

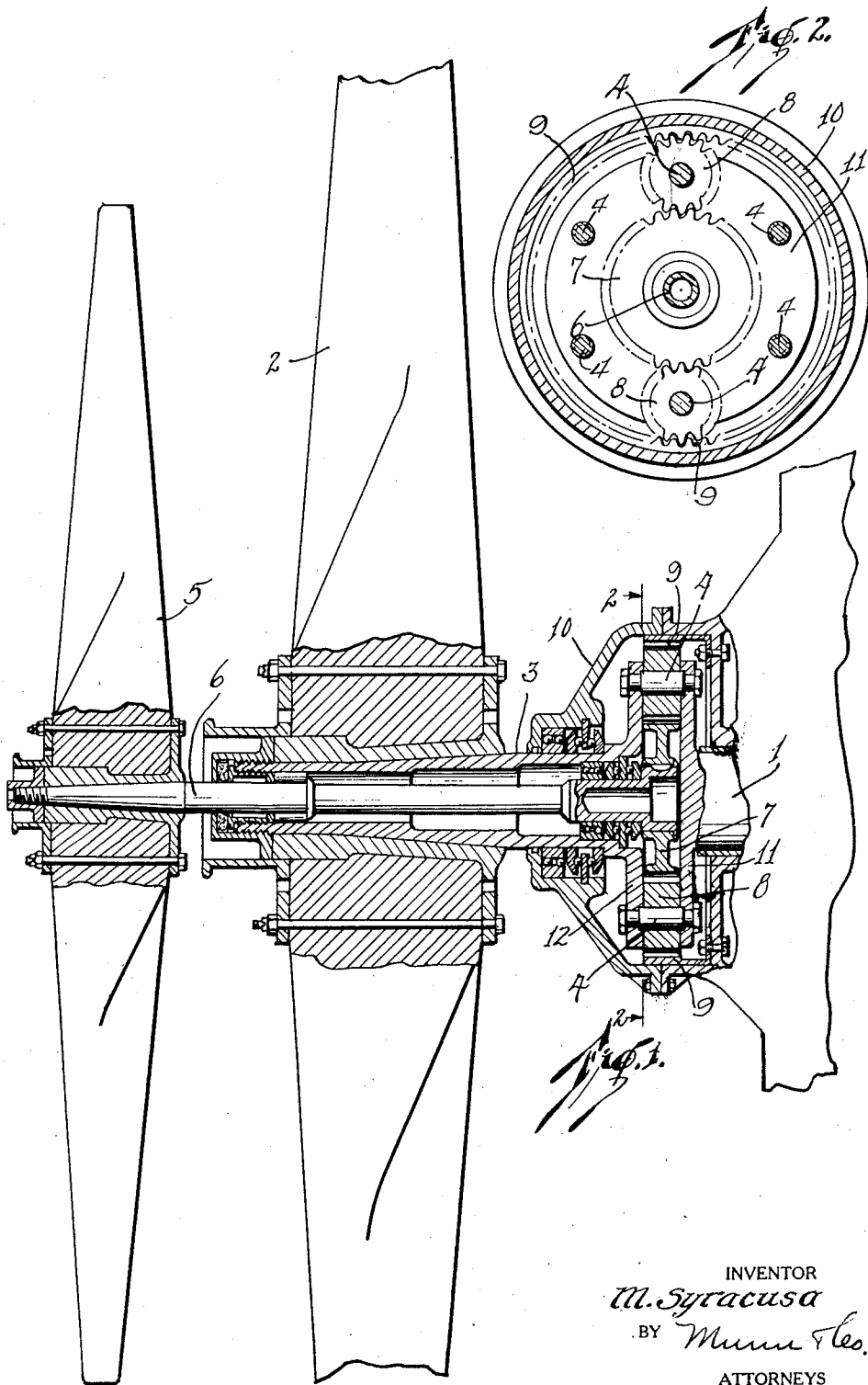
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AIRPLANE CONSTRUCTION

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# UNITED STATES PATENT OFFICE.

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## AIRPLANE CONSTRUCTION.

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My invention relates to improvements in auxiliary propellers for airplane propellers, and it consists in the combinations, constructions, and arrangements herein described and claimed.

It is well known that the portion of the airplane propeller disposed adjacent to the hub does not aid in moving the airplane forwardly, but instead acts as a resistance to the movement of the airplane through the air.

The principal object of the invention is to provide an auxiliary propeller and mount this propeller directly in front of the inactive area of the larger propeller, whereby the small propeller will overcome the resistance of the inactive portion of the large propeller, thus increasing the speed of the airplane, economizing in fuel, and making the entire airplane more efficient.

A further object of the invention is to provide a device of the type described which may be readily attached to a standard airplane engine and propeller with but slight alterations being necessary in the latter.

A further object of the invention is to provide a device of the type described which is simple in construction, durable and efficient for the purpose intended, and which is not likely to get out of order easily.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings, forming part of this application, in which—

Figure 1 is a vertical section through the device, and

Figure 2 is a section along the line 2—2 of Figure 1.

In carrying out my invention, I make use of a crank shaft 1 of an engine and a propeller 2. The propeller 2 is mounted upon a hollow shaft 3, and this shaft is connected directly to the crank shaft 1 by means of stub shafts 4. It will therefore be seen that the propeller 2 will be turned by the crank shaft 1. It is obvious that any type of motor having a shaft could be used.

Figure 1 clearly shows how I mount an auxiliary propeller 5 upon a shaft 6 and dispose this propeller directly in front of the propeller 2. The propeller 5 is very much smaller than the propeller 2, and is designed to cover the area directly in front

of the propeller 2 that is not acted upon by the propeller 2. In other words, the auxiliary propeller 5 acts upon the air in the area disposed adjacent to the hub of the large propeller and therefore overcomes the resistance of the portion of the large propeller disposed adjacent to the hub.

I have found that a speeding up of the small propeller will make it work more efficiently, and therefore I have connected the shaft 6 to the crank shaft 1 through a medium of gears now to be explained. The crank shaft 6 carries a gear 7 and this gear in turn is in mesh with pinions 8 that are carried by the stub shafts 4. The pinions mesh with a ring gear 9. Figure 1 shows how the ring gear 9 is carried by the housing 10. It will be seen that a rotation of the crank shaft 1 will carry the pinions 8 around therewith, and the pinions meshing with the ring gear 9 will impart a rotative movement to the crank shaft 6. Figure 2 shows two pinions 8 as being employed, but it is obvious that any number of pinions may be used without departing from the spirit and scope of my invention.

The shafts 3 and 6 are suitably mounted in ball-bearing races, these races being designed to permit the rotation of the shafts 3 and 6 at high speeds.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood. In operation, the auxiliary propeller 5 tends to force its way through the air in the same manner as the large propeller, and the force thus created by the auxiliary propeller overcomes the resistance of that portion of the large propeller disposed adjacent to the hub. It will therefore be seen that I am making use of practically the entire area of the large propeller for pulling the airplane through the air. The smaller propeller is geared up to cause it to operate at its maximum efficiency. The device is extremely simple in construction, and provides a novel means for overcoming the resistance offered by the inactive portion of the large propeller.

It will further be noted in Figure 2 that additional stub shafts 4 are provided and act as spacing members between the discs 11 and 12. The propeller 5 not only overcomes the resistance of the central portion of the propeller 2, but aids in turning the propeller 2 due to the fact that the propeller 5 is rotating faster than the propeller 2 and therefore

throws a current of air against the propeller 2 which tends to turn the propeller.

I claim:

1. The combination with a crank shaft, a relatively large propeller, a hollow shaft supporting said propeller, of a solid shaft disposed in said hollow shaft, a relatively small auxiliary propeller carried by said solid shaft, said auxiliary propeller being disposed in front of said first named propeller and covering the inactive area of said first named propeller, a gear disposed between said crank shaft and said hollow shaft and rigidly mounted upon said solid shaft, pinions rotatably disposed between said crank shaft and said hollow shaft, and in mesh with said gear, and means cooperating with said pinions, said gear, and said solid shaft for actuating said auxiliary propeller at a greater speed than said first named propeller when said crank shaft is rotated.

2. The combination with a crank shaft, a relatively large propeller, a hollow shaft supporting said propeller, of a solid shaft disposed in said hollow shaft, a relatively small auxiliary propeller carried by said solid shaft, said auxiliary propeller being disposed in front of said first named propeller and covering the inactive area of said first named propeller, a gear disposed between said crank shaft and said hollow shaft and rigidly mounted upon said solid shaft,

pinions rotatably disposed between said crank shaft and said hollow shaft, and in mesh with said gear, and means cooperating with said pinions, said gear, and said solid shaft for actuating said auxiliary propeller at a greater speed than said first named propeller when said crank shaft is rotated, said means comprising a ring gear disposed concentric with said crank shaft and in mesh with said pinions.

3. The combination with a housing, a crank shaft rotatably mounted in said housing, a relatively large propeller, a hollow shaft supporting said propeller, of a solid shaft disposed in said hollow shaft, a relatively small auxiliary propeller carried by said solid shaft, said auxiliary propeller being disposed in front of said first named propeller and covering the inactive area of said first named propeller, a gear disposed between said crank shaft and said hollow shaft and rigidly mounted upon said solid shaft, pinions rotatably disposed between said crank shaft and said hollow shaft and in mesh with said gear, and a ring gear rigidly mounted within said housing, and in mesh with said pinions, whereby rotation of said crank shaft will cause said solid shaft to rotate in the same direction and at a greater speed than said hollow shaft.

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