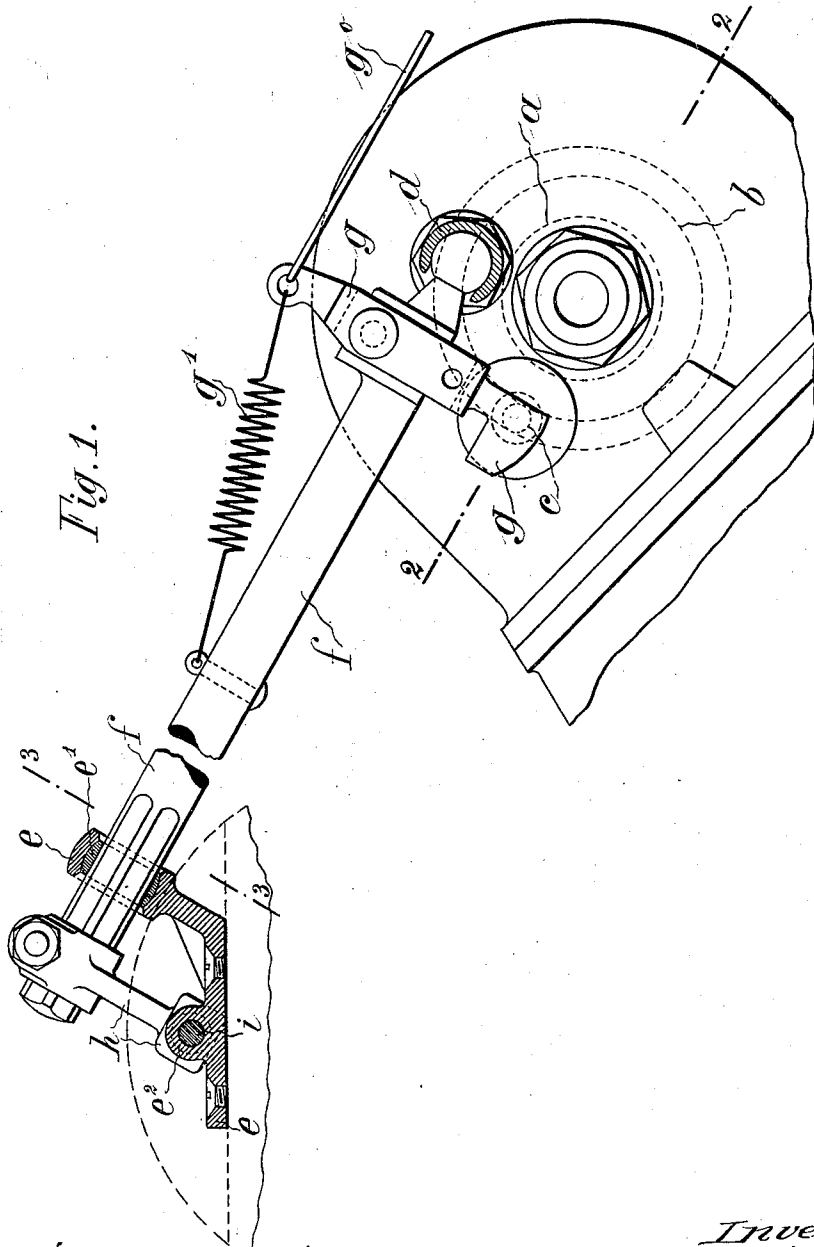


M. BIRKIGT.
MECHANISM FOR SYNCHRONIZING MACHINE GUN FIRE.
APPLICATION FILED MAY 31, 1917.

1,328,811.

Patented Jan. 27, 1920.
2 SHEETS—SHEET 1.



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Fig. 3.

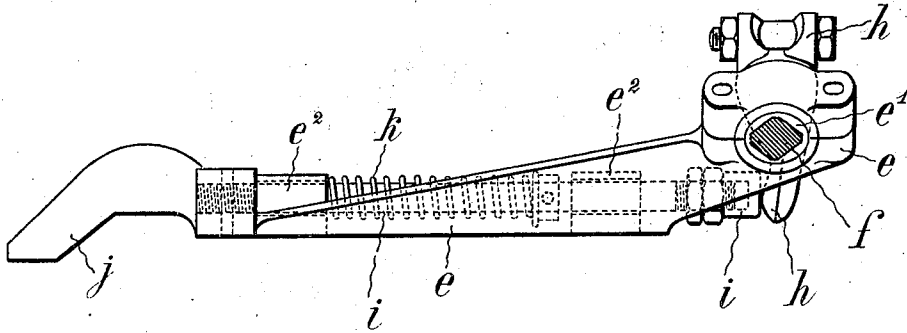
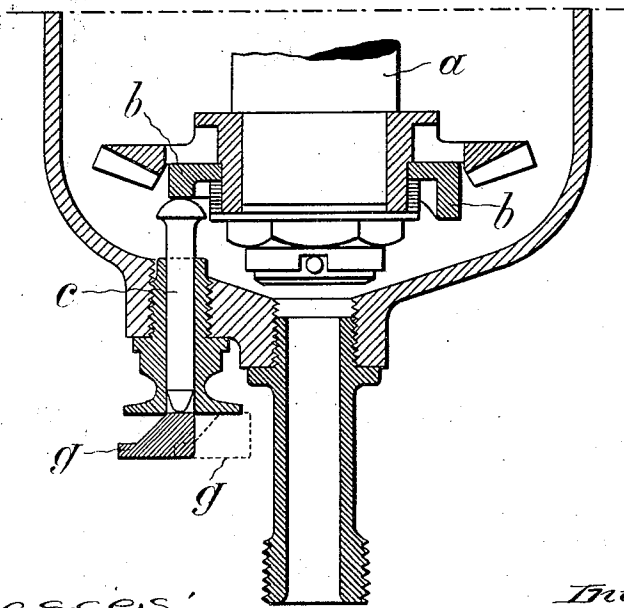


Fig. 2.



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MECHANISM FOR SYNCHRONIZING MACHINE-GUN FIRE.

1,328,811.

Specification of Letters Patent.

Patented Jan. 27, 1920.

Application filed May 31, 1917. Serial No. 172,097.

To all whom it may concern:

Be it known that I, MARC BIRKIGT, engineer, citizen of the Republic of Switzerland, residing at Bois-Colombes, Department of Seine, France, have invented certain new and useful Improvements in Mechanisms for Synchronizing Machine-Gun Fire, of which the following is a specification.

10 The invention relates to mechanisms for synchronizing, by the action of a motor, the firing of a machine gun, mounted on an aeroplane or the like, particularly to those machine guns which are automatically operated by the recoil of the barrel.

15 The invention relates further to those synchronizing devices in which the firing lever of the gun is replaced by a part which is brought into position so that it is controlled by the action of the motor of the aeroplane, said part being connected to a part which acts to operate the firing bolt of the machine gun, so that during the passage of a propeller blade in front of the muzzle of the gun the operation of the gun is suspended. The invention comprises a single rod adapted freely to oscillate about its axis and provided at each of its ends with a lever, one of the said levers acting to operate the firing bolt of the gun and the other constituting the firing lever.

20 The invention further comprises certain other arrangements, more explicitly referred to hereinafter and pointed out in the claims.

In the accompanying drawing.

Figure 1 shows in elevation, partly in section, the rod inserted between a fixed motor and a machine gun.

40 Fig. 2 is a section on the line 2—2 of Fig. 1, and

Fig. 3 shows the same mechanism in section on the line 3—3 of Fig. 1.

45 At the end of the cam shaft *a* of the motor is mounted a cam *b* with four projections, extending preferably in a lateral direction.

50 In a hole in the casing of the motor is mounted a small plunger rod *c* freely adjustable so that it can rest on the cam. The cam is keyed so that when the plunger rod *c* is in one of the recesses separating the projections of the cam, one of the blades of the propeller is in front of the muzzle of the machine gun.

On the casing of the motor is fixed a

55 bracket *d* and on the machine gun a bracket *e*, and in the two brackets is pivoted a rod *f*. Preferably the said rod is mounted by means of a ball and socket joint in the bracket *d*, so that it oscillates freely and has a limited longitudinal movement in view of the fact that the socket portion of the joint is open and so disposed that the ball member of the joint will shift within the socket and permit such longitudinal movement in a small bearing with exteriorly convex brasses *e*¹ mounted in the bracket *e*. This provision is made for the reason that the distance between the bearing *e* and the support *d* may be subject to variation in consequence of the vibrations of the motor or of any deformation of the airplane's fuselage. Owing to this means of support the rod *f* is not influenced by the vibrations of the motor or by any deformations of the fuselage.

To the end of the rod which is the nearest to the motor, is pivoted a lever *g* so that, when it is brought into a certain position, it rests against the outer end of the rod *c*.

The lever *g* is controlled by the action of a spring *g*¹, one end of which is secured to the said lever, and the other to the said rod *f* in order that, under the action of the said spring, the lever *g* is normally kept away from the rod *c* and is not operated by the said rod. The lever *g* is connected by a suitable control, for instance a Bowden wire *g*², which is adapted to be arranged within operative reach of the airman to move the lever *g* into contact with the rod *c*.

65 Preferably, the part of the lever *g* coming in contact with the said plunger rod, is provided with an inclined plane so as to facilitate the operation of the said lever.

To the other end of the rod *f* is secured a small lever *h*, and in bosses *e*² of the bracket *e* secured to the machine gun, a rod *i* is mounted so that the said lever rests with its free end against one of the ends of the said rod.

70 To the other end of the rod *i* is secured the lever *j* used for operating the firing bolt of the machine gun, and the said rod *i* is controlled by a spring *k* having the tendency to bring the rod *i* into such a position that the lever *j* is not in position to insure firing.

75 It is then only necessary in order to operate the machine gun, to bring the lever *g* into contact with the rod *c*. The projections

of the cam pushing back the said rod, and consequently the said lever, oscillate the rod *f* about its axis, and consequently the lever *h* acts on the rod *i* so as to bring the lever *j* into the operative position. The said lever *j* remains in operative position as long as the rod *c* rests on one of the projections of the cam, but moves out of action under the pressure of the spring *k*, whenever the rod *c* is off the projections of the cam, that is to say when one of the propeller blades passes in front of the muzzle of the machine gun.

Obviously the invention is not limited to the construction described but comprises on the contrary any modifications within the scope of the claims.

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

1. Mechanism for synchronizing the firing of machine guns relatively to the blades of a propeller of an aeroplane revolving in front of the machine gun muzzle, embodying an operating motor, and a single rod mounted to freely oscillate about its axis and provided at one end thereof with an operating arm to actuate the firing mechanism of the machine gun and at the other end with a lever disposed for actuation by the motor.

2. Mechanism for synchronizing machine gun fire relatively to a propeller blade mounted to pass in front of the muzzle of the machine gun, embodying an operating motor, a single rod adapted to freely oscillate about its axis and provided with a lever at one end, a cam operated by the motor and having lateral projections, and a plunger rod adapted to be engaged by the lever of said single rod, the plunger rod being also disposed to engage the projections of the cam, an operating arm disposed on the other end of said single rod, said arm being arranged for coöperation with the firing mechanism of the machine gun.

3. Mechanism for automatically synchronizing machine gun fire relatively to a propeller blade passing in front of the muzzle of the gun, embodying a motor, and a single rod adapted to freely oscillate about its axis and having a support at one end adjacent to

the motor with a ball and socket joint and at its opposite end provided with a supporting means having brasses therein with outer convex surfaces, the rod passing and movable through the said brasses, and a lever attached to one end of the rod, said lever being arranged for actuation by a part of the motor and an operating arm arranged on the other end of said rod and adapted to be disposed in operative adjacency to the firing mechanism of the machine gun.

4. Mechanism for automatically synchronizing machine gun fire relatively to a propeller blade which passes in front of the muzzle of the machine gun, embodying a motor, and a rod adapted to freely oscillate about its axis and provided at one end with a lever, in position for actuation by a part of the motor, the lever actuated by the motor having a spring attached thereto and to the rod, and means for manually operating said lever, said rod being provided at its other end with an operating arm adapted to actuate the firing mechanism of the gun.

5. Mechanism for automatically synchronizing the firing of machine guns relatively to a propeller blade disposed to pass in front of the machine gun, embodying a motor, a rod interposed between the motor and the machine gun and mounted to oscillate about its axis, a cam device actuated by the motor, a plunger rod coöperating with the cam device, a lever on the first-mentioned rod disposed to engage the plunger rod, the said lever having a hinge connection relatively to the first-mentioned rod and provided with a spring to hold it normally away from the plunger rod and also with a manually operative device to shift it into engaging position relatively to the plunger rod, and an operating arm on the opposite end of the first-mentioned rod adapted to be arranged in operative adjacency to and coöperate with the firing mechanism of the machine gun.

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

MARC BIRKIGT.

Witnesses:

CHAS. P. PRESSLY,
PAUL BLUM.