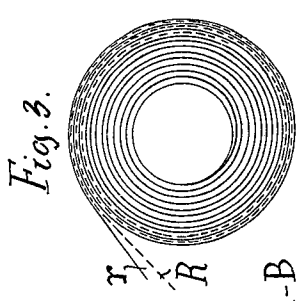
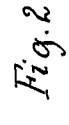
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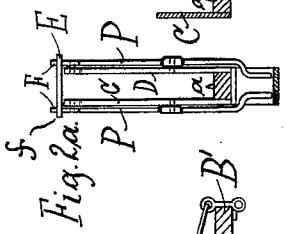
C. BRUNOT.

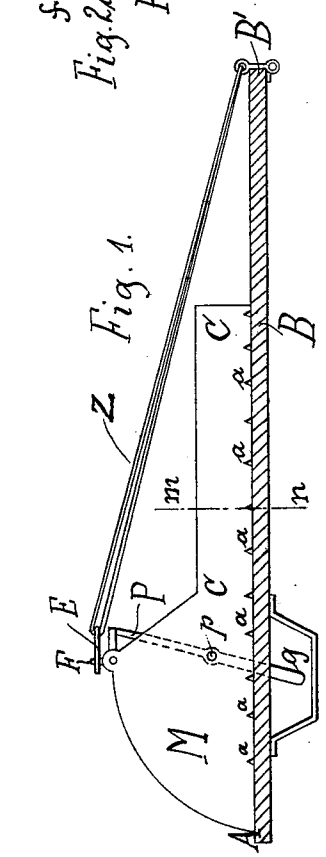
PYROTECHNIC SIGNAL.

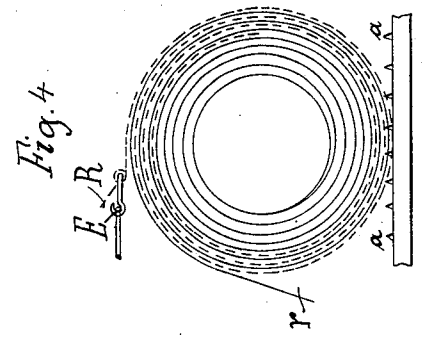
No. 590,822. Patented Sept. 28, 1897.

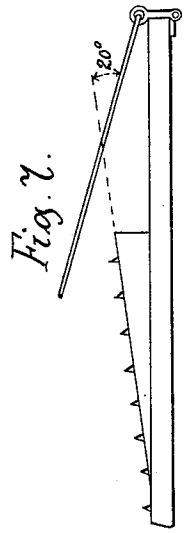


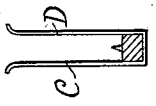


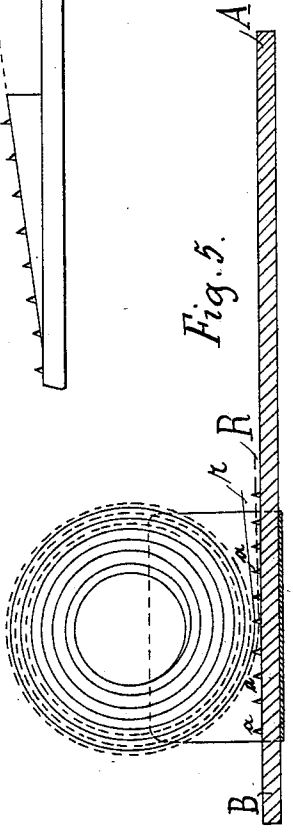












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PYROTECHNIC SIGNAL.

SPECIFICATION forming part of Letters Patent No. 590,822, dated September 28, 1897.

Application filed March 10, 1896. Serial No. 582,652. (No model.)

To all whom it may concern:

Be it known that I, CHARLES BRUNOT, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements in a Mechanical Projection of Serpentines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The object of this invention is to produce the mechanical projection of "serpentines." The serpentines are rolls of paper made of a long and narrow strip, resembling the rolls used in the Morse telegraph apparatus. These serpentines being of different colors are thrown during public festivals and especially during the carnival times. Until now they were thrown with the hand by keeping one of both extremities of the band of paper between the fingers. It was generally the inner extremity that was held fast.

My apparatus, on the contrary, are exclusively established to unroll the serpentines in beginning by the outward extremity. This unrolling is produced by a special and mathematically-determined movement communicated by the instrumentalities themselves of the apparatus.

The simultaneous throwing and unrolling are effected by two special instrumentalities, one rigidly connected to the apparatus, the other movable thereon. These instrumentalities exist in all the models I have built. These two instrumentalities constitute the two essential parts of my invention.

First. The movable instrumentality is a strong and flexible woven ribbon rolled around the serpentine. This ribbon acts like a strap on a belt-pulley or, more exactly, like the whip of a child's top.

Second. The immovable instrumentality is composed of a row of stiff points (teeth, notches, or other means of rough friction) which act upon the circumference of the serpentine exactly like the teeth of a rack upon a gear wheel or pinion.

The combined action of these two main instrumentalities may be determined in a number of different manners—for instance, by a spring or by the force of the arm. For this reason my apparatus varies much in the outer shape, but they all are based absolutely on the use of both main instrumentalities, as above described.

All my instruments embody the same mechanical principles and have all the same object in view—the throwing of serpentines with external unrolling. Consequently I claim all these different forms in my patent.

I will now describe the two models being the most different in shape and being represented in the accompanying drawings, in which—

Figure 1 is a longitudinal section through my apparatus. Fig. 2 is a cross-section on line M M, Fig. 1. Fig. 2^a is an end view of the apparatus. Fig. 3 shows in side elevation a serpentine constituting a roll made up of a strip of paper of any color or of a band of any pyrotechnic body and having interposed in the outer circumvolutions a ribbon of any woven fabric. Fig. 4 shows a serpentine placed upon the points in the apparatus and illustrating how the woven ribbon is secured to the elastic element of the apparatus. Fig. 5 is a longitudinal section through a more simplified form of my apparatus. Fig. 6 shows the same in cross-section. Fig. 7 illustrates a modification according to which the plane of points is arranged at an angle of inclination, so as to increase the grip of the points upon the circumference of the rolling serpentines.

First type, operated by an india-rubber spring: On one-half A B of its length a wooden bar A B B′ is lined with strong very sharp points *a a a a*, projecting upwardly, upon which the serpentine is made to roll. These points *a* constitute the second or fixed main organ, as above described. This part A B of the bar is provided with two thin boards or cheeks C C and D D, forming with it a deep groove, on the bottom of which are the points *a*. The cheek D D is supposed to be taken away in Fig. 1, Fig. 2 showing the groove in cross-section on line *m n*, Fig. 1. Near the end A the cheeks are widened, forming the broader parts M, on which at *f* bell-crank levers F, Fig. 1, are pivoted, the horizontal arms of which are adapted to be supported by levers P, pivoted at *p*, on the outside of the side cheeks and having a trigger end *z*.

To the other end B′ of the bar A B B B′ a

band of india-rubber Z is secured, which terminates at the other free end in an open buckle or metal strap E, adapted to be thrown over the upright short arms of levers F. In operating the invention I take a serpentine and a ribbon R, woven of any suitable material, of the same width as this serpentine and somewhat longer than half the length of the bar A B B′. I roll this ribbon R around the serpentine so that it makes two or three turns in the same direction of winding as the paper ribbon *r*, which constitutes the serpentine, Fig. 3. This ribbon R constitutes the first of the main instrumentalities, being above described as the movable organ. I place the serpentine thus wrapped into the ribbon in the groove formed by the bar in the cheeks C C and D D upon the first points *a a* nearest the part M, Fig. 1. In executing this operation care should be taken that the serpentine be placed so as to have the ribbon R tangent to the top of the serpentine and not to the lower edge when the ribbon is drawn out toward B′. I strongly press the serpentine down upon the first points *a a*, Fig. 4, so that they enter into its external circumference. I then fasten the free end of the ribbon R to the buckle E, after having drawn out the india-rubber and after having slipped the buckle E over the short arms of lever F, the long arms of which should then be supported by the ends P of the side levers. When now the trigger *g* is pulled, the india-rubber in contracting itself moves the buckles E quickly forward, thereby taking along the ribbon R and with it the serpentine. The latter in this motion rolls successively over all the points *a a a*, which enter one after the other and thereby prevent the serpentine from turning on the same place upon itself or around a fixed center, which would happen under a tangential and quick effort of the ribbon when no points were provided. These points act like the teeth of a stationary rack-bar on which a revolving pinion will roll forward for a distance equal to the length of circumference, having turned and having been in contact with the rack. With regard to the ribbon it has been stated already that it acts like the whip on a child's top.

I may state here as a very important point, which I consider as essential, that these two instrumentalities, the ribbon and the points, are sufficient without any other accessories to give an impulse for exact rolling. I mean thereby a rolling motion such that each point of the serpentine's circumference circumscribes a cycloid, and such that the tangential velocity of rotation is exactly equal to the velocity of forward motion without any slipping forward or backward.

Second type, moved by the muscular strength of the arm: A light bar A B, Fig. 5, is provided at its extremity B with sharp points *a a a*. At this extremity a groove having the shape of a U, Fig. 6, is formed by thin sheet-metal plates C D, secured to the sides of the bar and having the upper edges sufficiently near each other, so as to slightly clamp a serpentine placed in this groove. In Fig. 5, being a longitudinal section through the bar, one of the metal plates is supposed to be cut away. After having rolled a woven ribbon around the serpentine, as it has been formerly said for the type No. 1, (see Fig. 3,) this serpentine thus enveloped in the ribbon is placed on the bottom of the U-shaped groove and is firmly pressed upon the points *a a a*, while the edges of the plates maintain it in position in the groove by their clamping action. While executing this operation the serpentine should be placed so that it unrolls toward the end B, and, on the contrary, that it rolls up in moving toward the end A—that is to say, that the extremity R of the ribbon should point toward A and should be tangential to the lower edge at the points *a a*. (See Fig. 5.) Then I take the bar in the right hand at A and I quickly move it through the air like a whip; but care must be taken that the serpentine is directed toward the point intended to be reached, and the points *a a a* must be behind the serpentine—*i. e.*, following the same in its motion—so that the resistance resulting from the inertia of the serpentine is fully taken up by the points and the bar. The extremity B describes thus a part of an arc of which the shoulder of the person who operates is the center. Inertia tends at every movement to throw the serpentine in the direction of the prolongation of the radius passing through the center of gravity of the serpentine. As the circumference of this serpentine is held back by the points *a a a* and by the ribbon R a part of the motion resulting from inertia is changed into a rotary movement. Here again a movement of perfect rolling is attained, so that the different points of the circumference of the serpentine make cycloids. This movement is obtained without any other action than the coöperation of the two instrumentalities—the ribbon R and the points *a a*. It is not necessary to hold the paper strip composing the serpentine to produce its unrolling. The apparatus will be sufficient to unroll the serpentine without any auxiliary action. This is one of the chracteristic features of my apparatus.

It should be well understood that I claim in my patent not only the two special forms above described, but all those realizing an external unrolling by means of the two organs constituting the principle of my invention.

Finally, I shall add here the following accessory observations:

First. In the apparatus, Fig. 1, the gripping action of the points *a a* upon the roll can be increased by arranging same on an incline under an angle of about twenty degrees, as indicated in Fig. 7.

Second. To prevent loss of time, instead of having only one ribbon R to be used for every serpentine the latter may be prepared beforehand, each being provided with its own ribbon R. Thus the projectiles would

be ready to be thrown and the long and tedious manipulation of rolling the ribbon into the serpentine previous to its projection would be dispensed with. This disposition, similar to that of ordinary cartridges for guns, saves time, but is a little more expensive.

Third. Instead of throwing serpentines simply made of colored paper only to be thrown during the day I can also project with my apparatus luminous serpentines visible in the night. To this end I prepare serpentines of nitrated paper, or of ordinary paper impregnated with a phosphoric or a combustible substance.

The difference between these new serpentines employed as fireworks and the old fuses is that they are thrown before ignition. The old fuses, on the contrary, were ignited always before the throwing, as it was by the combustion itself that the forward motion through the air was obtained.

Having thus described my invention, what I claim is—

1. For a pyrotechnic-display toy or apparatus, the combination with a rack provided with teeth and adapted to be employed as a projecting medium, of a ribbon comprised of suitable combustible paper coiled spirally upon a suitable core not attached to said rack, and of a projecting ribbon coiled with the first ribbon and near the end thereof, and adapted to catch in the teeth of the rack whereby, by the throwing out of the serpentine coil its ribbon is caused to unwind, substantially as described.

2. For a pyrotechnic-display toy or apparatus the combination with a bar adapted to act as a base for, or medium of projection, of a spirally-coiled combustible ribbon adapted to be uncoiled, when, having been placed upon the aforesaid bar, one end of the said ribbon being held fast thereto, the coil is projected and unwound by a rapid jerk of the bar, substantially as described.

3. For a pyrotechnic-display toy or apparatus the combination with a bar adapted to act as a base for, or medium of projection, said bar being provided with teeth, notches or other means of rough friction, of a spirally-coiled combustible ribbon adapted to be uncoiled, when, having been placed upon the aforesaid bar, one end of the said ribbon being held fast thereto, the coil is projected and unwound by a rapid jerk of the bar, substantially as described.

4. For a pyrotechnic-display toy or apparatus, the combination with a rack provided with teeth and adapted to form a base of projection, of suitable mechanism for imparting a projecting impulse and a spirally-wound combustible ribbon adapted to be projected from said base by the projecting mechanism whereby the spiral coil is simultaneously projected and unwound, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES BRUNOT.

Witnesses:
EMILE PIERRARD,
RERÈ BROMILLER.