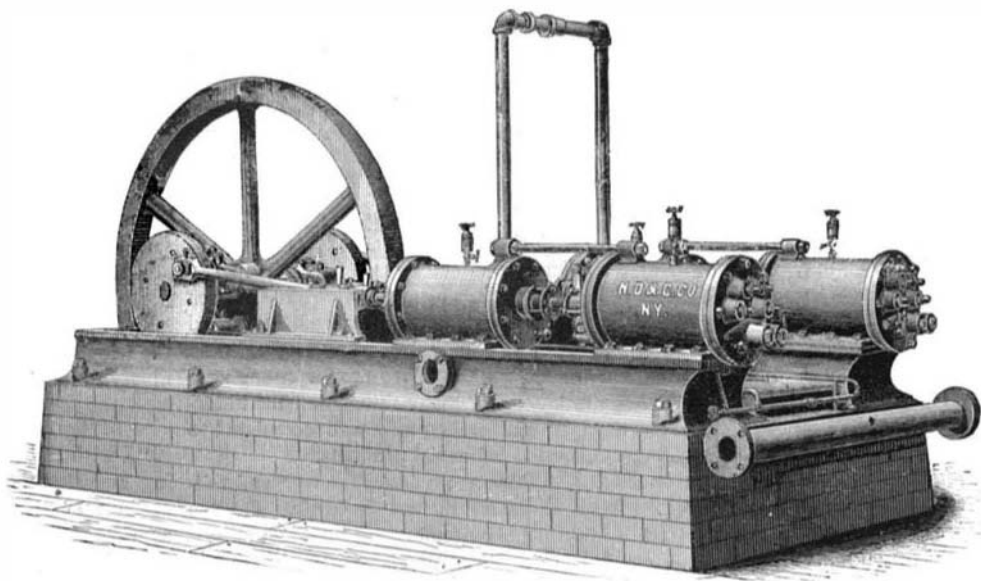
In the telephone shown in the annexed engraving the inventor has made use of Jamin laminated U-magnets to secure great magnetic power with little weight. The ends of the magnet are cut off diagonally, and the poles are each surrounded with a helix of fine insulated copper wire connected as in an electro-magnet. Two of these magnets are attached to an elliptical hoop, which surrounds the head and supports

**NOVEL TELEPHONE.**

the diaphragms and ear pieces. Each diaphragm carries a light triangular armature, which fits the poles of the magnets and nearly touches them. The telephones are connected with each other and with the line. The operation is similar to the Bell telephone. The instrument shown in the engraving is arranged as a receiver to be used with any of the ordinary transmitters, but it may be arranged as a transmitter.

Mr. Andrew C. Hubbard, of Danbury, Conn., is the inventor of this telephone.

A NOVEL system of insurance for girls has existed for several generations among the Danish nobility of Copenhagen. A nobleman, upon the birth of a daughter, enrolls her name with the insurance society, paying at the time a fee, and subsequently an annual sum, until she reaches twenty-one. She then becomes entitled to a fixed income from the society, and to apartments in the large building of the asso-

**DUPLEX AIR COMPRESSOR.**

ciation, which is surrounded by gardens and a park. Should her father die in her childhood, she may immediately occupy the apartments. Should she die or marry, the income and the right to entail the home both lapse.

MEN of science, students, inventors, and every other class of persons desirous of keeping up with the times should become regular subscribers to this paper. They will find it a paying investment, for the SCIENTIFIC AMERICAN not only contains a record of all the important discoveries and inventions of this country, Great Britain, and other English speaking countries, but translations from the French, German, and other foreign scientific and industrial publications.

**MISCELLANEOUS INVENTIONS.**

Mr. Judson S. Corbin, of Clinton, Iowa, has patented an improved gate, which is so constructed that it may be opened and closed by the wheels of passing carriages. It is simple, convenient, reliable, and not liable to be obstructed or get out of order.

An improved water closet cistern has been patented by Mr. Hugh Houston, of Pittsburg, Pa. The object of this invention is to provide an improvement in that class of automatic overflow cisterns for water closets, whose discharge is so regulated, by means of an overflow compartment or chamber and float and valve connected therewith, that the discharge occurs at regular intervals, and each time gives the water closet bowl a sudden flush and thoroughly washes it out.

An improvement in letter boxes has been patented by Messrs. Wauhope Lynn, of New York, and Gottfried Clasen, of Brooklyn, N. Y. It consists in providing the box with a tube extending from the slit at the top inward and downward, and closing the lower end with spring doors having arms in position to be operated upon by a plunger connected with the hinged door covering the slit at the top on the outside, whereby, when the outer door is opened to put a letter in the box, the doors at the end of the tube are closed, thus cutting off communication through the tube with the interior of the box; but when the letter is slipped through the slit and the outer door allowed to close, the inner doors open and permit the letter to fall within the box.

Mr. Theodore L. Wiswell, of Olathe, Kan., has patented a combined buckle and trace carrier, consisting of a metal skeleton buckle frame having hooks located opposite each other, and having their ends bent inward, then forward and downward, to adapt them for holding the cockeyes of the traces securely when the latter are not in use, and yet permitting convenient detachment of the cockeyes when required.

An improvement in grooving irons has been patented by Mr. John W. Ammons, of Columbia, Mo. The object of this invention is to provide a plane iron which will chamfer off the outer corners of the groove simultaneously with the planing of the groove. It consists in a plate with beveled cutting edges combined with a grooving iron.

An improved swinging gate that is to be placed across a railroad track to keep cattle and other animals off, has been patented by Messrs. David A. Walker and John R. Smith, of Fort Benton, Montana Ter. It is to be opened by the contact of the pilot or cow catcher of the locomotive, and will close automatically immediately after the passage of the train.

An improved combination tool, patented by Mr. Morgan H. Sly, of Shepardsville, Mich., combines several tools in one for the convenience of the mechanic, farmer, house-keeper, and others. It consists of a screwdriver, nail puller, wrench, nail hammer, wire cutter, riveting hammer, and pinchers combined in one tool.

An improved feed bag for horses, patented by Mr. Edwin Forbes, of Brooklyn, N. Y., has means for supporting feed bags in a convenient position for horses to eat from without interfering with the natural movements of the head. It consists in a spring arm adapted for connection upon the hames, with its outer end extending over the horse's head, and from which outer end the feed bag is suspended.

Mr. Patrick Gallagher, of Eureka, Nev., has patented an improved fire escape for attachment to buildings, which is so constructed that people can readily escape from the upper stories of burning buildings when the stairways may be rendered impassable by the fire.

Mr. Samuel H. Gregg, of Crawfordsville, Ind., has patented a fence panel formed of a long and short post, twisted wires, and hook headed bolts, arranged and applied in a novel way to form an inexpensive yet substantial fence.

An improvement in vises has been patented by Mr. Fortunato C. Zanetti, of Bryan, Texas. It consists in providing the clamping-jaws, which are secured to the lower end of the fixed jaws of the vise, with a spherical socket and adjusting-screw, to adapt the said jaws to embrace a ball on a standard attached to the bench, to form a ball-and-socket connection between the vise and bench.

Mr. Joseph Seiler, of Norwalk, Conn., has patented an improved device for connecting the mirror standards or supports with a bureau.

in such a way that they can be easily attached and detached.

Mr. Charles F. Harvey, of Van Buren, Ark., has invented an improved attachment for the dashboard of wagons, and other vehicles drawn by horses, for holding the reins. It consists of an adjustable frame attached to the dashboard, supporting a horizontal bar, composed of two parts, the upper part being divided so that the reins can be slipped down between the two parts.

Mr. Samuel V. Kennedy, of New Haven, Conn., has patented a device for removing the metallic primer from an exploded cartridge shell, for applying a new primer, and for closing the shell tightly about the ball after it has been reloaded.