

**AN IMPROVED ELECTRIC LIGHT SIGNALING APPARATUS.**

The present method of signaling at sea by codes, with flags, cones and lights, is often tedious, and in many cases there is a good deal of ambiguity about the signals or a want of the necessary thorough understanding between the sender and receiver.

So also in signaling upon land, by means of semaphore and heliograph, etc., there is always a wide margin for mistakes, aside from the tediousness of the work and the necessary limitations of this method of communicating information. The accompanying illustrations represent an improved method of signaling, designed to meet all the requirements of such a service, both upon sea and land, and adapted for day or night use.



**BOUGHTON'S "TELEPHOTOS," FOR DAY AND NIGHT SIGNALING.**

The improvement is styled the "telephotos," and is the invention of Mr. C. V. Boughton, of Buffalo, N. Y. The Morse alphabet is employed in this signaling apparatus and, by means of novel and ingenious electrical connections, the signs indicating each letter of the code are simultaneously displayed by simply pressing once upon a single key, after the manner of operating a type writer, the dots and dashes then being marked by corresponding bars and beams of electric light, with distinctive intermediate spaces, upon the side of a suitable signal staff.

That the device should be entirely practical, and adapted for the widest range of service, it was necessary that the dimensions and weight of the apparatus should be kept within the closest limits, that it might be readily portable. The machine case, therefore, is of aluminum, irregular in form, and occupying an area of 2½ feet square by a depth of 6 inches. Of this area, 1 foot 6 inches is taken up by the keyboard, with 37 letters, numerals, etc., the remaining portion being taken up by the several thousands of electrical connections required. Outside this area the connecting wires are gathered and stopped together as an unstranded cable of 1¼ inches diameter, and led to the light frame. The latter is also of aluminum, made in three parts with the two ends folding upon the center, in which position it measures 9 feet by 1 foot square, and when extended for use, 27 feet by 6 inches square. It contains 106 incandescent lights of 32 candle power (lamps of any power up to 110 candles can be used with a possible elongation of the frame to 28 or 29 feet). On reaching the light frame, the cable spreads out, each separate wire going to its proper lamp. Each lamp is numbered, and each binding post and cross bar within the machine bears the corresponding figures, so that any lamp failing to respond to the key touched, the cause is easily traced, and as easily remedied, even to a defective wire, which, if ever necessary, can be traced, withdrawn, and replaced by a new one in a few minutes. New lamps will burn for 600 consecutive hours, and when exhausted can be replaced as rapidly as those in every-day store use. The weight of the keyboard will not exceed 75 pounds, and that of the light frame 120 pounds.

The lights at night will be visible at distances equal with other electric lights of like power, and experiments now made with lenses encourage the belief that eventually the telephotos will be readable from distances beyond the reach of flags in broad daylight. Two lights form a dot, and the minimum of a dash is 20 lights, or five feet. The blank space between dashes and dots occupies the same length of space, five feet. Two red lights mark periods.

By a very simple arrangement the apparatus can be changed as desired for secret signaling,

by means of a thumb screw and ratchet, whereby the letters and characters are transposed as desired. When two instruments are talking with each other, the one receiving would acknowledge the symbols as received, and in case of secret signaling the characters of each instrument would be shifted in the same way.

On shipboard the keyboard can be located where most convenient, as any length of wire can be used in connecting it with the light frame, and the latter may be occasionally, as required, hoisted to or permanently fitted at any desired point, and read vertically, or it can be laid along the hammock rail and read horizontally; the same applies to semaphore, signal stations, light houses, and light ships. A simple mechanical arrangement will turn the light frame in any direction when permanently fitted to a mast.

For field work, a special wagon with appliances for raising and lowering the frame is designed, and the weight and requirements for handling will stand comparison with what field telegraphy calls for. The weight of the wagon filled with apparatus will not exceed 1,500 pounds. An attachment for the automatic printing of the messages sent and received by the apparatus, by which, it is said, 72 letters have been practically sent and read per minute, has been added. It will only print the letters in Roman characters when the light has been clearly displayed. The signal is designed to be plainly visible for about three miles by day or ten miles by night.

**A NOVEL CUTTING-OFF MACHINE.**

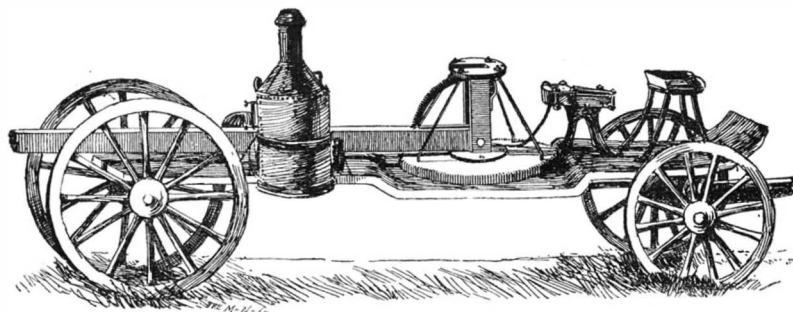
In this machine, in place of the usual cone pulley for driving and varying the speed, is a device producing a constant-cutting speed of the stock against the tools, which means, in other words, that the speed of the main spindle carrying the stock is automatically increased as the diameter on which the tools are cutting is decreased. This result is obtained by means of a friction wheel, traveling on the face of a disk; but, in this case, the usual arrangement is improved by using two leather-covered disks, revolving in opposite directions, and pressed upon opposite sides of the smaller friction wheel by a spring. The two friction wheels are used diametrically opposite to each other, and, contrary to the usual custom, these are the drivers and the disks the driven wheels. The friction wheels are mounted on feathered shafts sliding in sleeves driven by the pulleys shown in the cut, and are governed in their movements across the faces of the disks by a rigid connection with the cross feed screw of the tool blocks, any movement of the latter producing a corresponding motion of the

wheels. At the start, with the tools working on the largest diameter of the stock, the friction wheels being the drivers must run on the largest diameter of the disks to drive them at the slowest speed, thus giving the greatest leverage at the time when most needed. As the tools feed in and the worked diameter of the stock decreases, the friction wheels are also fed in onto a smaller diameter, and therefore the disks are driven at a higher speed. Each disk is geared to the main spindle, the two together giving ample power for very heavy chips. A wedge, operated by the handle seen in the cut, spreads the disks from the wheels, allowing the tool blocks to be moved quickly in or out.

These machines have an improved form of tool block, very solid

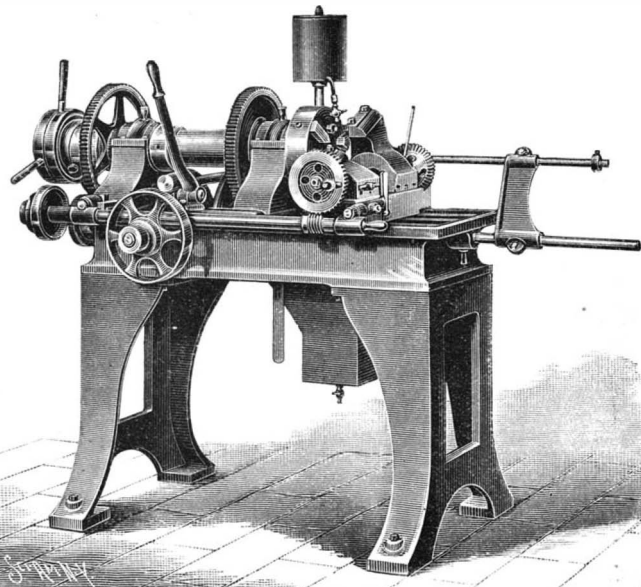
and rigid. The cutting blades are set at an angle with the line of travel, and are supported clear out under the cutting point. The whole machine is designed to be stiff, solid, and durable. The machine cuts 2 inch "cold rolled" or soft steel in 50 seconds easily, and in a cut for time only, cut several pieces in 28 seconds each, at a cutting speed of about 30 feet per minute. The machine embodies several patents. It is made by the Hurlbut-Rogers Machine Company, of South Sudbury, Mass., who will give any further information desired.

THE PHOENIX BRIDGE COMPANY, OF PHILADELPHIA, HAS

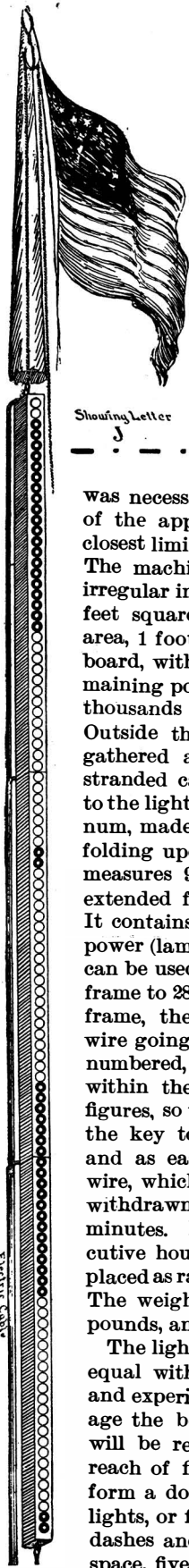


**TRUCK AND TURNTABLE FOR BOUGHTON'S "TELEPHOTOS."**

signed a contract for a tower to be erected at the Columbian Exhibition. It is to be constructed of steel, and will be in shape an open framework cylinder, 560 feet in height and 210 feet in diameter. The platform at the summit will be reached by a circular inclined railway, which will be operated by electric power, the grade being about 8 feet in a hundred. The ground space of the tower will be occupied by a spacious restaurant and the summit will be crowned by an observatory, where will be located search lights and other devices for electrical display. The tower is to be constructed as a permanent structure.



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**SIGNAL STAFF.**