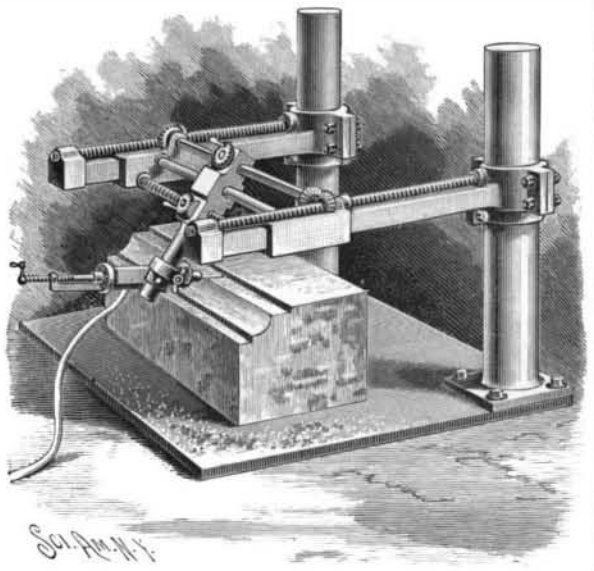
AN IMPROVED STONE DRESSER.

For quickly and accurately dressing stones to any desired configuration, the machine shown in the accompanying illustration has been invented and patented by Richard Aronstein, Mogollon, New Mexico. Adjustable clamps upon suitable columns support two horizontal arms upon which are fitted to move two slides rigidly connected with each other by a rod and a screw shaft, and in the slides turns a shaft which, with the other shaft and rod, forms a support for a longitudinally sliding crosshead on the lower end of which is clamped a stone-striking machine, preferably in the shape of a rock drill. The crosshead, with its striking machine, is moved longitudinally by a beveled gear wheel nut on the screw shaft, in mesh with a beveled gear wheel turning on a stud on the crosshead, the wheel having a handle to be taken hold of by the operator. The upper shaft has a longitudinal keyway engaged by a key on a gear wheel in mesh with a wheel turning on a stud on the crosshead, the latter wheel having a handle, by turning which gear wheels at the ends of the shaft actuate bevel gear wheel nuts on screw shafts secured to the horizontal arms. The nuts turn in bearings in the slides, so that by turning the handle the operator feeds the crosshead to and from the work.



ARONSTEIN'S STONE DRESSER.

CURIOUS TOPS.

I am in the habit of bringing home from my travels a few playthings, which, put away in a drawer, afford pleasure to my little nephews. Being desirous one day of getting a little order into this collection, I found therein a number and variety of tops that surprised me, and I set them aside. The idea occurred to me to examine them in detail and to compare them, and, in doing so, I was struck no less by the ingenuity of the manufacturers in introducing a nelement of novelty into a plaything so ancient and so simple in its primitive form than by the scientific interest of certain of the combinations realized.

I have adhered to the strict definition of the top, that is, a revolving body held in equilibrium upon its vertical axis through the rotary motion that is given it, and have thus had to exclude several very curious playthings, and especially the "air turbine" and the "magic box," as well as various others in which the object set in revolution is not a top, properly so called, but a flywheel whose axis is held by supports.

I have divided my tops into two great classes:

I. Those which revolve, as I may say, simply in order to revolve, or, in other words, those in which one has had in view merely the rotary motion and the momentary equilibrium resulting there from. I have divided them into different catagories according to the way in which the rotary motion is given them.

II. Those in which the rotary motion is applied in order to produce another effect — optical, acoustic, mechanical or otherwise.

I. SIMPLE TOPS.

1. Tops Set in Motion by Hand.—This category comprises the teetotums. I have, in the first place, the ordinary teetotum, set in revolution through the upper part of the axis. That of Fig. 1 has the pretension, I think, to represent a dancing dervish with arms swinging. The "top" teetotum (Fig. 2) differs from the preceding, in that the fingers grasp it by the point. The "domino" or "die" teetotum (Fig. 3) may be used for different plays. The "centrifugal" teetotum (Fig. 4) and the "cyclone" teetotum end the list of these forms of the top.

2. Whip Tops.—I know of but two characteristic types of these—the common one (Fig. 6), whose conical form is one of the oldest known, and the "mushroom" (Fig. 7).

3. Peg Tops.—These are the tops of collections: the "short point" top (Fig. 8), the "long point" top (Fig. 9) and the "flat" top (Fig. 10). Fig. 11 shows a variant of Fig. 8. The cord, instead of being free, remains fixed to the top while, at the same time, allowing it to spin.

These varieties do not differ in form only, but are thrown differently. The short point top is held in the hand, the point downward and the forefinger resting upon the stem, and is thrown by a downward motion of the arm (Fig. 8A); the long point top is held inverted, the point in the air, and, in throwing it, the arm describes a semicircle, from back to front, like the hammer of the blacksmith (Fig. B). The flat top is held with the arm lowered, and is thrown with a horizontal motion, analogous to that of the ricochet, in drawing the cord toward the body (Fig. C).

4. Humming Tops.—In this category the rotary motion is given by the cord drawn rapidly with one hand, while the top is held in place. The "Dutch" top is held in a handle provided with an aperture with which either engages the upper part of the prolonged axis (Fig. 13) or its point (Fig. 14), and from which it is disengaged after it has been set in action by the cord. These tops are generally of wood and are hollow. They are often called "humming" tops. A top of an analogous system (Fig. 15), but of metal and provided with a movable cover, is sold as a sugar plum box. The axis is held by a piece in the form of an elongated C provided with two apertures.

In other systems the bearing point is taken upon the top itself, or else the top around which the cord is wound and its axis are interdependent. The prolongation of the axis enters a sort of sheath or handle in which it revolves freely, and which is held in the hand while the cord is unwound. Sometimes, again, the top is loose upon the axis, the extremity of the latter being held for throwing, and, when the top is freed, the axis being carried along in the revolution. The "Eiffel Tower" top (Fig. 16) belongs to the first type. The penny top of the shops (Fig. 17) and many other analogous ones have the axis independent. To this second type belongs also the "acrobat" top (Fig. 18), save that the axis, arrested in its revolution by a notch, takes on a rectilinear motion upon the cord or sword blade that carries it.

In the "Protean" top (Fig. 19) the glass cone that forms the top is held at the moment at which the cord is drawn by a movable axis independent of it.

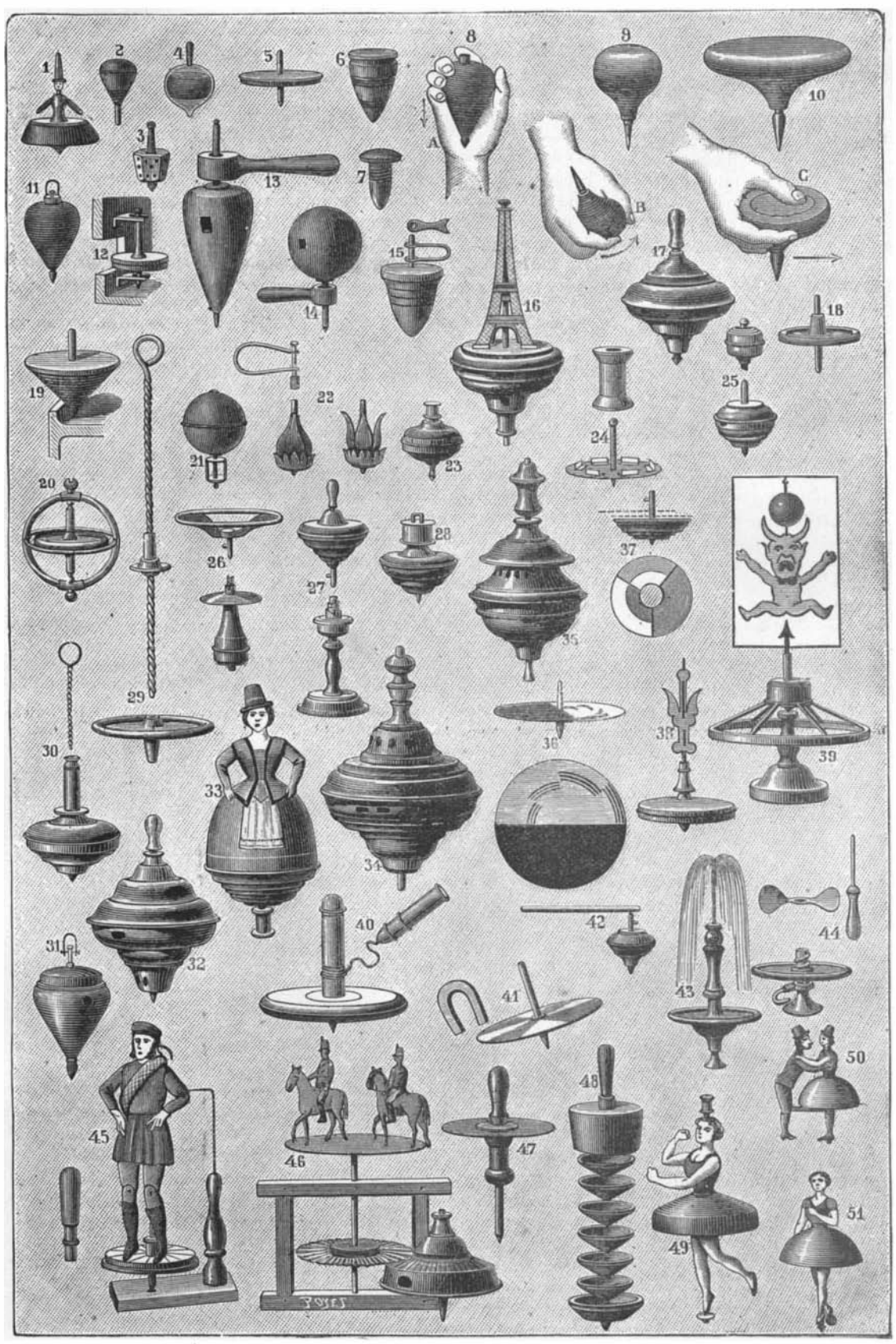
Finally, in the "gyroscope" top (Fig. 20), the rotary motion is given to the interior flywheel in holding the external ring in hand.

5. Tops of Various Systems.—The top having a to and fro motion (Fig. 21) is very ingenious. With one hand is held the small frame beneath, in which the axis turns freely, and, with the other, the cord whose extremity is fixed to the axis, and alternating rotary motions are then given the top. After the top has been set spinning, it is left to itself, when the cord winds up in the little cage, and the top revolves freely.

The "Flora" top (Fig. 22) is likewise set in motion in a peculiar way. It is mounted upon a screw thread, and takes on the motion of the upper axis, which revolves in a curved piece held in the hand. After the cord is unwound the axis is arrested, and the top unscrews and continues to spin. The petals of the fanciful flower that it represents open under the action of centrifugal force, the flower expands and then gradually closes under the action of small springs when the motion begins to slacken.

I have two air tops, one of which, called the "Æolian," is shown in Fig. 23 and the other in Fig. 24.

The spring top (Fig. 25) merits special mention on account of the simplicity of its operation. It is too well known to need a description. In a variant of it (Fig. 26) the spring is applied beneath, at the



CURIOUS TOPS.

lower part of the axis that serves as a bearing point for the top. This latter is nothing more than a ring provided with four wings. When the spring is freed, the top rises slightly in the air, and then falls back to the ground and continues its revolutions. In another variant (Fig. 27), the spring is also beneath, but forms part of a support upon which the top is capable of continuing to revolve. I have also a spring top (Fig. 28) that is very well balanced and spins for a long time. The helix has likewise been applied to the setting of tops in motion. The "Archimedes" top (Fig. 29) is a simple disk provided with a point. A traveler forces it to descend along the helix, from which it escapes in revolving. In another top, called the "Alternative," the motion is inverse, and it is the helix that is displaced vertically (Fig. 30). The top, held in the hand by a sheath loose upon the axis, thus takes on its motion. The rack has been employed in various playthings, for setting in revolution an internal flywheel that actuates them. I know of no application thereof to tops, properly so called.

II. COMPOUND TOPS.

Many of these have been described in these pages, and I shall confine myself to mentioning them. I shall add a few words of explanation to those that are, perhaps, unknown to our readers.

1. Acoustic Tops.—Among the tops that I have arranged in the first class, all those that are hollow produce more or less acoustic effects. They whistle, sing or hum under the action of the air in the apertures with which they are provided.

Other tops have been more especially devised with a view to the production of harmonic sounds. They often have a simple play of reeds giving a single tone. In the wooden peg top (Fig. 31), a variant of No. 2, the play of reeds is at the upper part, and the spinning of the top produces a draught of air through properly arranged apertures. The same is the case in top No. 32, the cheap model of the shops. The play of reeds is here in the interior.

In model No. 33 the axis is independent of the body of the top. It carries a flywheel which is provided with wings, and that revolves in the bell shaped portion. The air is thus projected upon a diaphragm with which the shell is interdependent and which carries the play of reeds. The sound is greatly reinforced through this arrangement. In the specimen that I have preserved, the external form is that of a pleasing Tyrolean woman.

The "harmonic" or "choral" top (Fig. 34) produces changing tones. The principle of model 35 is different. The axis terminates in a sort of claw that renders it immovable, and a revolution of the top is established upon the axis that remains fixed. The latter carries a tongue that strikes a play of reeds carried by the top, and the result is an air analogous to that of the music rattles sold under the name of "rivoltellas."

2. Optical Tops.—I mention in the first place the "spectral" top (Fig. 36) serving as an advertisement to Pears soap. It is a simple cardboard disk carrying lines figured in black upon a white ground. When set in motion in a good light, the concentric circles assume the colors of the spectrum, and the order of which is reversed according to the direction of revolution.

I shall not enter into a scientific discussion of this experiment. It would require me to take up the entire theory of the vibrations of the retina under the influence of colors.

The "chameleon" top (Fig. 37) was one of the first to popularize the effects of the Helmholtz colored disks. It is a spring top. Various systems of tops, almost identical and under various denominations, independently of the colored disks, have produced new effects always due to the persistence of impressions upon the retina, through open spaces in cardboard fixed upon needles, etc. The top shown in Fig. 38 is what is called the "dazzling" top. What is called the "enchanting" top (Fig. 39) lends itself to various optical experiments. The point revolves upon a support, and, thanks to this arrangement, the rotary motion and equilibrium persist for a long time.

3. Tops Producing Magnetic Effects.—The "induction" top (Fig. 40) has already been described in these pages, as has also the "magneto-electric" one (Fig. 41). The "Sultan" top (Fig. 42) is a small one with a very light spring. After it has been set spinning there is placed near the axis a magnetized bar to the rounded end of which it adheres and continues its revolution while suspended in the air.

4. Tops Producing Dynamic Effects.—The "hydraulic" or "water jet" top is shown in Fig. 43, and the "screw spinning" top in Fig. 44. The "puppet" top (Fig. 45) consists of a disk set in revolution upon a pivot by means of a movable handle and a cord. Above is suspended a jointed puppet made of cardboard. The projecting radii of the disk strike the feet of the figure and cause it to dance a sort of jig. Fig. 46 represents the "carrousel" top. A small table carries the carrousel, upon the axis of which there is a disk provided with bristles. The top being in its equilibrium of revolution, the carrousel is placed near it, when the circular brush rubs against the striated conical portion of the top, and the carrousel enters into a rapid motion to the musical sound of the top, which is provided with a play of reeds.

5. Various Tops.—The "gyrograph" top (Fig. 47) consists of a metallic disk of some little weight elevated upon quite a long point formed of a sharpened lead pencil. The top is spun upon a sheet of paper, and, as it is difficult for it to assume a vertical equilibrium, the pencil point draws spirals upon the paper that may be varied by interfering with the top's motion.

The "stork," also called the "parachute," top (Fig. 48) is formed of a series of cones that set into one another. When the upper one is removed, after having once been set spinning, the little cones of various colors separate and revolve around it.

Next came various dancing tops, such as the "waltzer" (Fig. 50) and the "dancer" (Fig. 49). The "waltzer," shown in Fig. 51, is very graceful and of a pleasing effect. The motion is given with a single revolution of the cord upon the part forming a hollow pulley at the foot, and is transmitted to an internal flywheel. The body of the dancer is carried along through the impulsion, and every time that the roller under the second foot touches the ground there occurs a displacement of the axis and a waltz movement.—J. J., in La Nature.

Some Shortcomings of the New Army Rifle.

Prominence has been given to reported defects in the new small arm, the modified Krag-Jörgensen gun adopted by the army ordnance office. Gen. Flagler, the army Chief of Ordnance, says the most serious defect developed by the trial of the gun in service has been the occasional rupture of the cartridge case near the head, causing an escape of gas, and interfering with the convenience and self-possession of the firer. This has been met principally by a change in the construction of the cartridge by thickening the base of the cartridge to remove the line of weakness. A good many officers complain of the inaccuracy of the sights. The principle of the present sights will not be changed, but an improvement will be effected by experimental firings at the armory to correct graduations of the sight and the fixed alignments for drift at the 500 and 1,000 yard ranges.

Many of the infantry officers have complained that the absence of a wind gage on the gun prevents as close shooting as might be obtained with it on the target range. Gen. Flagler says: "The object of all target practice is to enable the soldier to shoot better in battle. While it is obvious that the wind gage might in some cases enable the marksman on the target range to hit the bull's eye oftener, it is equally obvious that this would not train the soldier to shoot better in a battle because he cannot and will not use the wind gage in battle, except possibly in rare cases where special marksmen would shoot at an individual enemy at long range. It is much better that the soldier should be trained to use the rifle on the target range in the same condition that he will be compelled to use it in battle. Even in the exceptional case mentioned, it is probable that the soldier would obtain as good results by allowing for wind in his aim as he could by unknown and estimated distance, and it is therefore better that the soldier should be trained to make this allowance on the target range. In nearly all firing in battle such allowance is not required, because at long ranges the soldier shoots at a long, horizontal line, not at an individual enemy, and at close range, where no allowance is necessary, the sight makes allowance for drift."

Among the improvements made are the raising of the safety lock pin, the replacing of the straight cut-off spring by a coiled spring and spindle, and the discontinuance of the bluing of the parts of the bayonet, as the heat of the niter bath was found to injure the temper of the blade. Among the changes to be made are: The muzzle is to be rounded, inside and out, as on the Springfield rifle; in the cocking piece a cut will be made on the upper side, so that the safety lock may be operated to prevent the belt from turning when the arm is not loaded, desirable especially for cavalry; the stock will be lightened by two holes bored in the butt and by a cut in the barrel bed beneath the position of the sight; the hand guard will be extended further to the rear over the front portion of the receiver, to afford better protection to the hand from the heated parts. The department has encountered some difficulty in securing suitable steel for gun barrels. The manufacturers had some trouble in meeting the requirements, which had been increased in severity over the old condition for similar material. The army rifle will not be abandoned in favor of the Springfield gun, as has been reported. If any change is made, it will be made in the adoption of a still smaller caliber, although most ordnance officers maintain that the limit has been reached in the present, the 0·30 caliber rifle.

AN inch of rain falling upon an area of one square mile is equivalent to nearly 17,500,000 gallons, weighing 145,250,000 pounds, or 64,844 tons.

Cycle Notes.

In the recent maneuvers in the French army, in which bicycles were used, both pneumatic and solid tire wheels were ridden. Out of twenty-five wheels, half were equipped with pneumatic tires and only one puncture was reported, while quite a number of the solid tired wheels had spokes broken on account of the inflexibility of the tire.

A canvass has been made by wheelmen to find out what railroads in the East transport wheels free. Among these roads are the Baltimore & Ohio, New York, Lake Erie & Western, the New York, Ontario & Western, the Delaware, Lackawanna & Western, Long Island, West Shore, Central Railroad of New Jersey and the Philadelphia & Reading.

The coming cycle show, in Madison Square Garden, New York City, which opens on January 18 and closes on the 25th, will be, beyond all doubt, the most complete exhibition of cycles and things pertaining thereto that has ever been held. In a larger sense than ever before, the show will be of great importance, as dealers and manufacturers from all parts of the country will visit it.

Bicycles have been admitted into the grounds of the exclusive Botanical Garden in Regent's Park. They must not, however, be brought near the museums and conservatories.

Dr. Conan Doyle on Cycling.—"When the spirits are low, when the day appears dark, when work becomes monotonous, when hope seems hardly worth having, just mount a bicycle and go out for a good spin down the road, without thought of anything but the ride you are taking. I have myself ridden the bicycle most during my practice as a physician and during my work in letters. In the morning or the afternoon, before or after work, as the mood o'ertakes me, I mount the wheel and am off for a spin of a few miles up or down the road from my country place. I can only speak words of praise for the bicycle, for I believe that its use is commonly beneficial and not at all detrimental to health, except in the matter of beginners who overdo it."

A paper published in Germany, called the Fahrrad Export, is a cycle trade paper with every article and advertisement printed in German, English, French, Spanish and Russian.

An electrical vulcanizer is now being introduced by a large manufacturer of bicycle tires. The vulcanizers are built of 110 volts standard incandescent current. If any other voltage is used, a transformer is necessary. It may be attached to the ordinary lamp socket by providing wires from the vulcanizer to the socket. Where proper care is exercised, any repair man of average intelligence ought to be able to make satisfactory repairs with it.

The Empress of Austria, who has a reputation as a horsewoman, now rides a bicycle.

A race was recently run in France in which no machine was entered which was not twenty years of age or more.

One of the latest bicycle sundries is a kind of hip-pocket or leather pistol case fitted close to the handle bar. So many attacks have been made upon wheelmen, even upon the well-traveled roads of New Jersey and Long Island, that many of them are now carrying revolvers.

Cyclists should see that their shoe laces are fastened before mounting a machine; for, as in skating, a loose lace may cause a bad fall.

Tricycles are becoming very popular in the French capital for winter riding, and many French cycling firms are making a specialty of the tricycle for winter use.

The Coney Island cycle path has now been lighted throughout with electric light, so that many riders are now enabled to make the trip who could not otherwise have done so. The path continues to be well patronized by riders, and the Shelter House, at the Coney Island end of the path, has been inclosed in glass, and it is heated by stoves.

During the recent strike of the trolley car men in Philadelphia few cared to ride in the heavily guarded cars which were run. All the bicycles in the city were put into requisition, and the wheelmen had a decided advantage over their brethren.

The street railway company of a Western city has resolved to suspend the running of the horse cars, owing to the fact that the bicycle has diminished their profits.

Wood tubing is now being made in small quantities; only one wheel has now been built with it. Nearly two pounds of weight will be saved in every frame. It is impossible to break or buckle the wood without enormous strain. It is also impervious to water, and is not affected by heat or cold. A steel joint has been devised which is as reliable as the brazed joint of a steel frame. Of course, the supply of the raw material is inexhaustible. The tubing is made up of a number of sections of wood fastened together.

A sextuplet has been seen on the streets of Paris. It was built for track use. It weighs 150 pounds and is six and one-half yards in length.