SOMETHING NEW IN CONCRETE BLOCK MAKING.

BY M. H. HUNTING.

Of the many recent applications of concrete to the building industry in this country, few, if any, have attracted more attention than the process invented by a Des Moines, Iowa, man for the manufacture of enameled concrete blocks. A machine of gigantic proportions performs the many operations through which the block passes without the aid of the human hand, turning out 40,000 perfect blocks in each day of ten hours, each one an exact duplicate of every other in form and color.

The machine is 13 feet 8 inches in height, 17 feet in length, 6 feet in width, and weighs over 70,000 pounds. In the accompanying illustrations a man is shown standing beside the machine. This comparison gives a good idea of the machine's great size.

The process for the manufacture of the blocks, as before stated, is automatic from first to last. The raw material, including cement, sand, and gravel (or crushed stone), is first screened, and then workmen separate the aggregates into several sizes to eliminate voids and give added strength to the finished product.

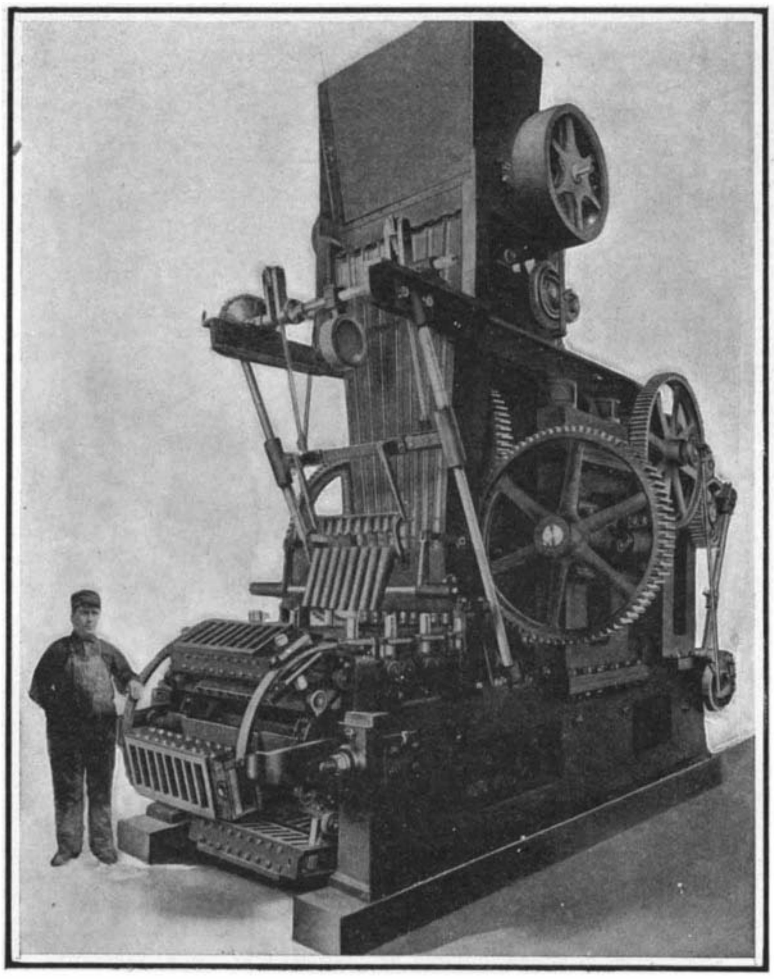
The ingredients are then mixed dry, after which a sufficient quantity of water is added to bring the mixture to a proper consistency. This mixture is then fed into an agitator, where it is kept under continual motion and permitted to flow into eight individual scale hoppers, each weighing the exact amount of material required for a single block. Then in unison these hoppers are dumped through receiving spouts into the molds which form the block, these being prepared in advance for the reception of this material.

While the above process is going on, a similar one for the preparation of the material forming the enameled part of the block is taking place in another part of the machine. This also starts by taking a dry mixture from individual bins, and measuring it automatically in a receptacle known as the reserve tank. At this time also the proper amount of coloring matter is added, so that blocks of a uniform shade may be produced.

Any color or combination of colors may be used; and no matter whether one, one hundred, or one thousand blocks are made, the same shade is produced in each one.

Water is next added after being automatically measured, and from the reserve tank the material is discharged into a receiving tank, a part of the machine proper with which are connected eight dipping cups conveying the material in a liquid form to the individual molds.

The molds are now ready for the body material, which has been in preparation as already described, and with the next movement of the machine an intimate association is effected between the two by the enormous pressure of 3,200,000 pounds applied to produce perfect cohesion.



A CONCRETE BLOCK MACHINE WEIGHING 70,000 POUNDS.

The molds move forward until they reach the releasing section of the machine, where the blocks are ejected, eight at a time, upon a pallet and loaded intact by workmen upon a car especially constructed for the purpose.

They are now conveyed to suitable storage, where they are allowed to season, no burning being required. Nature finishes the work by a process of crystallization, which gives each block a perfect surface without danger of distortion, as commonly results from burning clay bricks.

The illustration shows the machine to contain a rotary carrier consisting of thirty mold frames, each containing eight individual molds. At each movement of the machine several of these molds are receiving material at various fixed points; one group the enameling material, one the body material, while a third is submitting to the tremendous pressure which unites the two. After the application of this pressure, the next motion delivers the blocks contained in one mold frame upon the pallet as described elsewhere.

Anyone familiar with the process of manufacturing clay brick will readily realize the tremendous saving of time and expense accomplished by this process of manufacture. It has been estimated that the cost of sorting clay brick for quality and color is not less than $6 per thousand. This work of course is entirely done away with, as the enameled concrete blocks are absolutely uniform as to size and shape, and there can be no variation in color.

While especially designed for the manufacture of blocks, this is not the only function of the machine. Tile of various shapes, sizes, and colors are also produced by it with equal facility.

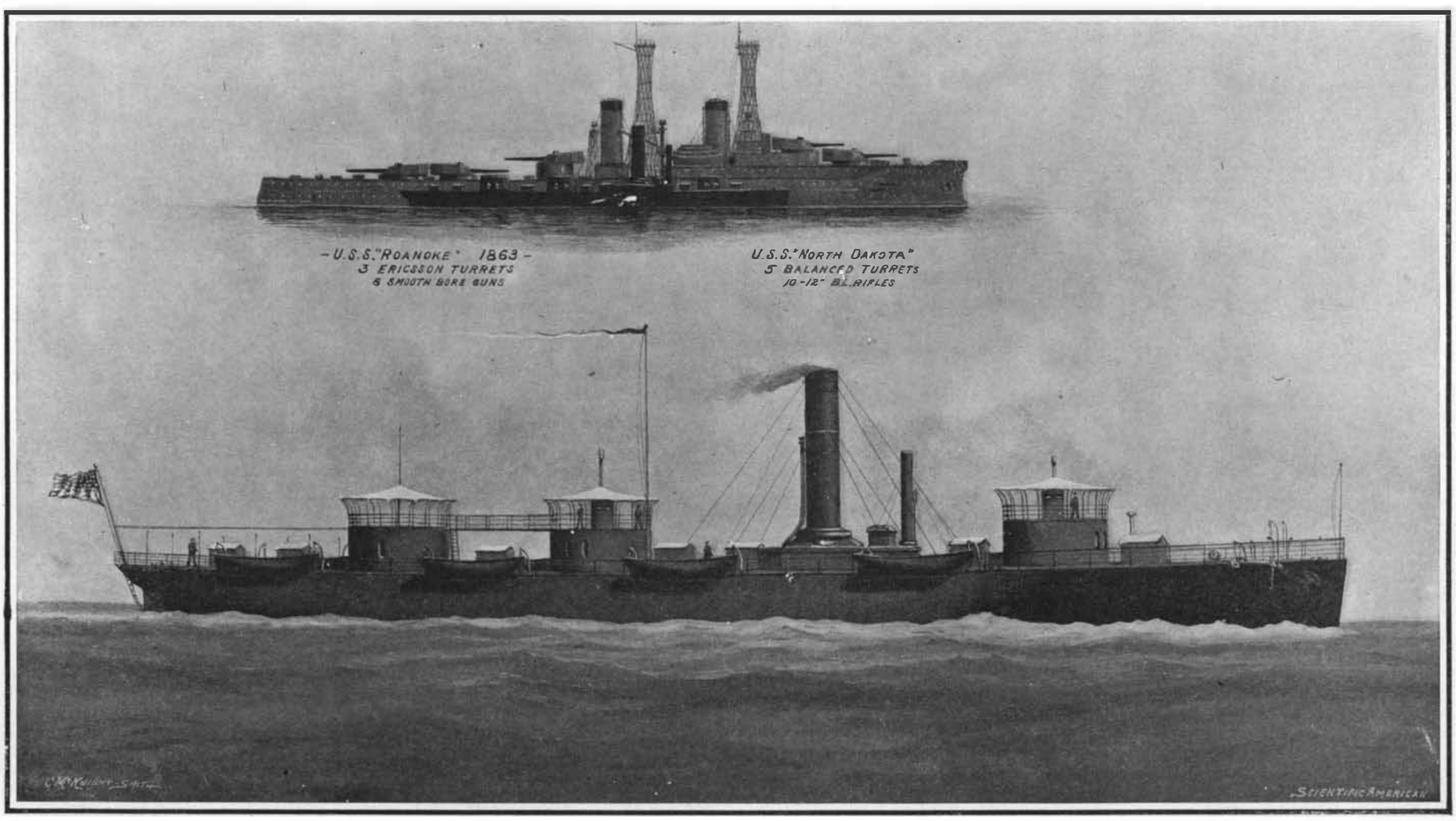
Though not in general use thus far owing to the inability of the manufacturers at the present time to supply the demand, the machine has nevertheless received exhaustive tests, and in each has given entire satisfaction. As for the material it produces, there can be no doubt as to its becoming popular. Our forests are rapidly disappearing, stone is prohibitive because of its expense, and the prospective builder turns with satisfaction to this comparatively new material, which recommends itself not only because of its cheapness, but because of its great lasting qualities.

A "DREADNOUGHT" OF 1863.

[The correspondent who sends us the photograph of an engraving from which the accompanying illustration of the "Roanoke" is reproduced, believes that this United States warship is entitled to be considered as the prototype of the modern "Dreadnought." We doubt if any early vessel can be quoted as having a stronger claim to be regarded as the first warship of this type.—Ed.]

To the Editor of the Scientific American:

In the battleships of the "Lord Nelson" class of 1906, the British had come to about the limit of their intermediate battery, which consisted of ten 9.2-inch guns; these being substituted for the four 9.2 and ten



The frigate "Roanoke," subsequently to the civil war, was reconstructed at the Brooklyn navy yard. Her masts were removed; her sides armored; and her broadside battery was replaced by an all-big-gun armament of six heavy guns mounted in three armored turrets. The correspondent who sent us the above illustration suggests that she was the first of the "Dreadnoughts."

U. S. S. "ROANOKE," 1863. IS THIS THE PROTOTYPE OF THE MODERN "DREADNOUGHT"

6-inch of the "King Edward VII." class launched three years previous. In this same year they also launched their first "all-big-gun" ship, the "Dreadnought," by abolishing the 9.2-inch guns, substituting in their place six 12-inch guns, and adding these to the four 12-inch guns, which the other two classes already had, making ten in all, and placing them in pairs in five turrets. This is the ship that in three years has revolutionized the navies of the world, all of whom are now building this class known as "Dreadnoughts." But was not this idea of the "all-big-gun" ship taken from one that was first produced in the American navy?

The definition of a "Dreadnought," as I understand it, is an armored ship with a high freeboard, carrying only guns of the largest caliber in use, these arranged on one deck in pairs and in armored turrets; the number of turrets not being restricted necessarily to five, can be one more or one less according to the tonnage of the ship.

In 1852 there was a steam frigate built by the United States at the Gosport navy yard at Norfolk, Va., and called the "Roanoke." She was 265 feet in length, with a breadth of 52½ feet, and a depth of 26. Her machinery was built by the Tredegar Iron Works at Richmond, Va., and consisted of a pair of trunk engines with cylinders 72 inches diameter and 26 inches stroke.

This frigate was anchored in Hampton Roads at the time of the battle between the "Monitor" and "Merrimac." After this fight, which introduced to the world the revolving armored turret with its pair of heaviest guns afloat (15-inch smooth-bores) she was taken to New York and razed at the Brooklyn navy yard. Her masts and sails were removed, her sides were armored, and she was equipped with three Ericsson turrets at the Novelty Iron Works in 1863. Each of the turrets contained a pair of the heaviest guns in use, and they were placed fore and aft on the center line of the vessel, which is the arrangement of the turrets on American "Dreadnoughts." The vessel had no masts and no secondary or auxiliary battery, only the "all-big-gun" armament.

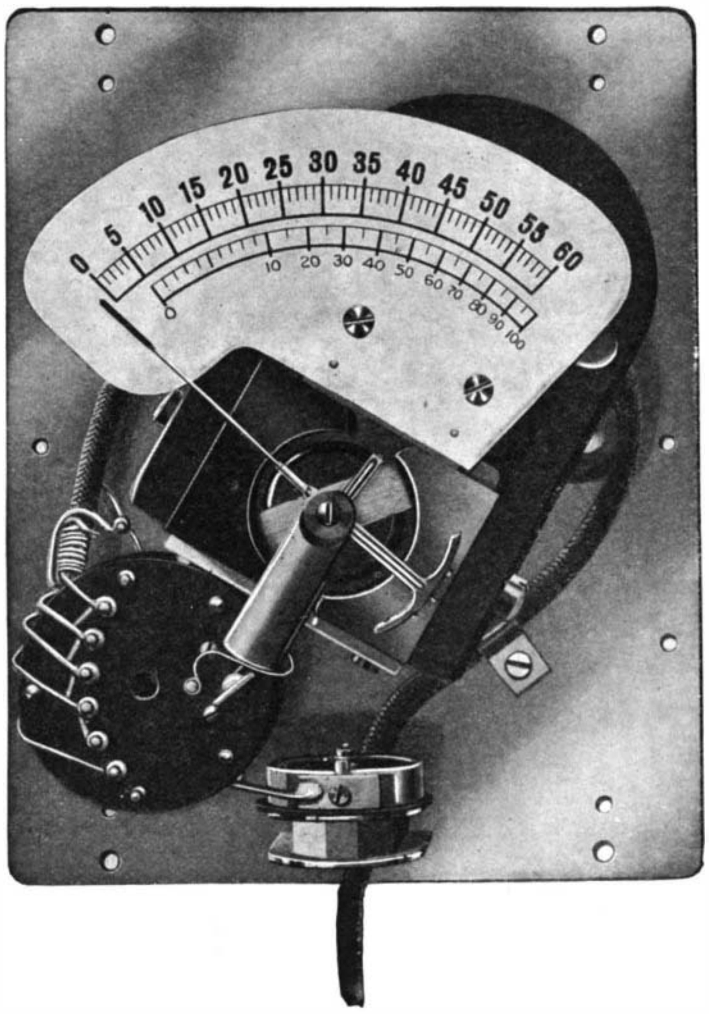
It seems to me that the "Roanoke" complies in every way with the definition of the modern "Dreadnought"; that the idea of the "Dreadnought" was first developed in her; and that she *was* the first "Dreadnought"—or in other words, the great "Dreadnoughts" are developed "Roanokes." Their arrangement of guns, armor, and turrets is from her. The "Roanoke" had no military or skeleton masts or rapid-fire guns, these at that time not being necessary, as wireless telegraphy and torpedo boats were not then known.

The American navy had the first steam vessel of war and the first "Monitor," and should it not be credited with the first "all-big-gun" ship, the "Roanoke," of which the "Dreadnoughts" are but an enlargement of the same idea? I inclose a photograph of the "Roanoke," taken from a large lithograph made for the Navy Department, and presented to me by the Assistant Secretary, G. V. Fox, with a number of others in 1863. WILLIAM BOERUM WETMORE.

Allenhurst, N. J.

POWER INDICATOR FOR INTERNAL-COMBUSTION ENGINES.

A strikingly novel instrument, the invention of Prof.



Interior details of the indicator.

N. Monroe Hopkins of the George Washington University, is pictured in the accompanying engravings. The instrument is a combination power indicator and precision speedometer without a flexible shaft, and when the equipment is installed upon a stationary engine, automobile, motor boat, or aeroplane, shows what the cylinders of the engine are doing separately or together; which, if any, cylinder is missing; the power of the engine and the conditions under which it is doing the most useful work; how to adjust the carbureter perfectly when the engine is idle as well as under load; speed with absolute precision from 1 to 60 or 100 miles per hour, and mileage; and the revolutions per minute of the propeller in aeroplane and marine work.

The instrument is an original application of the fact that an electric current is produced by the simple heating of the junction of two dissimilar metals, and the magnitude of the current so generated is proportional to the junction temperature.

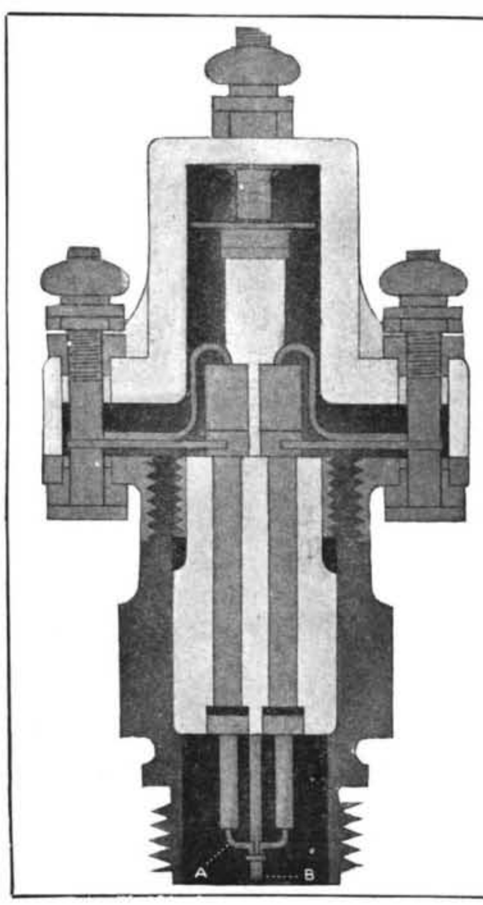
Ordinary thermo-couples as evolved by Becquerel, and used for general temperature measurement in the arts and sciences, would never "live" to operate under the high temperature and peculiar chemical conditions in a gasoline engine cylinder, because they would become so heated as to preignite the charge and cause the gas engine to buck, hitch, or back-fire, and in addition would become brittle and drop apart, either through oxidation or the absorption of carbon, after a short period of use. Actual temperature measurements by means of thermo-couples or thermometers could not be made in gasoline engine cylinders.

Prof. Hopkins's thermo-couples are of original construction and are designed to give an idea of the temperature in a gasoline engine without actually attempting to measure it. His instrument faithfully and continuously shows, by modified temperature readings, the working conditions of gasoline engine cylinders. The "thermo-plugs" give the same "electrical pressures" after 50,000 miles' use on an automobile as when first applied.

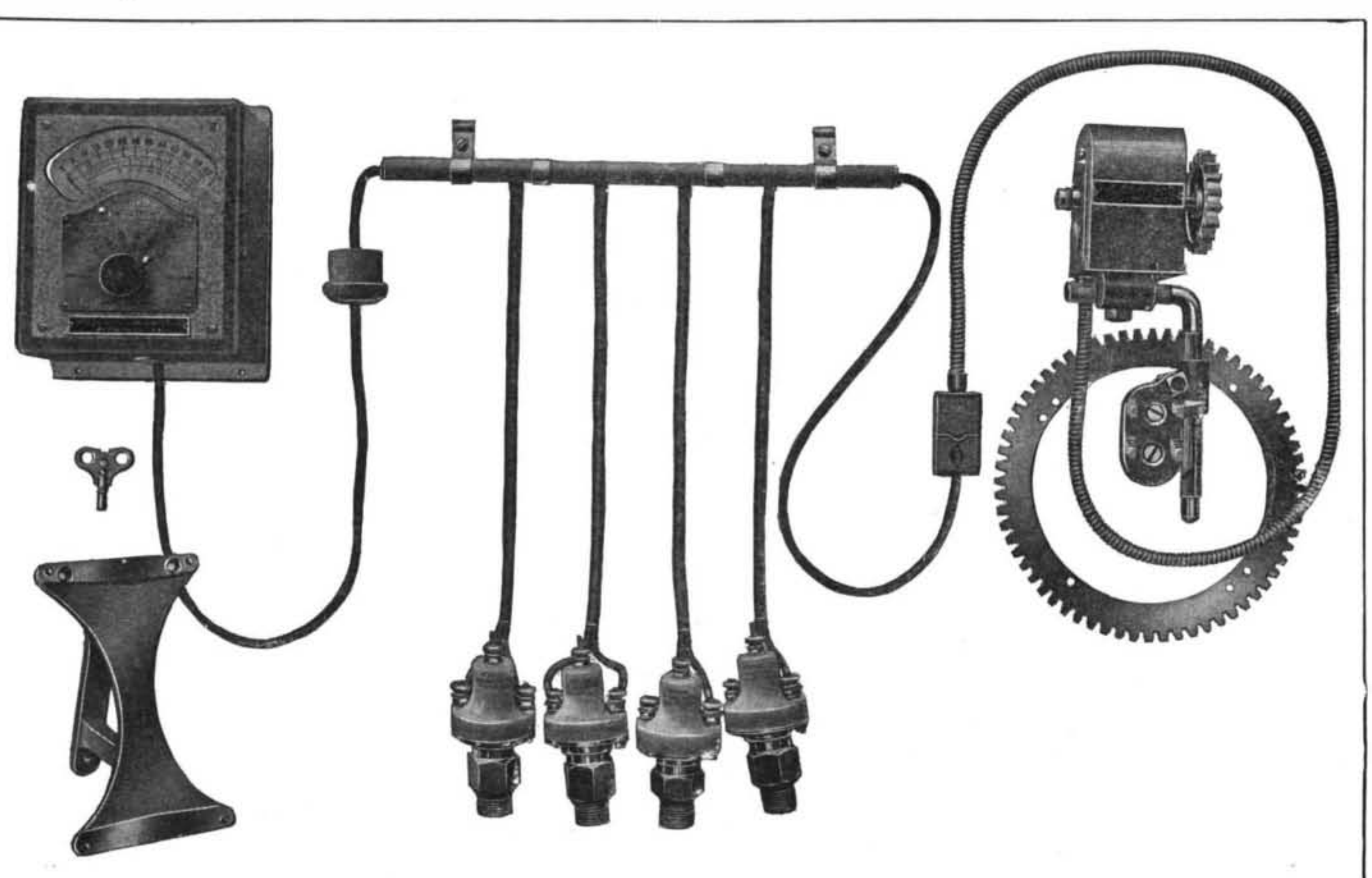
One of the illustrations shows a sectional view of a combination firing and indicating plug. The thermo-couple may be seen at *A*. It consists of special alloys drawn into wires surrounded by massive metal tubes closely fitting the wires and adjustably receiving them. These metal tubes are connected at their upper ends through the agency of heavy metal lugs connecting with the binding posts, and dissipate the heat by conducting it at a predetermined rate away from the tip of the thermo-couple within the engine cylinder to the binding posts without. All plugs are calibrated and are interchangeable. The adjustment in such plug being obtained by sliding the thermo-couple wires through the heavy metal tubes to a greater or lesser distance into the engine cylinder. Stuffing boxes screw on to the top of the metal tubes, making a gas-tight joint between the thermo-couple wires and said tubes. In practice they protrude beyond the lower end of the metal tubes about 3/64 of an inch.

An engine should have these specially constructed thermo-couples in each spark plug. They may be selectively or collectively connected with an electrical indicating instrument which gives an accurate reading of the current delivered by one particular cylinder or by the combined cylinders if the spark plugs be connected in series.

There is a switch on the instrument for obtaining separate or combined cylinder indications. The instrument has two scales, the upper a speed scale and the lower a power scale. On the switch there is also a speed contact *S* which connects a small magneto-dynamo with the indicating instrument and electrical current is furnished in direct proportion to the speed at which the dynamo is driven. In addition to this com-



Spark plug fitted with thermo-couple.



General view of the indicator and speedometer.

POWER INDICATOR FOR INTERNAL-COMBUSTION ENGINES.