

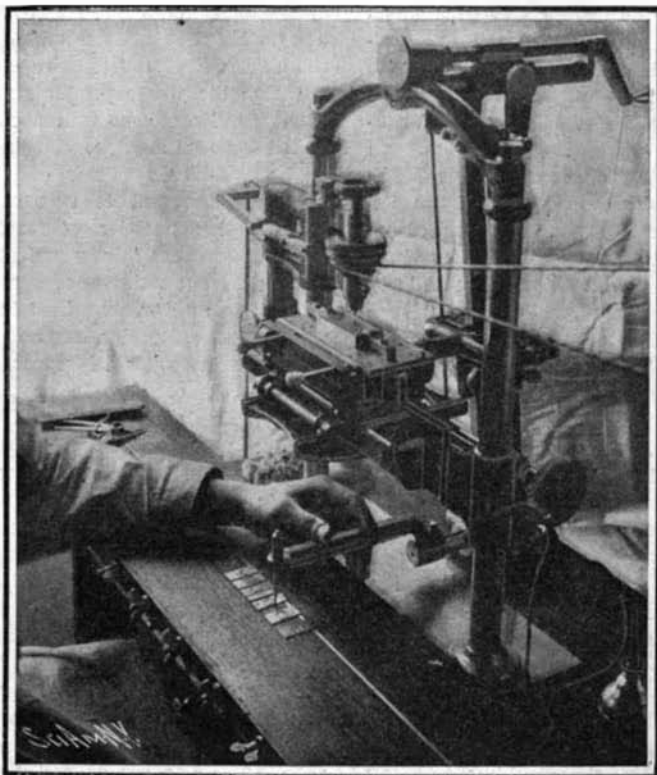
### GASOLINE LOCOMOTIVES.

BY OUR BERLIN CORRESPONDENT.

Locomotives driven by gasoline motors possess a number of special advantages which particularly adapt them for use on temporary forest and field railways, and mining railways. They are also useful as drill engines, in which connection they even prove preferable to electrical locomotives, dispensing as they do with the necessity of a special power station and current-conducting lines. Steam operation is on the other hand quite impracticable in mines, and in the case of forest railways gives rise to the danger of fire, especially in dry weather, owing to the sparks flying about.

The construction of motor locomotives for benzine, alcohol, and gasoline operation has been developed by the Deutz Gasoline Motor Works, of Cologne-Deutz, Germany, to whose courtesy we are indebted for the accompanying photographs representing some typical plants. The general arrangement of these motor locomotives is as follows: A horizontal motor is mounted on a frame resting by means of springs on the running axles, the power of which motor is transmitted to these axles through the intermediary of gearing situated at the side or rear of the motor. In the case of mining and field railway locomotives, the fuel reservoir is inserted in the cooling water reservoir, both being located above the motor. In drill engines and motor cars for the operation of tramways, the water reservoir rests on the frame, while the fuel reservoir is situated above the motor, as in the case of mining and field railway locomotives. The various parts of the engine are protected against dust by means of a sheet-metal casing. Ignition is effected by a magneto operated by the engine. The power is transmitted to the running axles by means of a chain and sprocket wheel thrown in and out of gear by friction clutches. According to the conditions of the case, the locomotives are designed with one, two, or more transmissions in the driving gear, admitting of both forward and backward running at the speed produced by the latter. Single transmission locomotives are mainly used in mining plants, where only small gradients are generally to be dealt with at moderate speeds (about 3.75 miles per hour). For any higher speed on horizontal tracks or for the hauling of trains over steeper gradients, the locomotive is fitted with a driving gear having two or more transmissions. The maximum speed of these locomotives is reduced either by using greater ratios of transmission or by acting on the governor. In order not to vitiate the air, the exhaust gases of mining locomotives are entirely condensed. These engines are designed for any outputs intermediary between 6 and 60 horse-power.

A Norwegian inventor has devised a process to convert the Iceland moss, the nutritive and curative qualities of which are well known, and which is in great demand in Europe, into a succulent and nourishing edible. The lichen, after being thoroughly rinsed, is soaked in a boiling solution, by which means the bitter element is extracted from the plants. After being subjected to this process the moss is submitted to a second rinsing, after which it is ready to be packed.

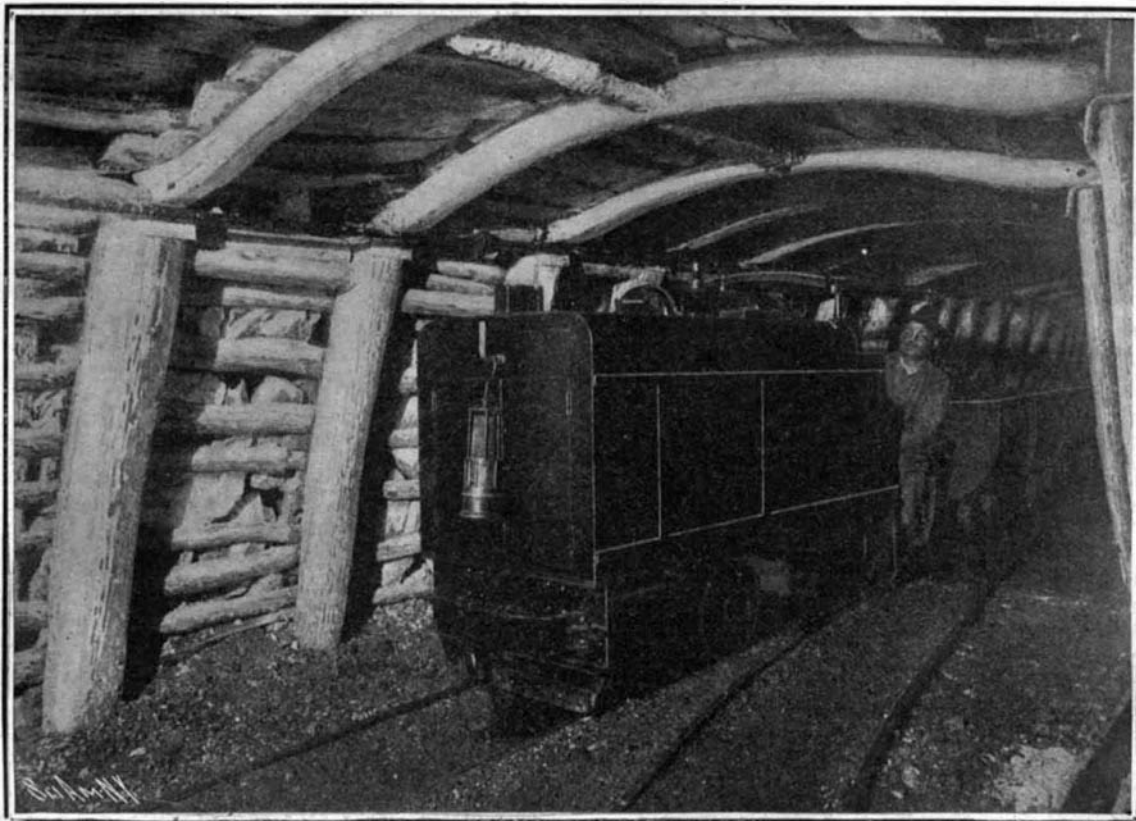


The Steel-Plate Engraving Machine, Showing Pattern Letters and the Routing Tool in Position on the Steel Block.

### A NEW MACHINE FOR ENGRAVING STEEL PLATES.

BY A. FREDERICK COLLINS.

The old and honored art of wood engraving has practically suffered extinction in recent years from competition wrought by the inventions of the half-tone and zinc-etching processes; and the facility, precision, and greatly reduced cost of the latter in reproducing all manner of drawings, photographs, and paintings by adept manipulation have given these substitutes a wide and constantly increasing popularity.



AN 8-HORSE-POWER GASOLINE MINING LOCOMOTIVE.

There is another branch of the allied arts that has more successfully resisted the onslaughts of mechanical methods, and this is the engraving of steel plates by hand, yet this too has at last succumbed to the ingenuity of the inventor, and a machine has resulted which is even now working a silent but none the less effective revolution in the most useful of all the industries, namely, printing.

Engraved stationery has been expensive from time immemorial, for the reason that each letter must be cut tediously and with exactness by hand, and an expert engraver cannot produce more than one hundred letters a day; but by means of the new engraving machine shown in the illustrations, a boy can cut upward of three hundred letters per day, and with an accuracy that hand work cannot nearly approach, while the dies thus made do not, as is evident from what has been said, approximate more than a mere fraction of the expense entailed by hand labor.

The machine in question, which is the invention of Mr. William S. Eaton, is an excellent example of how persistent and well-directed effort will overcome the

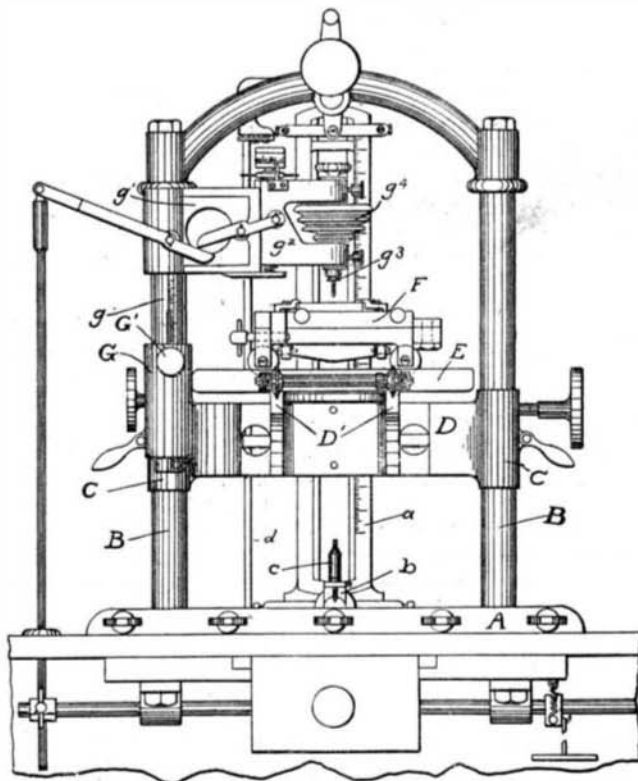
greatest obstacles, either by circumvention or elimination, for it has required many years of experiment to reduce it to a commercial form, wherein it would do the work better and cheaper than a skilled engraver, and this together with other improvements has brought the price of engraved stationery almost to the level of common printing.

Before entering into a detailed explanation of the various functional parts of the new engraving machine, it may serve to make the following text clearer by saying at the outset that it embodies the principles of a pantograph and, like that instrument, it makes a copy of a letter or other design either on the same scale or with a reduction or increase in size as desired. With a pantograph the tracing is made by means of a stylus; but in the engraving machine, instead of following a mere line, it traces the original or pattern letter in the form of a groove which has been previously cut, while the reproducing head consists of a routing tool, formed of a revolving steel point, which cuts away and deepens the line on the steel plate with amazing rapidity.

By referring to the photograph, Fig. 1, and the front elevation, Fig. 2, it will be seen that the machine as a whole comprises a table which carries the support, A, on which the original or pattern letters are held, and which are to be reproduced on the steel plate. To this table two standards or guides, B B, are bolted, while the top is held rigid by an arcuated cross-bar, as a reference to the front elevation shows. On these guides are sleeves, C C, provided with lugs, by means of which the former may be clamped to any desired point. The crosshead, D, is provided with brackets, the upper faces of which form V ways. Moving lengthwise of the machine in these ways, D', is a carriage, E, supported by beveled wheels. On this carriage rests a frame carrying similar ways, and these are arranged in a horizontal plane parallel to the ways, D, and perpendicular to them.

A second carriage, having wheels similar to those above described, moves laterally in the ways on the carriage, E, and this supports the work-bed of the machine, F, to which it is secured by a pivot placed against its surface, this permitting the withdrawal of the work beneath the routing tool for the purpose of inspection. Normally, the bed-plate which holds the steel block to be engraved is maintained upon the carriage by means of a movable stop, while on the surface of the carriage there are adjustable clamps for securely holding the work in position.

Carried by the crosshead, D, and integral with it is the guide sleeve, G, in which the vertical bar, g, is mounted, carrying a support, g', for the spindle carrier, g'; this is furnished with a rack and pinion, by means of which the carrier may be adjusted vertically independent of the movement of the crosshead, D, and the work-bed carried by it. The spindle carrier moves vertically with the ways of the support, and is provided with arms on which is mounted a spindle, g', having a chuck for holding the routing tool. To this spindle there is attached a stepped pulley, g', driven by a small electric motor.



Front Elevation of the Steel-Plate Engraving Machine.

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GASOLINE LOGGING LOCOMOTIVE.



AN 8 HORSE-POWER GASOLINE LOGGING LOCOMOTIVE.



GASOLINE MINING LOCOMOTIVE ENTERING A GALLERY.—[See page 412.]