Oct. 13, 1931. J. D. RAUCH 1,827,438

AIRPLANE

Filed Sept. 10, 1928 2 Sheets-Sheet 1

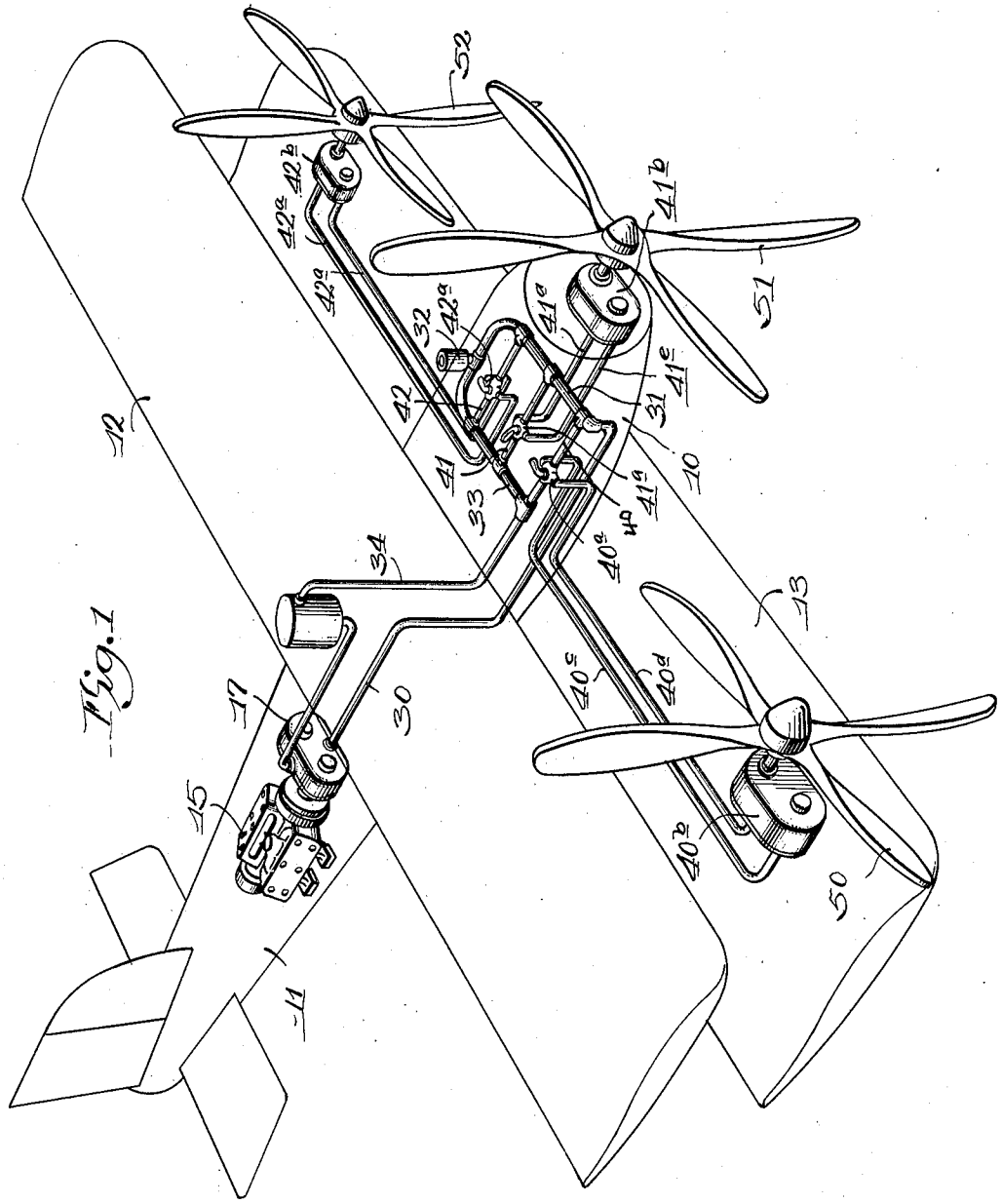


Fig. 1

Witness:
Chas. R. Kourse.

Inventor,
John D. Rauch
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Attys.

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Filed Sept. 10, 1928 2 Sheets-Sheet 2

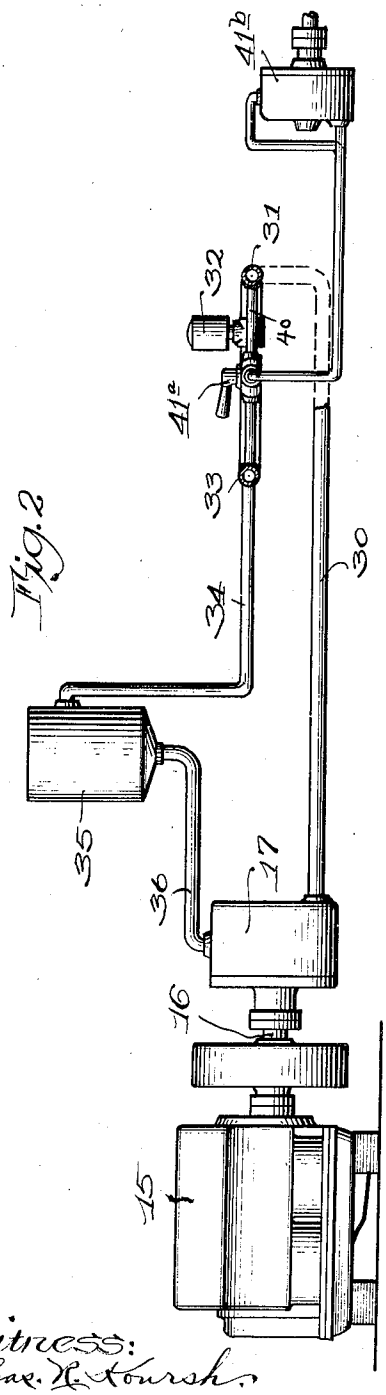


Fig. 2

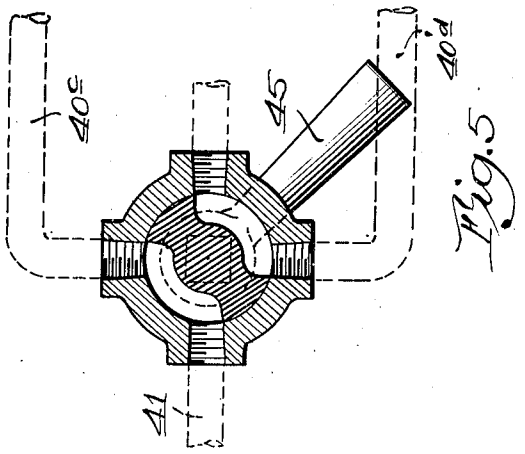


Fig. 5

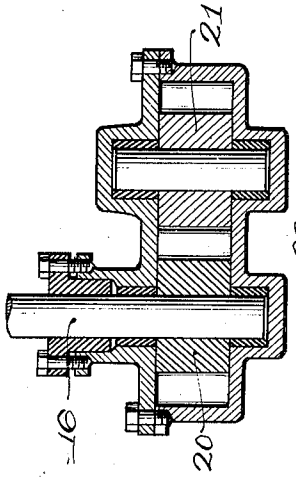


Fig. 4

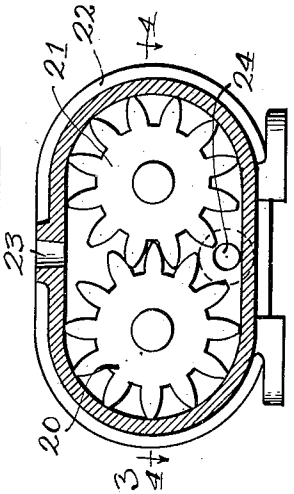


Fig. 3

Witness:
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Inventor,
John D. Rauch
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Patented Oct. 13, 1931 1,827,438

UNITED STATES PATENT OFFICE

JOHN D. RAUCH, OF LIMA, OHIO

AIRPLANE

Application filed September 10, 1928. Serial No. 305,061.

This invention relates to improvements in airplanes, and more particularly to propulsion devices therefor, and has for its principal object to provide an improved system of airplane propulsion mechanism utilizing hydraulic power transmission wherein a single driving motor may be utilized in connection with a plurality of propellers which can be cut in and out individually or collectively as desired.

Other objects of the invention will appear from time to time as the following description proceeds.

The invention may best be understood by reference to the accompanying drawings in which

Figure 1 is a skeletonized view of an airplane to which my improved form of propulsion device has been applied.

Figure 2 is an enlarged side view of the main pump and motor and supply lines connected to one of the propeller motors.

Figure 3 is a vertical section of one form of hydraulic pump or motor which may be utilized as the main pressure pump or as one of the motors for actuating the propellers.

Figure 4 is a horizontal section of the pump or motor shown in Figure 3.

Figure 5 is a detail sectional view of a four-way valve of the type used for controlling the pressure to the propellers.

Referring now to the details shown in the drawings, the airplane shown in skeletonized form in Figure 1 comprises a fuselage 10 with a tailpiece 11 and upper and lower wings 12 and 13, respectively. In my improved construction a single engine or prime mover, herein of the internal combustion type, is indicated at 15 and is arranged to drive a hydraulic pressure pump indicated at 17, as for instance, directly through suitable drive shaft 16. The pump herein illustrated is of the well known rotor type shown in detail in Figures 3 and 4 and consists of a pair of meshed rotors 20 and 21 in casing 22 having inlet and outlet ports 23 and 24 arranged in the usual manner to produce a pressure on a liquid, such as oil, when the rotors are driven. An outlet or high pressure pipe 30 leads to a manifold 31 and through a pressure valve 32, as shown in Figures 1 and 2. This pressure valve may be of any well known form to automatically maintain a predetermined pressure in the high pressure line 30, such as illustrated in detail in my copending application bearing Serial Number 189,849, filed May 9, 1927. Such valves are well known in the art and details need not be herein shown or described. The arrangement is such that upon excess pressure produced in the manifold 31, the pressure will be relieved through the pressure valve 32 and permit the liquid to escape through the relief manifold 33 and from thence to a low pressure pipe 34. The low pressure pipe returns rearwardly and upwardly to a low pressure tank 35 preferably arranged in a relatively high position, as for instance, near the upper wing 12, as shown in Figure 1 so that the tank is at or above the normal level of all of the hydraulically operated control members. A supply pipe 36 leads from the supply tank 35 to the inlet port 23 of the main hydraulic motor 17.

Connected with the pressure manifold 31 and in parallel between said pressure manifold and the relief manifold 33, I provide a plurality of pipes 40, 41 and 42, respectively having a control valve 40*a*, 41*a* and 42*a* therein arranged to supply circuits to respective propeller motors 40*b*, 41*b* and 42*b*. Each of these motors referred to may be similar in construction to the pump 17 but are now utilized as motors and are connected respectively by supply pipes 40*c*, 40*d*, 41*c*, 41*d* and 42*c*, 42*d* to their control valves 40*a*, 41*a* and 42*a*. These valves are of the four-way type as shown in detail in Figure 5, and arranged so that pressure may be applied to either pipe 40*c* or 40*d* from the pressure pipe line 40 connected to the pressure manifold 31, depending upon the position of the control handle 45. It will be understood that when the valve is arranged so as to supply pressure to one of the pipes, as for instance 40*c* or 40*d*, the other pipe will be connected through the four-way valve to the relief or low pressure side of the connecting pipe 41, and vice versa. Furthermore, each of the valve handles may be moved to an off position.

With the construction above described, the

several propellers 50, 51 and 52 may be controlled at will, and the number of such propellers may be increased or decreased as desired. In all cases, the propellers can be operated at full or varying speeds, or entirely turned off by manipulation of their valves. Furthermore, the propellers are capable of being reversed, as for instance, for retarding the movement of the airplane during landing.

A further advantage of my improved transmission device is that it permits the placing of the gasoline engine or prime mover 15 at a most advantageous position toward the rear of the plane, which, under some conditions, gives better weight distribution of the heavy parts and at all events does not confine the motor to the front forward end of the body of the fuselage as in present constructions. It also permits the use of a single motor with a plurality of propellers to reduce the motor weight now necessary when a motor is required for each propeller.

I claim:

1. In an airplane having laterally extending wings, a plurality of propellers each provided with a hydraulic motor supported in laterally spaced relation on said wings and hydraulic transmission system for said propeller motors including a centrally disposed motor and a pump driven thereby, a high pressure line, a pressure valve, a low pressure line, and independent control means operatively connected with each of said propeller motors and interposed in parallel between said high and low pressure lines.

2. In an airplane, a motor, a plurality of propellers each provided with a hydraulic motor, hydraulic transmission system for said propeller motors including a pump driven by said motor, a high pressure line, a pressure valve, a low pressure line, and independent control means operatively connected with each of said propeller motors and interposed in parallel between said high and low pressure lines, said control means including a four-way valve for reversing one or more of said propeller motors at will.

3. In an airplane having a centrally disposed fuselage and laterally extending wings, a plurality of propellers each provided with a hydraulic motor supported on said wings remote from said fuselage, and a hydraulic transmission system for said propeller motors, including a centrally disposed pump and a driving motor, a high pressure line, a low pressure line and pressure valve, and independent control means in said fuselage operatively connected with each of said propeller members and interposed in parallel between said high and low pressure lines.

Signed at Lima, O., this 30 day of Aug. 1928.

JOHN D. RAUCH.