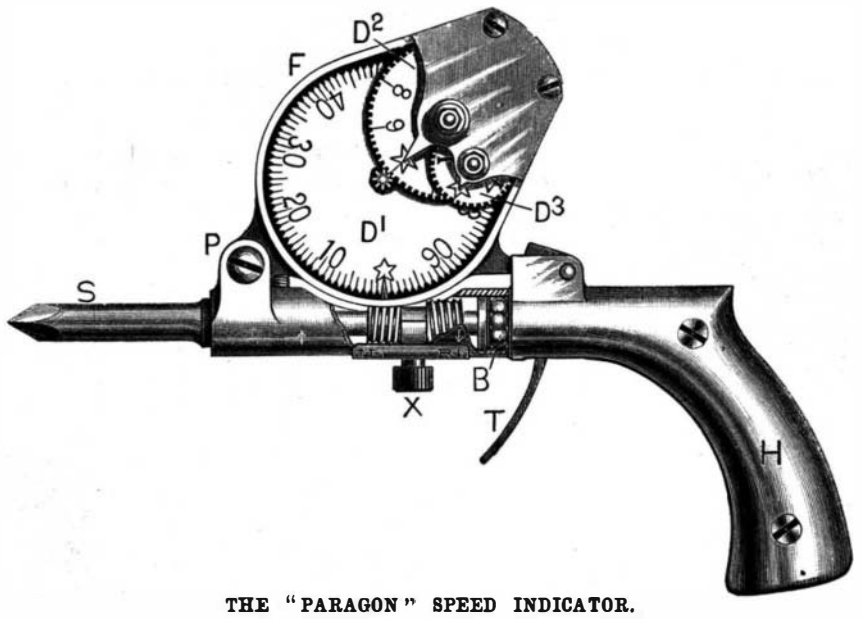
THE "PARAGON" SPEED INDICATOR.

A very convenient and handy speed indicator is shown in the accompanying illustration. The device is made in the form of a pistol, which it closely resembles in appearance. The handle is grasped firmly in the hand of the operator, the point being pressed against the end of the shaft and the indicating mechanism is set in operation by simply pulling the trigger. This simple contrivance enables the operator to time the indicator with the hands of a watch with considerable nicety, while the form in which it is manufactured is convenient and the parts are simple in construction.

In the illustration, a portion of the tubular bearing in which the spindle revolves is cut away, to show the worm gear connections and the ball bearing at the inner end of the spindle which sustains the end thrust when the device is in use. The handle, H, is of pistol grip form, the spindle, S, being angularly pointed, with the inner ball bearing, B. The frame, F, in which the dial wheels, D^1, D^2, D^3, are mounted, is pivoted at P, so that it can be moved downward against the force of a spring to cause the teeth of the dial wheel, D^1, to engage with one of the worm gears on the spindle, S, the first wheel indicating units and tens, the second hundreds, and the third thousands of revolutions. By means of a thumb nut at the back of the dial frame, the dials are quickly and easily reset to zero, the star on each wheel being then opposite its pointer. A shifter slide, X, has two worms, one right hand and the other left hand, and this shifter may be moved to the right or left, as indicated by the letters R, L, according to the direction in which the shaft is running, whereby the revolutions may be counted by one set of figures, no matter in what direction the shaft may be running. The dial wheels are instantly brought into operation by pulling the trigger-formed lever, T, the releasing of the trigger instantaneously disengaging the registering mechanism, even though the spindle continues to revolve. An accurate registration may thus be obtained without even looking at the instrument from the time it is applied until after its removal. The device is strong and well made throughout.



THE "PARAGON" SPEED INDICATOR.

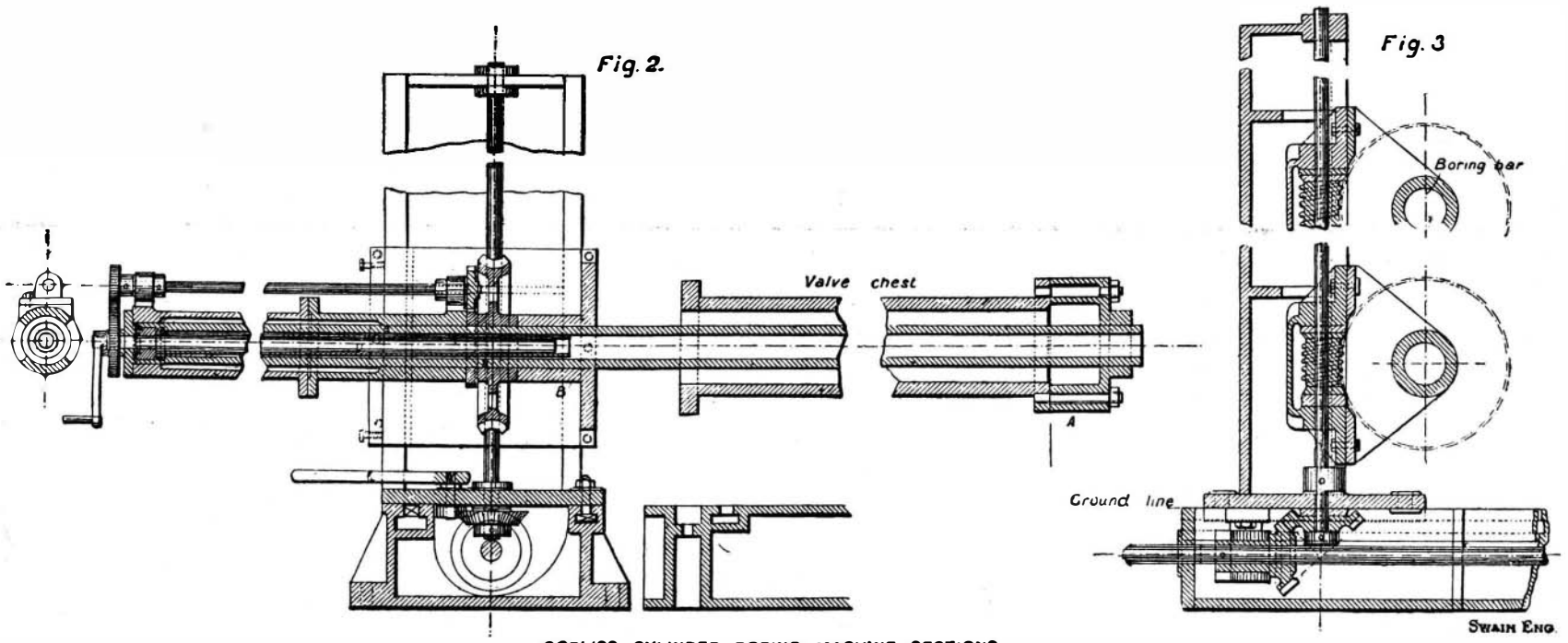
Further information in regard to it may be obtained of Messrs. Lintner & Sporborg, Gloversville, N. Y.

BORING MACHINE FOR CORLISS ENGINE CYLINDERS.

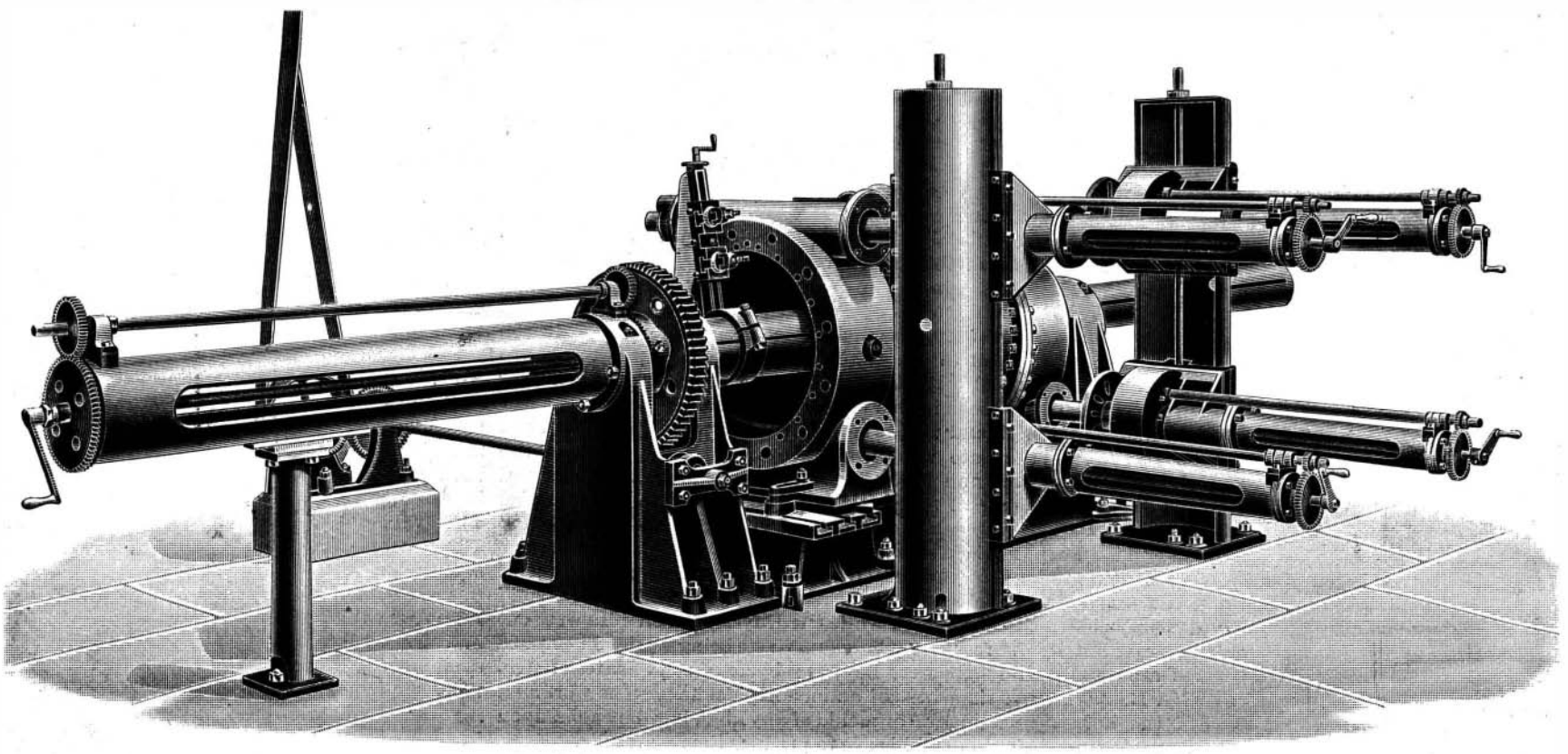
Herewith are illustrations, Figs. 1, 2, and 3, of a machine designed and constructed by M. H. Bollinckx, of Brussels, for boring the valve chests and cylinders of Corliss type engines at one operation.

The *Engineer*, London, to which we are indebted for our illustrations and particulars, says: "From the general view, *Fig.* 1, it will be seen that the machine consists of a horizontal bed plate, at each end of which stands a head supporting the boring bar and the driving gear. In front of the machine are two upright columns, on whose faces move four carriages, two on each, containing the driving and feeding gear for the four horizontal bars employed for boring the valve chests. We give sectional views, Figs. 2 and 3, of the gearing used in these carriages.

"In the boring operation the entire bar moves, being supported at its further or back end by the guide piece marked A in Fig. 2, a piece bolted to the valve chest face, and at the driving end by the long bearing constituting part of the actual carriage; the projected end of it enters the long sleeve extending backward from the carriage. This boring bar, it will be observed, is a tube—inside of which passes the feeding screw—passing through a plate at the end of the long sleeve, and having on its end the gear wheels necessary for automatic action, and the handle for manual use. The screw passes through a nut at the end of the bar, and is covered by an interior sleeve to prevent the entrance of grit. The bar is caused to rotate by means of worm gearing through the vertical shaft driven by the bevel wheels beneath the bed of the machine. The bar has a long key way cut in it, in which slides a feather attached to the worm wheel, and similarly for the worms themselves. There are two identical devices on each column, but they are independent, and can be placed in any relative position to each other, so as to accommodate many different sizes of cylinders. The columns also slide on bed plates by means of a rack and pinion worked by a spanner, and can be placed in positions closer together or further apart, in accordance with the demands of the cylinder.



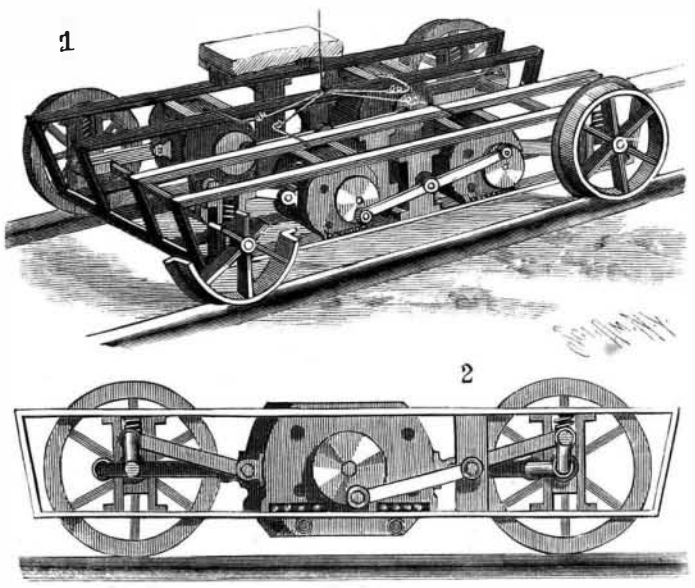
CORLISS CYLINDER BORING MACHINE—SECTIONS



CORLISS CYLINDER BORING MACHINE.

The gear for the boring of the cylinder is nearly identical with that described, only on a much larger scale. The few modifications will be readily gathered from the general view. In all cases the bar is entirely removable with facility. The method of using the tool is this: The cylinder having been placed on its face, is bolted to the bed plate, being blocked up to the right height for the main boring bar. The other four bars are then arranged in their places, their relative positions being adjusted by the insertion of a gauge between the two carriages on each column, and between the feet of the columns themselves. In the bars for the valve chests are mortise holes into which are fixed the tools for the first cut, which is made at a rate of from 12 feet to 16 feet a minute; they are afterward replaced by a milling cutter of the Brown & Sharp type, made in two parts for convenience, and ground to exact size, cutting at the rate of 10 feet a minute. The cylinder is bored in a similar manner, but on account of its size a collar has to be used, which, however, does not travel on the bar, but is carried forward with it. It is believed that better results can thus be got than by having a rotating tool holder on a fixed bar.

"This machine takes cylinders varying in diameter from 400 mm. (55 inches) diameter, with 800 mm. stroke (71 inches) up to 1·250 m. (49 inches), with 1·800 m. (71 inches) stroke. It is evident great saving of time must be experienced with a machine that thus performs five operations at the same time; the machine being carefully constructed, the four valve chests are bored perfectly parallel to each other, and the cylinder at right angles to them; the use of adjusted milling cutters and gauges for fixing the relative distances between the four carriages insures that all cylinders from the same pattern are interchangeable. The machine is therefore well suited to its work, and as the design is in no degree complicated, it is to be hoped that some good maker will take the matter in hand and produce here a tool for which Corliss engine builders will be thankful. In the engraving a tool holder employed for facing the cylinder flanges is shown; this is removed before the boring is commenced."



WILSON'S ELECTRIC MOTOR TRUCK.

Kamela Dye.

In a handbook published by Mr. Thurston, an account is given of kamela dye, which produces a gorgeous flame color of varying shades, according to the process employed. The dye is a native of India and is merely the powder which coats the berries of the *Mallotus philippinensis* tree, which grows wild in many parts of the country. It is brushed off into baskets made for the purpose, and requires no further preparation, but the method of collection is very wasteful, as the trees are often felled in order to facilitate the gathering of the berries, and confidence is destroyed by the frequent adulteration of the article.

The red powder requires to be mixed with alkali, which, in Bengal, is obtained by burning plants, after which it is allowed to stand in water to extract the color. The silk to be dyed has only to be soaked in the mixture to make it take up the color, which is afterward fixed with alum. The dye has been submitted to the director of the Sericultural School at Como, who writes: "I think this color is fast and durable, but, nowadays, few persons care about durability, and dyers obtain the same dye with the artificial product called aroflavina, and with much greater facility."

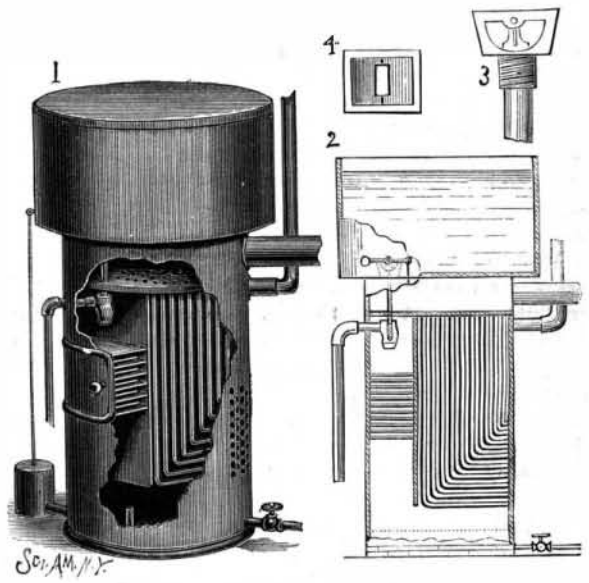
AN IMPROVED ELECTRIC MOTOR TRUCK.

According to this improvement the motors are made to reciprocate and communicate motion to cranks on the car axles after the manner of a steam engine. The construction is the invention of Mr. James Thompson Wilson, of Tyrone, Pa. The car frame has suitable ways, with bearing surfaces provided with anti-friction rolls or balls, on which the motors are reciprocated in opposite directions, the cranks attached to their armature shafts being connected with levers pivoted to the car frame, and connecting rods jointed to the motors being connected with cranks on the car axle in the usual manner.

Fig. 1 represents a truck provided with four such motors, while Fig. 2 shows a two-motor car, the motors in each case reciprocating simultaneously in opposite directions, so that the reciprocation of one motor counteracts that of the other. The current is conveyed to the motors by conductors with flexible joints, the return current being carried through the car wheels and rails in the usual way, or when storage batteries are used it is returned direct from the motors to the batteries. The two-motor car may be made very light, and is designed to answer all the purposes of street car use, being especially advantageous where there are short curves in a line, having smooth action and giving sufficient speed for a city street.

A HEATER AND CONDENSER.

To condense exhaust steam and use the heat thus obtained for the heating of buildings and other purposes, as well as to purify the feed water used in the boiler, are the objects of the improved apparatus shown in the illustration, recently patented by Messrs. Gueva G. Paull and Walter F. Brown, of Wilson, Kan. Fig. 1 is a perspective view of the improvement, with a portion of the shell of the condensing chamber broken away to show its interior, Fig. 2 representing a transverse section. At one side of a vertical partition extending nearly to the bottom of the condensing chamber is a series of L shaped air pipes leading from the outside to a partitioned-off space at the top, from which a flue extends either to the rooms to be heated or to a connection with a suitable exhaust fan, insuring a constant passage of air through the pipes. At the top of the space on the other side of the vertical partition the exhaust pipe from the engine is connected with a downwardly discharging exhaust head, into which also extends the perforated nozzle of a water supply pipe, connected with a pipe valve in the water supply tank at the top. This valve, shown in detail in Figs. 3 and 4, has a segmental valve seat, and the valve is held on a shaft extending through one side of the tank, there being on the outer end of the shaft a weighted arm connected by a rod with a float in a closed vessel connected at its lower end by a pipe with the lower portion of the condensing chamber. From the bottom of this chamber an outlet pipe extends to the feed pump, the inner end of the pipe being bent upward to prevent the entry of sediment collecting on the bottom, but when the water rises above the desired level it flows through the pipe into the vessel containing the float, and the raising of the latter operates the valve to shut off the supply of water from the tank at the top. A series of spaced purifying plates is arranged, one above the other, beneath the exhaust head, and the entering water and steam pass through these plates, depositing thereon their impurities, the steam not condensed rising around the air pipes on the other side of the vertical partition. A pipe leads to the outside from the top of this space, so that the uncondensed steam will always have a free passage off. A door affords convenient access to the purifying plates that they may be readily cleaned, and in the bottom of the condensing chamber is arranged a blow-off pipe to facilitate the removal of sediment.



PAULL & BROWN'S HEATER AND CONDENSER.

MECHANICAL ARITHMETIC.

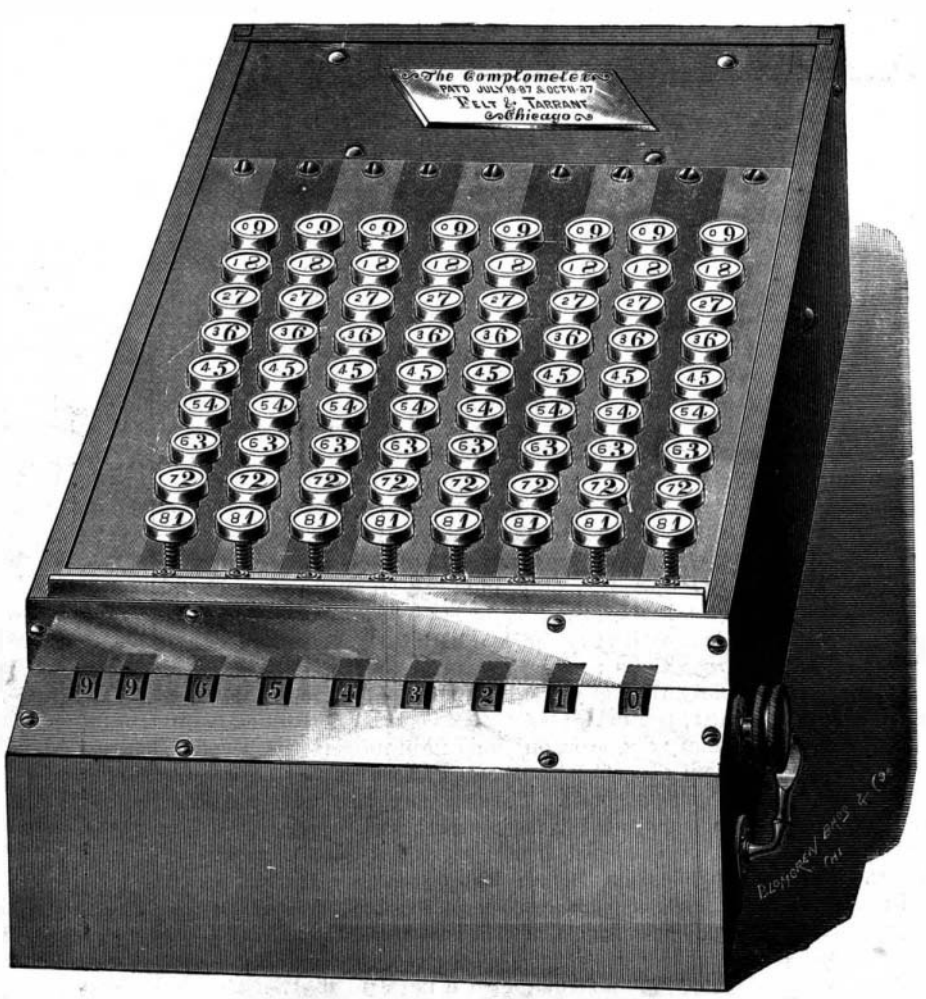
BY DORR E. FELT.

"Mechanical arithmetic"—is not all arithmetic mechanical? At least every arithmetical computation consists of enumerating numbers or quantities of units whose dimensions are determined by some mechanical means, and it is said that our system of enumeration by tens is the outgrowth of the mode of counting and expressing on his fingers such simple numbers as the early half-savage man could comprehend, and to-day the great government and insurance actuaries all over the world use mechanical appliances of various kinds to perform their arithmetical calculations. Since counting started in a form of mechanical arithmetic—counting on the fingers—it would be a wonderful illustration of the circle in which affairs move if mankind, after centuries of mental arithmetic, should again come back to mechanical arithmetic, and it in a very high state of development become the common mode of making all kinds of arithmetical calculations. Such a consummation is not impossible, in fact, recent inventions in calculating machines indicate that it is probable.

Perhaps the branch of mechanical arithmetic most widely known is the little frame of parallel bars with balls sliding thereon, the abacus, on which the Russian and the Chinaman count sums with a facility that seems to us surprisingly rapid, though upon investigation this method seems to involve too much mental work mixed with mechanical work to commend it to the Caucasian, for mental and mechanical arithmetic do not mix very well.

Either alone is better than a mixture of the two. Perhaps the next most widely known calculating instrument is the one which was devised by Babbage, a famous English scientist and writer, backed by the British government to the extent of £20,000 which he sunk in addition to a part of his private fortune in an endeavor to make it work, but he never completed it.

This machine was intended for calculating tables by means of ratios of common differences, particularly for



FELT'S COMPTOMETER.