THE REMINGTON TYPEWRITER.

With almost periodic regularity there appear from time to time great inventions which form the bases of new industries, or greatly modify those already existing. They often affect wide ranges of business interests, frequently producing marked changes in the manners and customs of the people. Such inventions were the steam engine, the reaper, the sewing machine, telegraph, telephone, and dynamo.

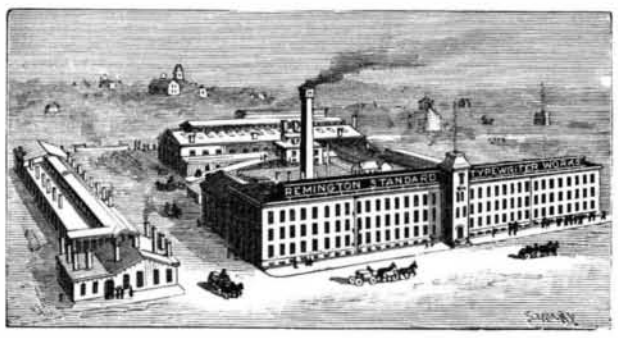


Fig. 4.—THE WORKS.

Another invention, none the less deserving of a high position among important modern inventions, is the typewriter. Its earlier development, like that of the steam engine and many other leading inventions, was not rapid, but by gradual improvement it has been perfected to a high degree, both in principle and construction.

The machinery required in its manufacture, as well as the system by which the parts are made, inspected, and assembled to form a perfect machine, are the necessary concomitants of a new invention, and altogether form a new industry, employing a small army of the best of our mechanics. The extent of the typewriter business is little known outside of those immediately interested in its manufacture or sale. More than 1,500 machines are turned out monthly at the works which we now illustrate. This looks like a large number, but we venture to say that it will soon be doubled and perhaps trebled.

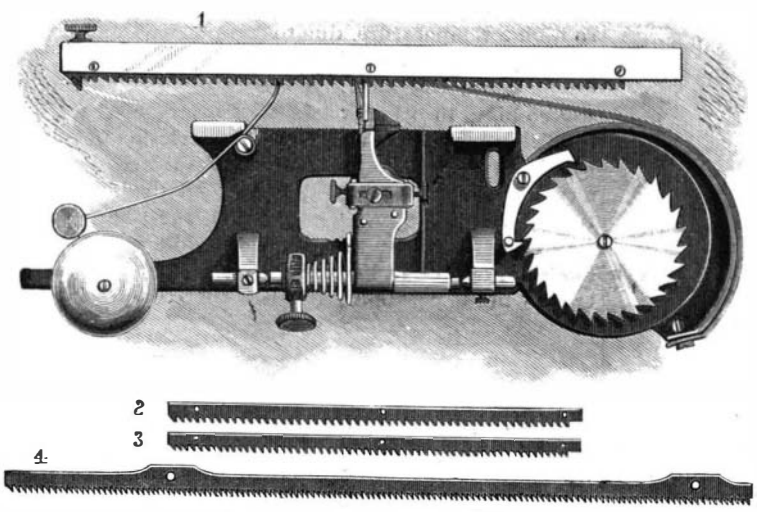


Fig. 9.—FEED MECHANISM.

The typewriter is becoming as indispensable in business and for private use as is the sewing machine in manufacturing and domestic uses. The advantages gained by the employment of the typewriter are so numerous and so important as to excite wonder as to why the machine was not invented and perfected centuries ago, instead of being one of the most recent products of inventive genius. Among these advantages the foremost is, perhaps, that of accuracy. There is no cover of crooked lines and ink blotches under which to conceal poor spelling and bad punctuation. Every character is positive. It stands for itself and cannot be mistaken for anything else. Another advantage, which is no less important than that of accuracy, is that of rapidity. It needs no argument to prove that 1 is less than 4 or 7. Every character made by the typewriter is the result of a single stroke of the finger, whereas the simplest written characters require several movements.

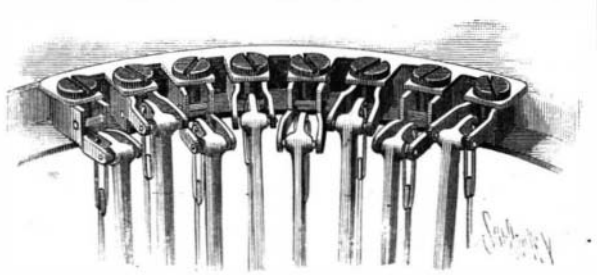


Fig. 8.—PIVOTS OF THE TYPE ARMS.

Another advantage is the facility of learning to write. In ordinary hand writing the student may be correct in spelling and in the use of capitals, and accurate in punctuation, yet never be able with any amount of practice to produce a legible or presentable manuscript. With the typewriter, all rules for the formation of letters and characters may be ignored, and all of the toilsome practice required to produce a copyist's hand may be avoided.

Still another advantage is that of producing manuscript in duplicate. It is often of great importance to provide exact copies; nothing is easier than to accomplish this by means of the typewriter. From four to twenty legible impressions which are exact duplicates may be made simultaneously.

It is about as difficult to tell who invented the typewriter as to name the inventors of the locomotive. The typewriter in its present state is the result of the efforts of many inventors. The fundamental invention which underlies the construction of the type writer most largely in use was due to Mr. A. E. Beach, one of the proprietors of this journal. The principal feature of his invention was the arrangement of the radial swinging arms, carrying at their free ends the types for producing the impressions. Mr. C. Lathom Sholes, of Milwaukee, was the principal inventor of the first Remington typewriter. We cannot enter into the detail of all the improvements that have been made in the typewriter, but will point out in a general way the main features of construction and describe briefly the manufacture of the Remington typewriter, which has been so successfully perfected and introduced under the management of the well known firm of Wyckoff, Seamans & Benedict, of 327 Broadway, New York.

The Remington typewriter, formerly made by E. Remington & Sons at Ilion, New York, is now made at the same place by the Remington Standard Typewriter Manufacturing Company, a company organized by Messrs. Wyckoff, Seamans & Benedict and others some two and a half years ago, and by whom, at that time, the business, machinery, tools, and franchises of the typewriter were purchased from the Messrs. Remington.

One of our engravings presents a bird's eye view of the Remington works; the other views show the construction of the machine and several of the operations concerned in its manufacture.

Fig. 5 is a vertical transverse section of the No. 3 machine, showing the arrangement of the keys, key levers, and connections. In the upper part of the main frame of the machine is arranged a ring to which are clamped loops in which are pivoted the type arms. These loops are arranged in two series, one above the other, to economize space. There are in these machines as ordinarily constructed from 38 to 42 of these type arms, each one bearing at its free extremity a die having on its face two characters, generally an upper and a lower case type, but some of them bear other characters; for example, figures and punctuation marks. The type arms are pivoted relative to the ring so that the characters which they bear all strike exactly in the same place. The type arms have hardened steel pivots which are ground to a bearing, thereby insuring accuracy in the movement of the levers, and at the same time increasing their durability.

As shown in Fig. 5, each type arm is connected by an adjustable steel wire connector with the key lever pivoted at the back of the machine and projecting beyond the front, where it is curved upwardly and provided with a finger piece or key bearing the character or characters represented by the type arm with which the key lever is connected. By using two characters on each type arm, and by a very ingenious arrangement of the paper carriage, the necessity for separate keys for capitals and small letters is avoided, one key being made to serve for two letters or characters.

The mechanism by which this is effected is shown in Fig. 6. The paper-supporting roller is journaled in a frame which is capable of moving transversely on the paper carriage the distance required to shift the paper from the lower case letter to the capital upon the type arm. The end of the type arm and the double type carried thereby is shown in detail at A, and the paper-supporting roller, B, is shown in full lines above the lower case type, and in dotted lines in its position for writing capitals. The capitalizing key, C, which is the foremost one shown in this view, is connected with a right-angled lever, D, through which lateral motion is imparted to the carriage. A spring connected with the lever, D, returns the roller to its normal position as soon as the finger is removed from the capitalizing key.

In this view (Fig. 6) is also shown the feeding and spacing mechanism. The space bar, E, extends entirely across the front of the key board, and a bar, F, which is supported by rods, G, from levers, H, extends under all of the key levers, including the levers attached to the space bar. The levers, H, support the ratchet bar, I, which acts upon the pallets, *a*, *b*, in alternation, allowing the spring attached to the paper carriage to move forward one space at a time, as the pallets, *a*, *b*, escape from the teeth of the ratchet bar, I.

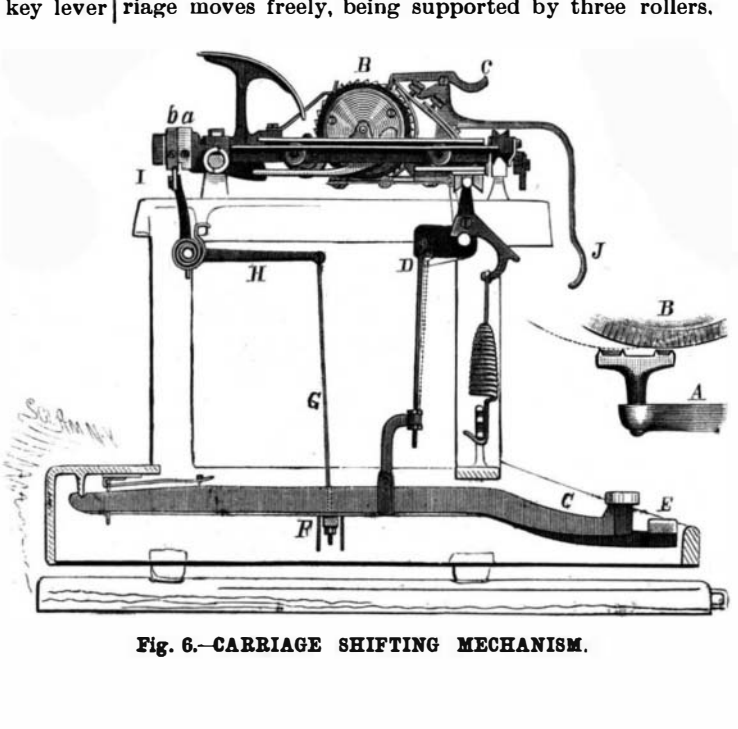


Fig. 6.—CARRIAGE SHIFTING MECHANISM.

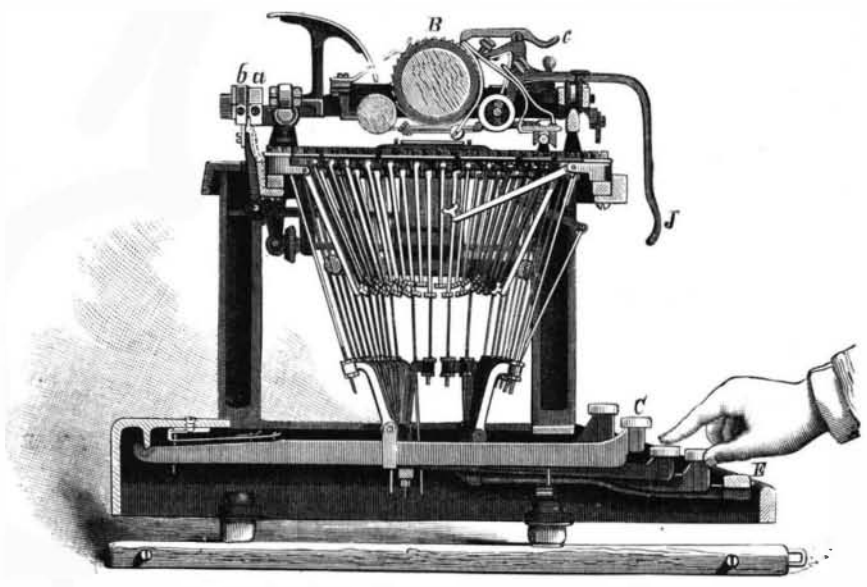


Fig. 5.—TRANSVERSE SECTION OF THE TYPEWRITER.

It will be observed that whenever a key is depressed to print a character upon the paper carried by the roller, B, the bar, F, will be moved down and the rack bar, I, shifted from the pallet, *b*, to the pallet, *a*. This is done without any movement of the carriage; but when the key is released and the rack bar, I, returns to its position on the pallet, *b*, it allows the paper carriage to move forward one notch. If a greater space is desired than the normal action of the machine provides, the space bar, E, is touched immediately after printing the character, and if a space is required without writing, the space bar, E, alone is operated.

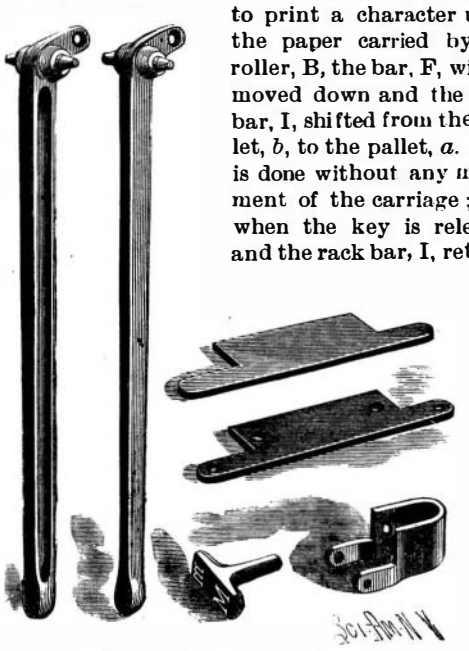


Fig. 7.—TYPE ARMS AND TYPE.

In the No. 3 machine for wide paper, which is the machine selected for our illustrations, the paper carriage moves freely, being supported by three rollers.

two running on a cylindrical rod at the back of the machine and the third one running on a V-shaped track at the front of the machine. The carriage may be readily lifted to inspect the work by means of a carriage handle extending over the frame of the machine at the left, above the key board. When the carriage is returned to write a new line, the raising of the lever, J, brings the pawl, *c*, into engagement with the ratchet on the roller, B, thereby moving the paper carried by the roller forward a distance equal to the space between the letters. The carriage is provided with a simple adjustment, by means of which the space may be varied according to the requirements of the work.

In Fig. 10 is illustrated the operation of centering the type arms. An arm carrying a pin corresponding in form to the shank of the double type is supported above the ring carrying the type arms, the pin being located exactly in the center of the ring. Each lever is adjusted so that the aperture in its free extremity which receives the double type fits upon the pin. The types are adjusted in the ends of the arms in a similar way.

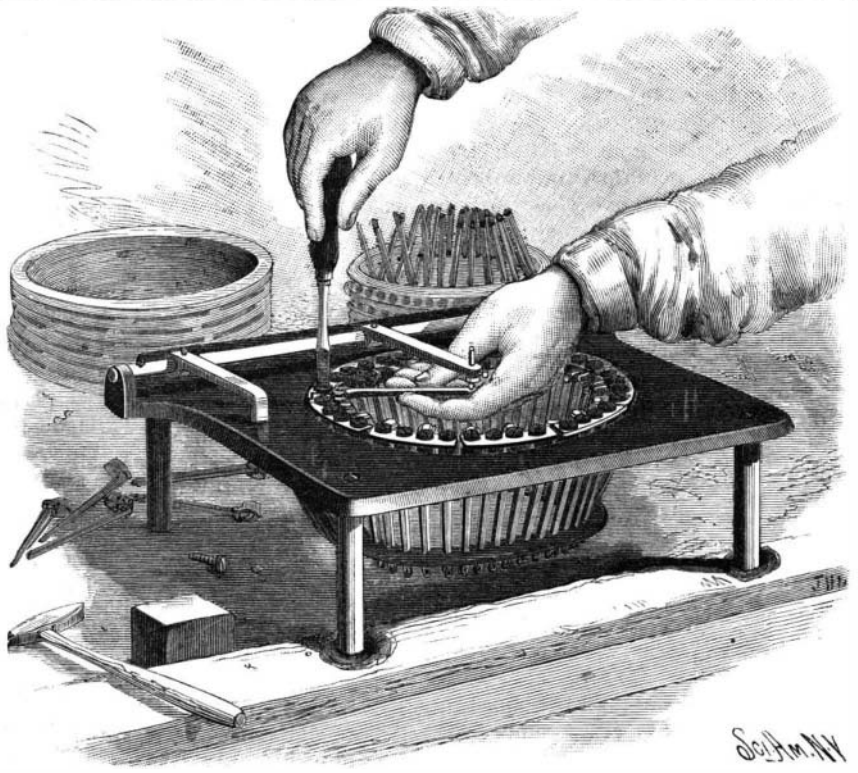


Fig. 10.—CENTERING THE TYPE ARMS.

In Fig. 1 is represented the department in which the dies for making the steel types are designed and made. Great skill and much patient labor is required in the making of these dies, but when once made they are capable of producing a large number of types. Types are here formed for nearly every written language. For the Chinese no type writer has been constructed. As thirty thousand characters are employed in expressing this language, it is obviously impossible to adapt the type writer to such a large number of characters.

In Fig. 3 is shown the department for tempering, annealing, and bluing. The types used in the type writer are made of steel, tempered and hardened like wood- or iron-working tools. The workman takes a quantity of types, heats them to the proper temperature, and plunges them into a vat containing a mixture capable of giving them the required degree of hardness. To facilitate the operation of separating the types from the mixture contained in the vat, the vat is composed of an inner and outer portion, the inner portion being a sieve of sufficient fineness to retain the types while allowing the mixture to flow out as the sieve is raised.

Adjoining the type-hardening fire is the bluing furnace, in which the steel parts not otherwise protected against oxidation are blued. This operation is performed with unformity and great rapidity by placing the screws and small parts in sand, and heating the whole until the required color appears, the sand bath being agitated to cause the heat to be uniformly distributed over the contents of the heating vessel. When the bluing operation is completed, the screws and other small parts together with the sand are emptied into a sieve which allows the sand to pass through while it retains the steel parts.

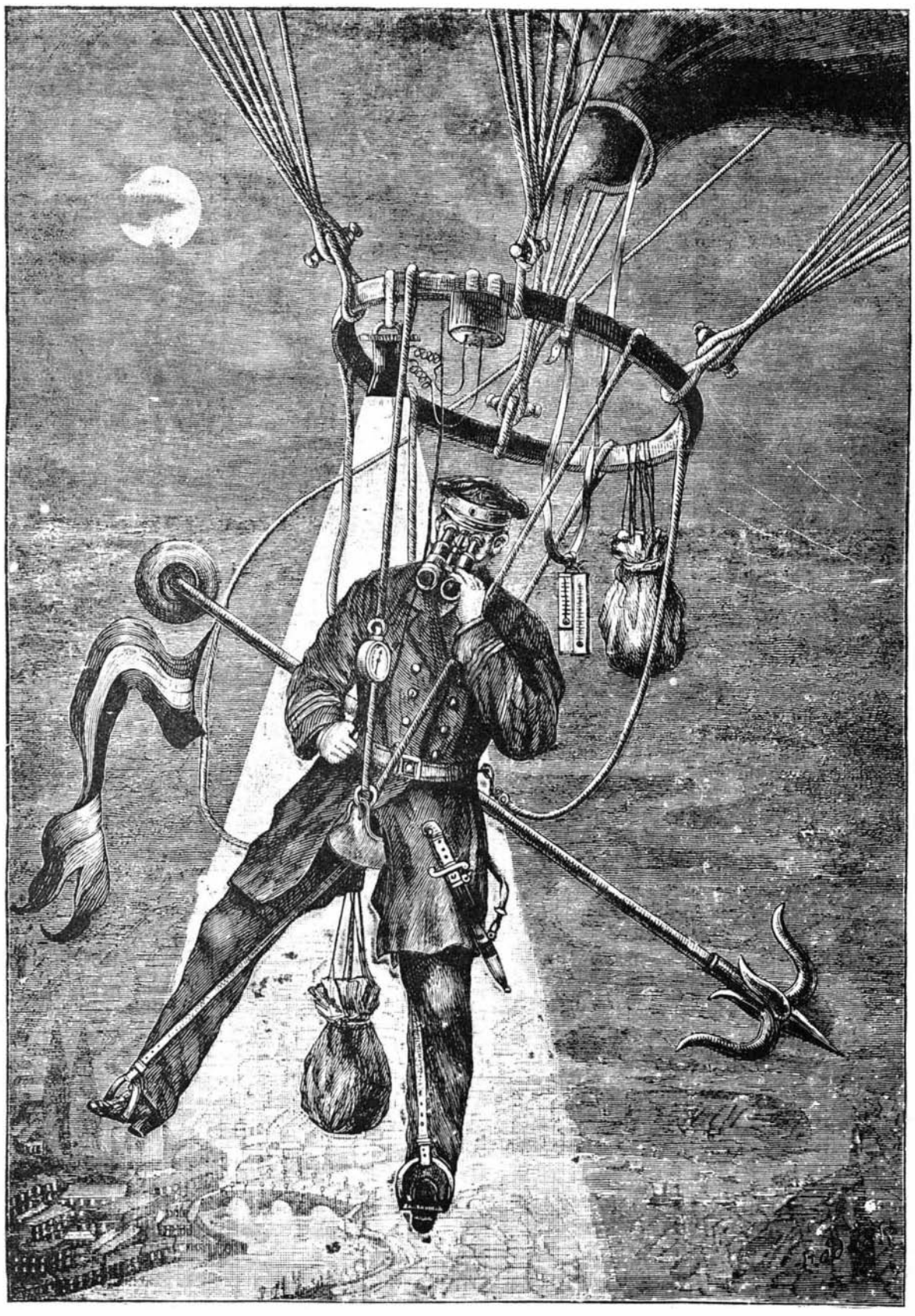
Adjoining the bluing furnace is the annealing furnace, where the types and other steel parts are softened preparatory to forcing them into dies which give them their form, before hardening.

In Fig. 2 is shown a machine in which the covers for protecting the machines are formed. In this ingenious machine the covers are quickly formed from sheet metal.

In addition to the various operations which we have briefly described, there are necessarily many others which go toward the completion of the machine; for example, many of the parts are nickel plated, others are japanned and nicely ornamented; many of the parts are drop-forged. The key levers are of wood ingeniously re-enforced to secure strength with a minimum of weight. All part require special machinery to secure uniformity and perfection in their construction, which it is perhaps unnecessary to describe in this connection.

The type writer takes rank as one of the principal inventions of the age. In almost every office in every large city may be found one or more of these now indispensable machines. The SCIENTIFIC AMERICAN makes use of these machines in its editorial work, in its correspondence, and in its patent business. By its use, business has been greatly facilitated in these departments, and at the same time uniformity and accuracy have been secured.

Besides the benefits derived from the use of the type writer in business by individuals and large houses, this useful machine has furnished profitable and pleasant employment for thousands of men and women who might otherwise have been engaged in harder work at lower wages. It has proved a great educator, elevating the standard of letter and manuscript writing, often effecting the combination, in one person, of author, compositor, printer, and proof reader.



A NIGHT TRIP IN A BALLOON WITHOUT A CAR.

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Public ascensions such as have been made by professional aeronauts from pleasure parks and other accessible places have been so frequent that the exhibitors can no longer expect to reap such profits from admittance fees as heretofore, and, therefore, other means of attracting the public had to be resorted to.

Many ways have been tried, among others a "trapeze artist" ascended with the aeronaut, performing his feats on a trapeze fastened to the car. But scientific men were loth to use such methods.

When aeronauts did away with the car, using instead a simple, saddle-like seat, the load carried by the balloon was greatly decreased, and consequently the balloon could be proportionately decreased in size, making its construction much less expensive and each separate ascension much cheaper, for, of course, a smaller balloon requires less gas. A saddle balloon need not have a capacity greater than 400 cubic meters, while a balloon made for carrying passengers must have a capacity of from 800 to 2,000 kilometers.

One who is fully versed in the technicalities of balloon traveling can make a journey in a so-called saddle balloon with very little more risk than in a balloon with a car, if he is physically strong, ready for all emergencies, and thoroughly practiced in his art. Of course, the saddle is less comfortable than the car. A trip in the saddle seems specially dangerous at night. Our illustration represents a night ascension made by Engineer George Rodeck, who is celebrated for his unusually hazardous voyages. In his longest trip he traveled