N. GHERASSIMOFF.

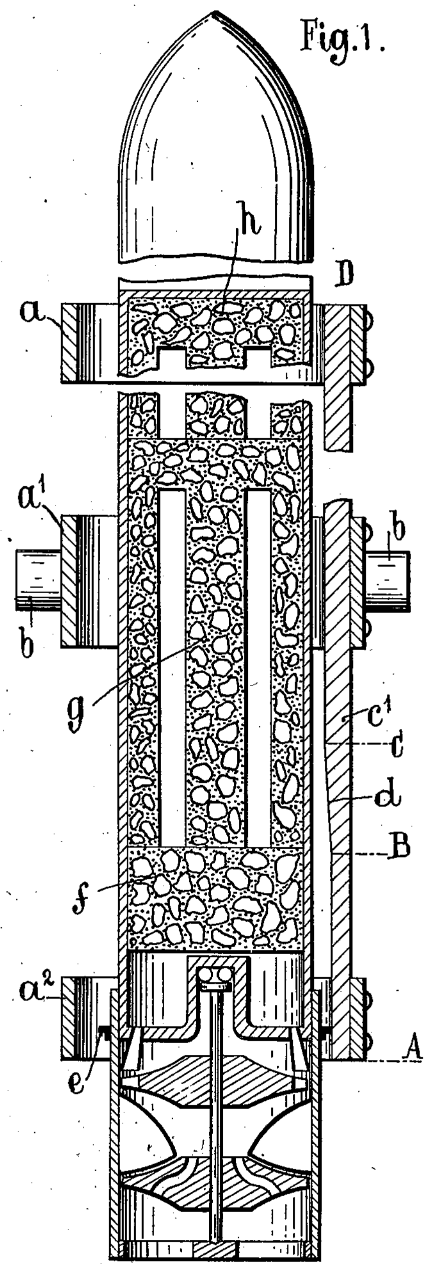
GYROSCOPIC ROCKET AND THE FIRING APPARATUS THEREFOR.

APPLICATION FILED SEPT. 14, 1911.

1,018,312. Patented Feb. 20, 1912.

2 SHEETS—SHEET 1.

Fig.1.



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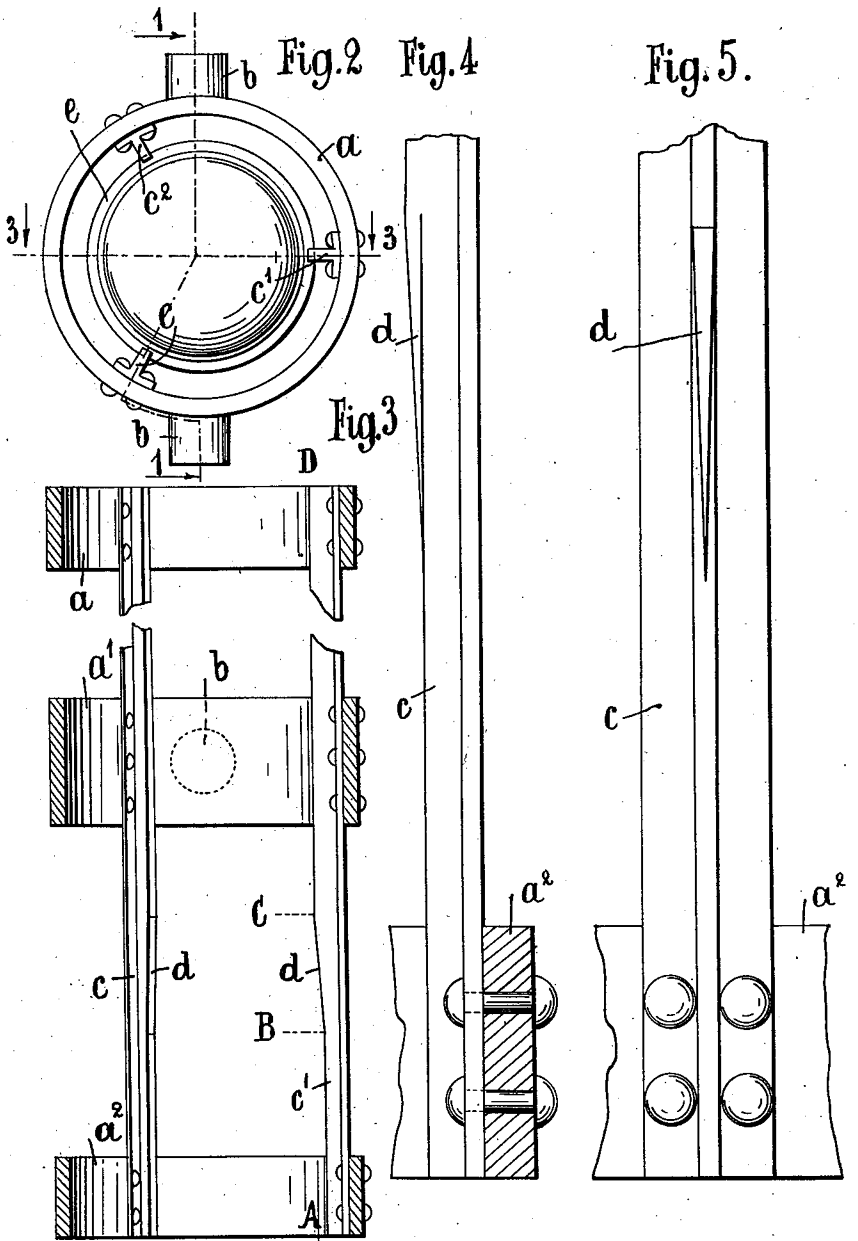

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UNITED STATES PATENT OFFICE.

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GYROSCOPIC ROCKET AND THE FIRING APPARATUS THEREFOR.

1,018,312. Specification of Letters Patent. Patented Feb. 20, 1912.

Application filed September 14, 1911. Serial No. 649,347.

To all whom it may concern:

Be it known that I, NICOLAS GHERASSIMOFF, of 41 Liteiny Prospekt, St. Petersburg, Russia, military engineer, a subject of H. M. the Czar of Russia, have invented a new and useful Improvement in Gyroscopic Rockets and in the Firing Apparatus Therefor, of which the following is a specification.

This invention relates to gyroscopic rockets of the type described in the specification of my prior U. S. Patent No. 976732. In this type of rocket use is made of the gyroscope as a means for insuring the stability of the rocket, the gyroscope receiving its motion from the gases resulting from the combustion of explosive materials.

As described in this specification the rocket works in a satisfactory manner but it is capable of improvement for the purpose of improving the firing thereof. It is important that the rocket shall receive, through the speed of rotation communicated to the masses which it incloses, the desired stability even before it quits the apparatus which serves to fire it. Now it has been found in practice that this speed of rotation is only produced after the expiration it may be of some seconds starting from the moment the gases begin to exert their action on the turbine, that is to say the stability of the rocket is not always insured with sufficient speed and in some cases the direction or trajectory of the rocket may be unfavorably influenced from this cause.

Now the object of the present invention is to remedy this possible disadvantage and to consequently insure very great precision in firing under all circumstances.

For this purpose the invention consists broadly in retarding the discharge or firing of the rocket until the masses actuated by the turbine have attained the speed of rotation necessary to the stability of the rocket. In other words, while working substantially in the manner described in the said prior specification the rocket is kept back in the firing apparatus during the time necessary for the evolution of a certain quantity of gas, which, acting upon the turbine, imparts to it a progressive rotary motion and it is only when the masses set in motion by this turbine have attained the speed of rotation necessary to the stability of the rocket that the rocket is allowed to ascend.

The accompanying drawing illustrates by way of example one construction of firing apparatus according to the present invention.

Figure 1 is a sectional elevation of the apparatus corresponding to the line 1—1 of Fig. 2; a rocket ready to be fired being in position therein. Fig. 2 is a plan of the parts shown in Fig. 1. Fig. 3 is a section corresponding to the line 3—3 of Fig. 2, the rocket being omitted. Figs. 4 and 5 are views to a larger scale, illustrating a modified form of the firing apparatus.

The firing apparatus is composed generally of a certain number of rings a, a^1, a^2, and a certain number of equidistant guide bars c, c^1, c^2, three for example, riveted to the rings a, a^1, a^2. One of the rings, the center one a^1 for example, may be provided with trunnions b, b about which the apparatus is mounted to rock on any kind of carriage (not shown) for the purpose of pointing it at the object to be hit. The generatrices of the internal faces of those bars c, c^1, c^2, are such that from the point A to the point B, see Figs. 1 and 3, they are parallel and are capable of receiving a cylindrical body of a given diameter, while from the point B they incline toward the interior, converging toward the point C and forming an inclined plane d beyond which point they are of the same diameter from the point C to the point D.

The rocket is in all respects similar to that described in my said prior specification save as regards the cylinders of compressed powder which will be referred to hereinafter, and with the exception that it is furnished with a belt e of relatively soft metal fixed in any suitable manner at any point on its cylindrical body. The external diameter of this belt is such that it enters freely, that is to say without any appreciable friction, between that portion of the guide bars c, c^1, c^2 which lies between the points A and B, but is only able to enter in the restricted portion between the points B and C, past the inclined planes d, by exercising a comparatively powerful thrust, either by hand or mechanically, during which the belt e of soft metal becomes changed in shape and yields before the hard metal of the bars c, c^1, c^2 being wedged between these bars in proportion to the force exerted when the rocket is inserted. The rocket, thus anchored, so to speak, in the apparatus is then ready to be discharged after having been pointed at the object to be hit.

As in the said prior specification the rocket contains cylinders *f*, *g*, *h* of compressed powder or other slowly burning explosive material, the number and size of which may vary. In a rocket according to this invention however a difference is made between the powder which is intended to impart the movement to the turbine and that intended to give the propelling movement to the rocket. It should be noted that the force necessary to drive the gyroscope need not be as powerful as that which is necessary to discharge the rocket, seeing that the rocket before it can be discharged has to overcome a certain amount of resistance due to its being wedged in the apparatus. Again, since the power of propulsion of the gases depends on the surface of combustion the first powder cylinder, that is to say the one marked *f* is made solid, while the second and third powder cylinders, namely those marked *g*, *h* may remain hollow as in the previous arrangement.

The combustion of the powder cylinder *f* will produce a quantity of gas sufficient to work the gyroscope but insufficient to dislodge the rocket or impart any movement to it. On the contrary the surface of combustion of the powder cylinders *g*, *h* is great and moreover remains constant during the duration of the combustion. As an alternative, instead of making the combustion of the powder cylinder *f* vary on account of its form, with relation to that of the powder cylinders *g*, *h*, it may be made of a powder of a composition which is suitable to the end to be attained.

The action is as follows:—The rocket already mounted is first introduced into the apparatus, see Fig. 1, and is then pushed forward until the belt *e* abuts against the inclined planes *d*. There is then exerted upon it either by hand or mechanically, an upward pressure until the belt *e*, changes its shape at the place where at three points it comes into contact with the planes *d*. The bars then more or less extend into the belt *e* and thereby anchor the rocket to the apparatus. The first powder cylinder *f* is then ignited and the gases thereof work the turbine and then set the masses of the gyroscope in motion, the turbine continuing to work to the end of the combustion of the said powder cylinder. During this time the rocket remains anchored to the apparatus. When however the second powder cylinder *g* burns, the force of propulsion of the gases becomes such that the rocket frees itself from the planes *d* and finally quits the apparatus its stability being already insured. The same apparatus may serve indefinitely for the same sized rockets.

The inclined plane *d* represented in Figs. 4 and 5 differs from that shown in Figs. 1 to 3 in that instead of having a uniform width, it is pointed or rather tapered, so as to facilitate its penetration into the belt *e* of soft metal with which the rocket is surrounded.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed I declare that what I claim is:—

1. A firing apparatus for gyroscopic rockets comprising a plurality of supports having gripping surfaces provided with inclined planes adapted to frictionally hold the rocket until a desired pressure is exerted thereon, substantially as described.

2. The combination of a rocket provided with an external belt and a firing apparatus having inclined planes adapted to be frictionally engaged by said belt, substantially as described.

3. In a firing apparatus for gyroscopic rockets, the combination of a plurality of supports provided with inclined planes adapted to receive a rocket between them; and means for holding said supports in operative relation to each other and to the rocket, substantially as described.

4. In a firing apparatus for gyroscopic rockets, the combination of a plurality of supports provided with tapered inclined planes adapted to receive a rocket between them; and means for holding said supports and inclined planes in operative relation to each other and to the rocket, substantially as described.

5. The combination of a rocket provided with a propellant; a gyroscope carried by said rocket adapted to be operated by said propellant; an exterior band carried by said rocket; a plurality of supports between which said rocket is adapted to fit; inclined planes on said supports adapted to contact with said band when said rocket is being fired; and means to hold said supports in operative relation to said rocket, substantially as described.

In witness whereof I have hereunto set my hand in the presence of two subscribing witnesses.

NICOLAS GHERASSIMOFF.

Witnesses:

ALEXANDER DE SMIRNOFF,

L. HOLTZHAUER.