THE MOTSINGER IGNITION DYNAMO.

This is a strong, well-built, inclosed dynamo for ignition purposes. It was the first successful little machine of its kind to be used in America, and it has been so well thought of by the French firm of Panhard & Levassor that they have secured the patent rights in their country and are equipping their machines with it. A new type of governor has recently been brought out, and it is plainly shown in the illustration. The dynamo is set under the flywheel and its pulley is driven by friction with the latter. When it has reached the proper speed the governor balls are thrown out by centrifugal force and bell cranks attached to them push the sleeve on the end of the shaft against the curved spring attached to the lever pivoted on the dynamo base. This forces the outer end of the lever downward and raises the inner end, which is yoked to the governor sleeve, and which therefore tends to tip up this end of the machine, since the whole dynamo is pivoted on its transverse axis. The result is that the pulley moves away from the flywheel, and the whole machine assumes the position shown by the dotted lines until it drops back to speed. By employing this governing arrangement, it is possible to start the engine with ease when turning it by hand, and yet not damage the dynamo from excessive speed while the engine is running. The speed of the latter can be varied also without affecting the spark produced. The door in the casing allows of examination of the brushes, and the dynamo can be made to operate over the flywheel by changing the yoke to the hole near the outer end of the lever on the base.

The diagram shows an automatic switch arrangement for employing the dynamo in connection with two cells of storage battery. The storage battery furnishes the electricity for the spark and thus allows one to start the engine when turning it over slowly. As soon as the engine starts and the dynamo begins to generate, current from the latter will pass through the electro-magnet, *M*, and cause the core, *C*, to attract the armature, *A*, thus throwing the switch arm, *S*, on the lower contact, which is connected to the + pole of the battery. The dynamo current will then pass through the battery and back to the — pole of the dynamo. A great advantage of this arrangement is that the battery is always kept charged and so can be called upon to supply current for testing the wiring, or for operating the spark should the dynamo get out of order. Two small 10 or 15 ampere-hour cells are all that are necessary.

THE COMPUTING TRIANGLE.

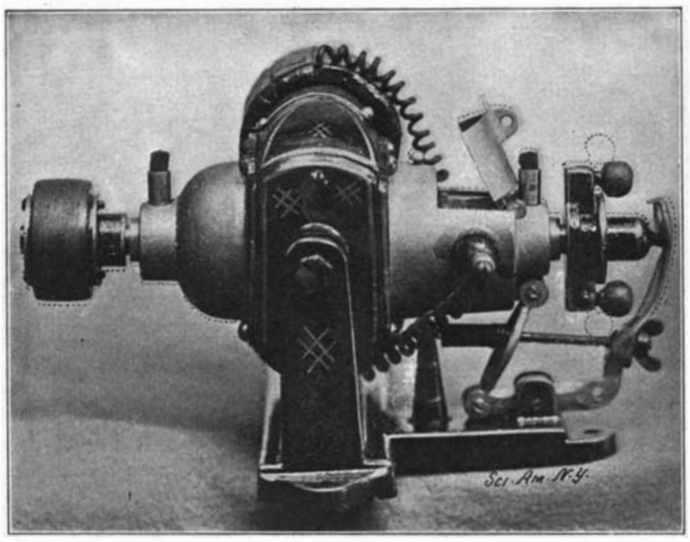
BY B. M. DES JARDINS.

This instrument was designed to solve the problem of justifying type. It is practically adapted to automatic machine computation, on account of the equal distances of its graduations making it easily operated by the simple step-by-step motion. Its mathematical possibilities are large, as it possesses all of the qualities of the triangle for purposes of computing problems.

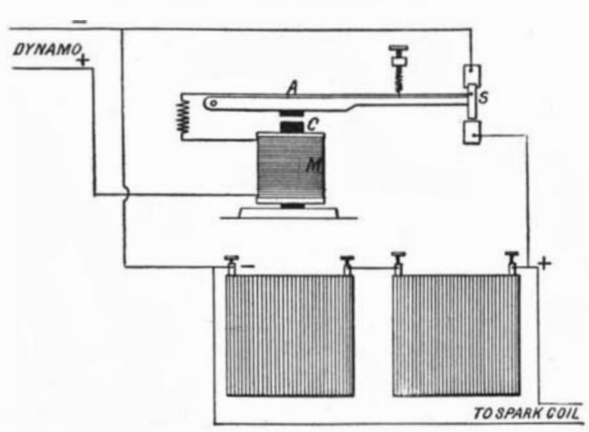
Its capacity for performing examples in addition and subtraction would be better shown by other forms of construction; the present construction, however, illustrates the underlying principle employed for performing examples. This construction is peculiarly adapted for adding and subtracting proportional amounts.

For simple addition or subtraction use the eccentric controlling the movable caliper jaw, displacing it by the addition or subtraction of the required amounts, one after the other.

For proportional addition or subtraction the successive amounts may be added or subtracted by means of the scale and eccentric controlling the angle, the amount of the proportion being controlled by the position of the stop along the lower scale. If it is required to vary the proportion while the process of addition or subtraction is going on, the variation is made on the lower scale either direct or by means of its eccentric.



THE MOTSINGER IGNITION DYNAMO.



AUTOMATIC SWITCH FOR CHARGING STORAGE BATTERIES.

In machine subtraction among others it performs such examples as would be necessary to reduce the end of a rod a given number of steps. Set the lower jaw, on its scale, a distance equal to the smaller size, then caliper the rod with the upper jaw, and when in this position set the angle in accordance with the number of steps wanted; set the stop on the lower scale till the parts are tight, then set the angle successively at the various figures or positions of its scale proportional to the steps wanted, and each position will locate the jaws at the successive positions required to caliper the metal as it is turned down.

Examples in division may be performed in either positive or negative quantities. The pivotal point of the angle represents 0, the right or upper arm is used for positive quantities, the left or lower arm for negative quantities.

The lower caliper jaw is adjustable for two purposes; it is necessarily set on the lower scale when the upper jaw is used in gaging negative quantities, and it is always set on the lower scale to designate the part of the substance upon which no example is performed. For simple examples in division the dividend, or amount to be divided, is designated by the position of the upper caliper jaw, which is adjusted according to the number and fraction required by means of its scale and segment. The amount of the division is then designated by the position of the angle by means of its scale and segment. Having located these two elements, the quotient is located by the position of the stop block against the angle and the amount is designated by means of its scale, and the remainder is then determined by the position of its segment. By means of this instrument, fractions of any nature may be divided with the same ease as simple numbers. The segments in each case readily locate the intermediate positions of the instrument. For multiplication the stop is located according to the amount to be multiplied by means of its scale and segment. The angle is then set in a similar manner, but in this case it represents the multiplier. The answer is then expressed by the position of the upper jaw. For examples in negative multiplication the lower jaw may be used for the same purposes as in division.

Examples in square root are performed by maintaining proportionate movements or speed between the stop block and angle gage.

The equal distances between the graduations in the respective scales make the peculiar construction of this instrument well adapted for automatic machine motions. The various adjustments referred to for working different examples are designed for machine computation.

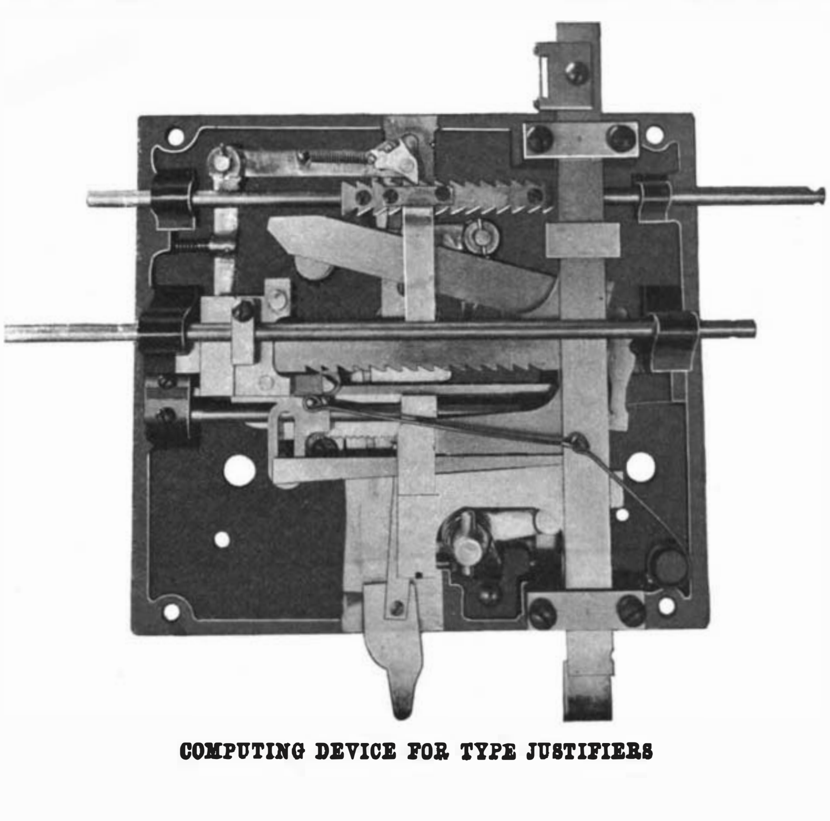
Computing Device for Type Justifiers.—The computing device for type justifiers is constructed to automatically perform simple examples in division and to give the quotient and remainder in order to determine the positions and motions necessary to locate the required sizes of space needed by the justifying machine.

This instrument necessarily performs more than the simple examples in division, as it is required to control and handle the other devices of the automatic mechanism, designating when they shall start and stop.

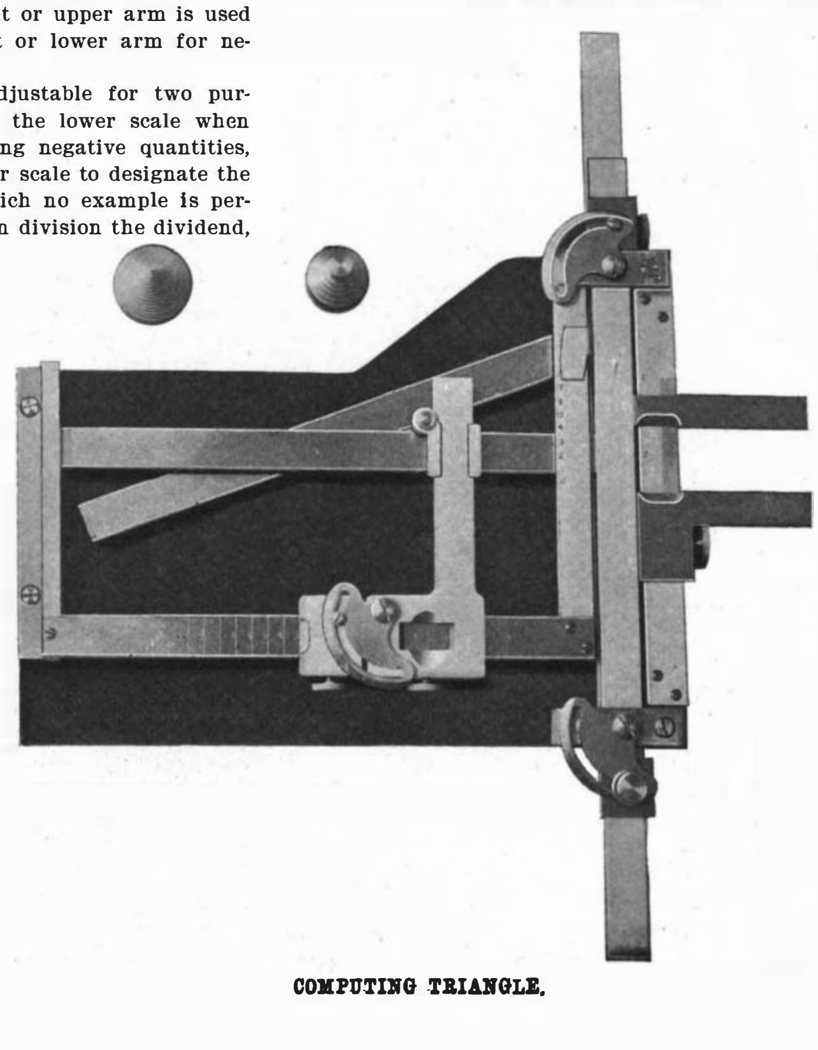
The line of type is given to the machine with metal separators between the words, making it necessary to subtract the amount of these separators from the total measurements.

The line of type including the separators is brought under the vertical guide of the measuring bar locating the stop block, which slides thereon, below the angle pivot, a distance equal to the line shortage, that is, the amount which the type line still remains short while it has all of the separators between the words. This is the distance to be divided by the number of separators.

The angle bar is lowered one step while each separator is inserted. This process tilts the computing angle on its pivot in accordance with the units of the divider, the stop block then moves leftward until it comes in contact with the computing bar. This gives the exact product in amounts representing units and fractions. The teeth on the under edge of the computing bar represents the units used, and in this case are made to represent the different sizes of spaces with which the machine is provided. If the pawl stops between two teeth this indicates that there is a fraction



COMPUTING DEVICE FOR TYPE JUSTIFIERS



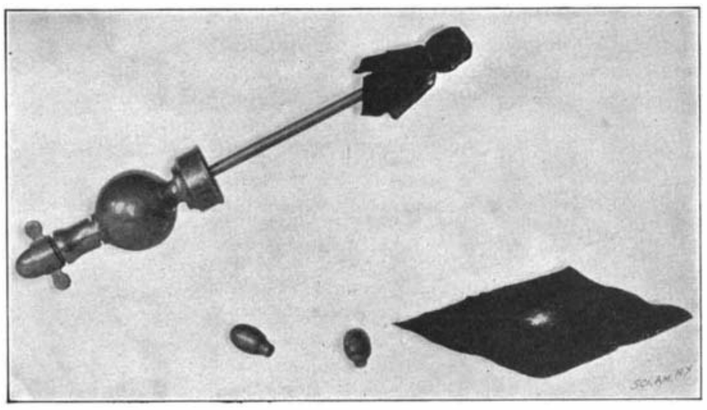
COMPUTING TRIANGLE.

or remainder. The machine then reverses the motion of the stop, forcing it backward till the pawl under it is intercepted by the tooth under the computing angle. This leaves a looseness between the stop block and the computing angle. The wedge under the measuring bar has teeth also representing units. The machine then proceeds to insert the wedge, thereby raising the measuring bar with the stop block until it is again tight, against the computing angle. In doing this the wedge moves rightward, one tooth for each unit, as far as it can go. When the parts are in this position the escapement rod and rack above the computing angle moves leftward until its projection strikes against the stop block, and when at this position it is engaged by its pawl. The parts are now in readiness to begin the operation of inserting the spaces. With the insertion of each space the wedge is moved leftward one tooth, and when it reaches its starting point it causes the escapement rack in this case to slip one tooth. The downwardly projecting arm of the escapement causes the dog underneath to be pushed out from the lower tooth while the escape dog is thrust between the upper teeth, thereby causing the rack to change its position. This changes the size of spaces in the machine, after which the process of inserting the next smaller spaces is continued until the line is finished.

SOLID CARBONIC ACID FROM "SPARKLETS."

BY PROF. R. W. WOOD, JOHNS HOPKINS UNIVERSITY.

It may be of interest to those engaged in the teaching of physics, whose laboratory equipment is limited, to know that the solidification of carbonic acid by the cold developed by its own expansion can be shown with the "sparklets" which are now sold everywhere for the aeration of beverages. The "sparklets" are small steel capsules which are filled with liquefied CO_2 and sell for a few cents each. The larger of the two sizes is the best for experimental purposes. It is a good plan to start with the capsule well cooled, which can be done by packing it in ice and salt. The top of one of the siphon bottles is removed, the "sparklet" inserted, and a small piece of black velvet held tightly over the end of the tube which ordinarily conveys the gas into the beverage. The velvet should form a little bag the size of a small marble over the end of the tube and must be held tightly around the tube, so that the escaping gas has to pass through the meshes of the cloth. It is a good plan to take a few turns with a string around the velvet where it surrounds the tube. On screwing down the cap, the gas escapes into the small velvet bag, and the great cold produced by the expansion is sufficient to freeze a portion of the solid particles collecting on the inner surface of the little bag. On removing the velvet we find a layer of snow-white solid CO_2 on its surface, and if a small drop of mercury be placed on it, it can be frozen in a few seconds. The experiment is absolutely without danger, and the small price at which the "sparklets" can be procured brings one of the classical low-temperature experiments within the reach of every teacher. The advantage in using black velvet is that the white solid shows off to good advantage on the dead black surface. The "nap" should be on the inside of the bag.



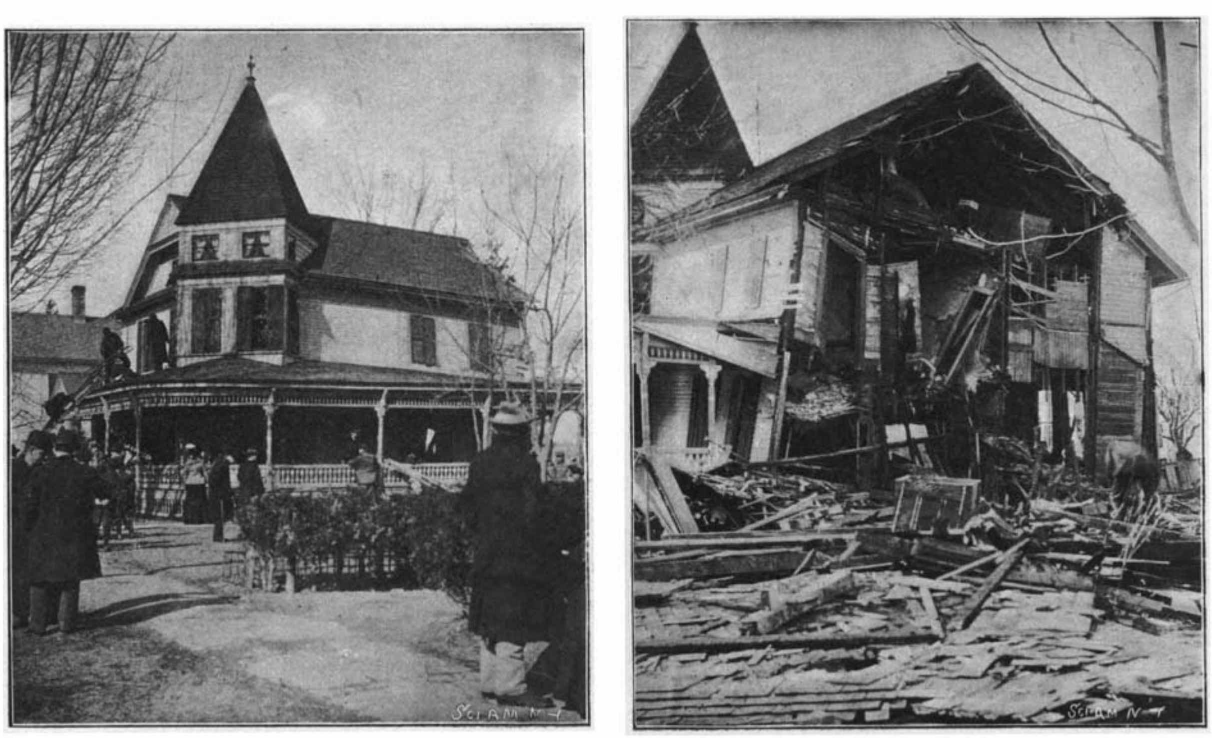
SOLID CARBONIC ACID FROM "SPARKLETS."

SOME DISASTROUS ACETYLENE GAS EXPLOSIONS.

An accident similar to the one recorded in the SCIENTIFIC AMERICAN for March 25, 1899, occurred February 6 at Fort Wayne, Ind., in a two-story house occupied by four persons. On the morning of the occurrence, the young man clerk visited the cellar to thaw out the water-pipes. He lighted a candle and crawled through a small opening which connected the cellar with the front part of the foundation. He did not notice the smell of gas, and nearly reached the water-pipe when there was an explosion which hurled him backward. He retained presence of mind enough to scramble back, and hurried upstairs to assist the other members of the house in getting out of the débris. The explosion completely wrecked the building. The entire front of the house was blown out, and it remained practically intact. The west wall was half destroyed, the explosion tearing away the section holding the weather-boarding apart from the studding and the plastering. The inside of the house was a total wreck. The floors of several of the rooms were pushed upward, and the fire was extinguished before it could get any headway. The child who was sleeping on the sofa directly over the seat of the explosion was not killed, but received a fractured skull. It is evident that there must have been an extensive accumulation of gas beneath the house which remained undetected by the occupants.

A somewhat similar explosion took place in the house of T. E. Gould at West Brookfield, Mass. The house was lighted by an acetylene gas plant installed in the cellar. Shortly before the explosion occurred the lights failed to burn, and Mr. Gould started down the cellar stairs, with a lighted lantern, to investigate the trouble. A slight explosion drove him back, and while he was going to the outside cellar door, with the intention of throwing it open to permit the escape of the gas, the disastrous explosion took place. Of the five persons in the house at the time, Mrs. Gould and a neighbor were instantly killed, Mr. Gould and a servant were so badly injured that they died within a week, and a sister of Mrs. Gould's, who was in one of the front rooms, escaped practically unharmed. The extent of the damage can be easily read in the illustrations. The rear of the house was entirely demolished. Not a square foot of plaster was left on any of the walls, not a pane of glass remained unbroken. Bits of wreckage were picked up over a quarter of a mile away. In adjacent houses windows were smashed, curtains torn down, pictures thrown from the walls and crockery broken. The entire town was shaken, and the noise of the explosion could be heard at a distance of five miles.

A HOUSE AT FORT WAYNE, IND., PARTIALLY DESTROYED BY AN ACETYLENE GAS EXPLOSION.



A RESIDENCE IN WEST BROOKFIELD, MASS., ALMOST DEMOLISHED BY A GAS EXPLOSION.

What caused the gas to escape is not known, but it is supposed that the safety pipe, which was small and inadequate for the purpose, became clogged, and the gas, generating faster than it was consumed, broke the water seal of the gasometer and escaped into the cellar. It must then have been ignited by coming into contact with the fire in the steam heater which was also in the cellar.

Science and Yellow Journalism.

When newspapers scream at the crowd misrepresenting accounts of scientific matters so completely beyond the common comprehension that hardly a dozen men in a nation can understand anything whatever of the matter, it is easy to foresee that the reputation of men, of institutions, and even of a country, may be injured. Do American universities, came the question from abroad, sanction the publication of the results of the most recondite researches of their professors in the Sunday newspapers? If not, how did these papers secure the long ear-marked quotations? An experiment in parthenogenesis is quoted as it is described by the "American" reporter as "the jelly-fish did not jell," and Europe laughed. We have been at a great deal of pains to ascertain the facts as to responsibility for the newspaper outgivings in the special case alluded to, and we find beyond all question that the principal man mentioned as the revealer of all mystery not only had nothing whatever to do with this newspaper notoriety, but that it misrepresented him as completely as it was loathsome to him. No blame whatever can attach to him. Students acting as reporters, and for it dismissed from the institutions, and others who were careless, or worse than careless, were accountable for a quickly recognizable injury to friendships, to institutional and national reputation, and to science itself. The lessons are plain. All who believe, as we do, that the person principally quoted is utterly innocent should hasten to compensate him for the injury done him by the criminal folly of others; and assure him of the honor in which he is held by the discriminating, and for the credit that will finally be recognized as due to American science through the work of a most worthy investigator. Next in importance is the proper punishment of the willful blunderers. But most of all should every scientific man guard against any such possible happenings in the future.—American Medicine.

Chinese Typesetting.

The Chinese language is derived from 214 root-words, which expand into the 4,000 or 5,000 words of daily use, and the thirty-odd thousand of the dictionary. It requires 11,000 spaces to hold a font of Chinese type. The large cases, or false partitions, are ranged about the room and divided into spaces for each individual type, each a word complete in itself. A Chinese printer, it is estimated, can arrange 4,000 characters a day. The work has been carefully systematized, and the characters are arranged according to their formation. A simple character designates its group, and the elaboration of form is the elaboration of its meaning, as our terminations and prefixes elaborate the root. A division is devoted to the simple character that stands for "wood," and all of its amplifications. In this space or column are to be found "box," "bed," "plum tree," and so on, through a long list of objects pertaining to, or made of, wood. Should an unusual word be needed type is cut and delicately patched to make the required character. Comparing our combinations of twenty-six letters and ten figures, besides common symbols, an idea of the labor of a Chinese compositor can be formed.

Painters' aprons, soaked in turpentine twenty-four hours before washing, lose all oil paint spots.