June 17, 1930. F. F. DANIEL 1,765,210

AEROPLANE CATAPULT

Filed Nov. 28, 1928 5 Sheets-Sheet 1

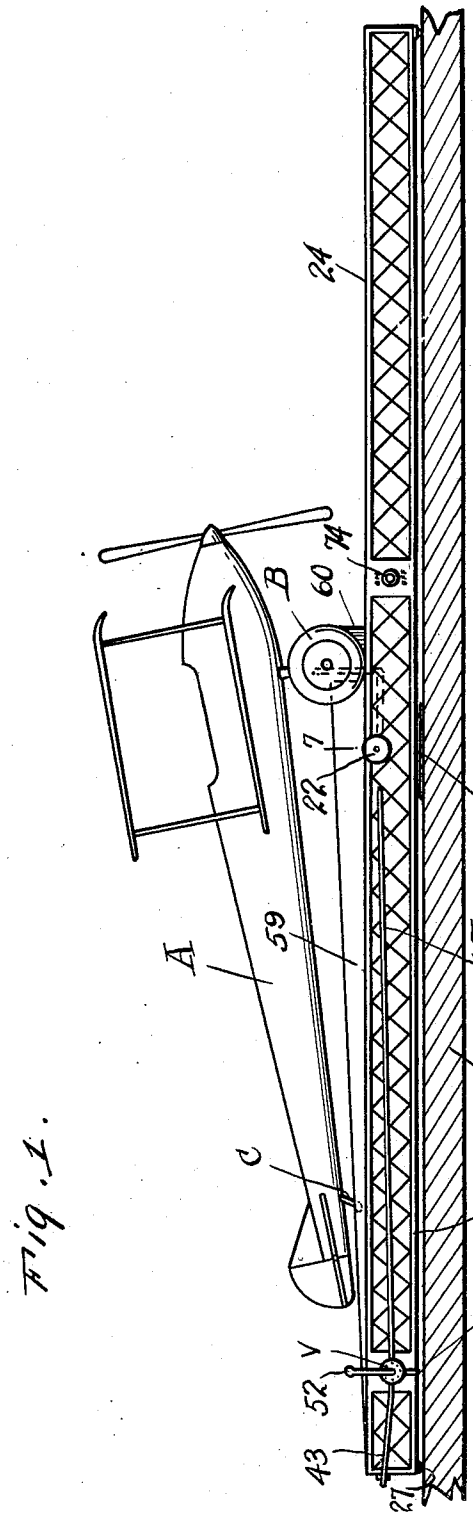


Fig. 1.

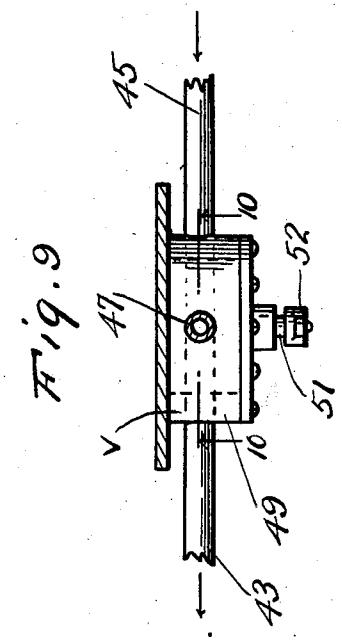


Fig. 9.

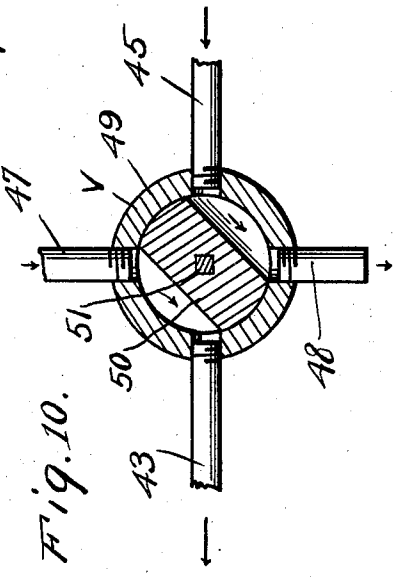


Fig. 10.

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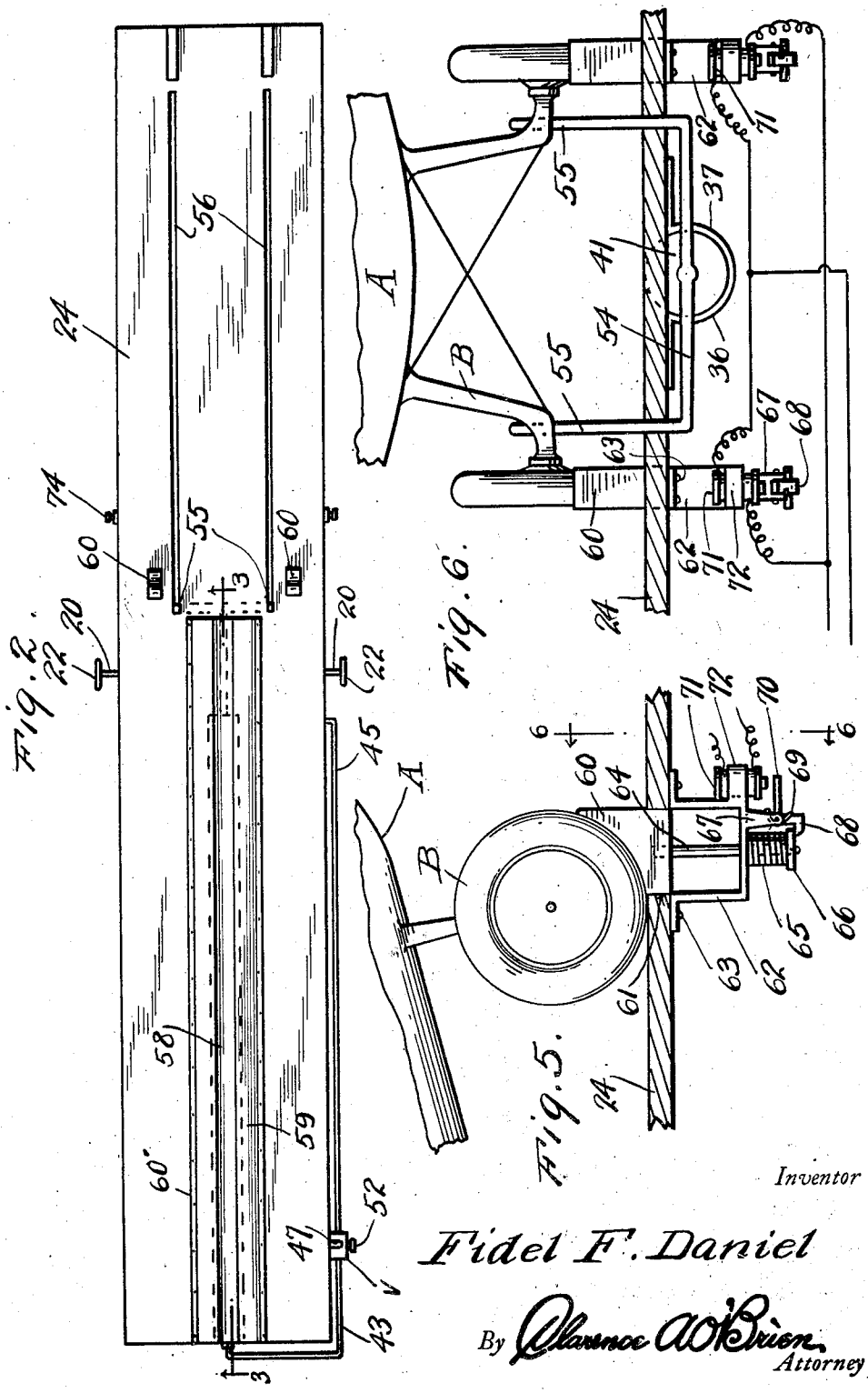
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AEROPLANE CATAPULT

Filed Nov. 28, 1928 5 Sheets-Sheet 2



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AEROPLANE CATAPULT

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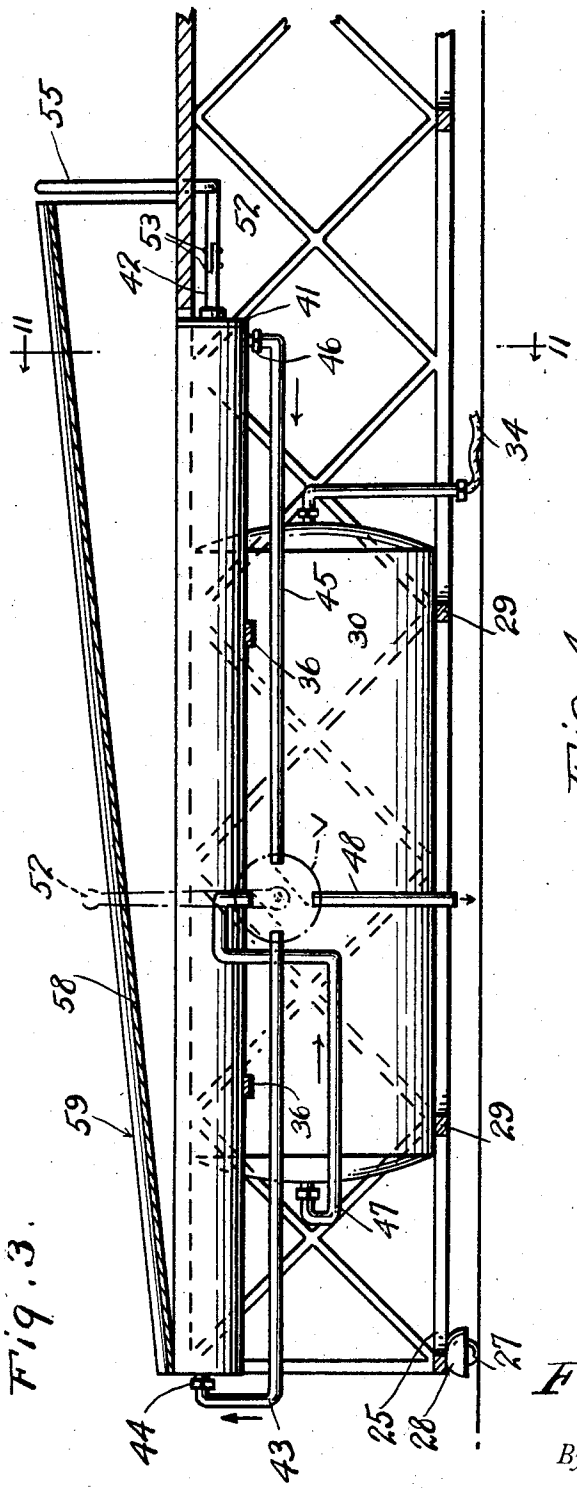


Fig. 3.

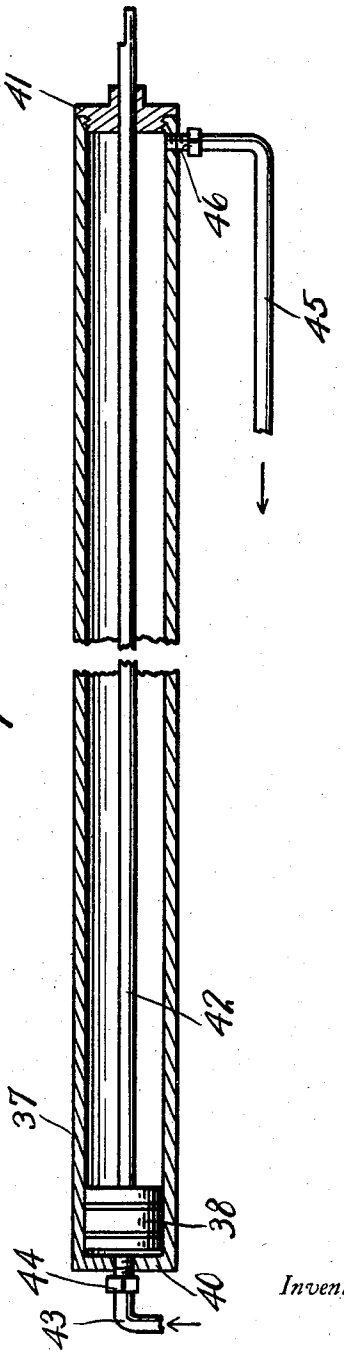


Fig. 4.

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AEROPLANE CATAPULT

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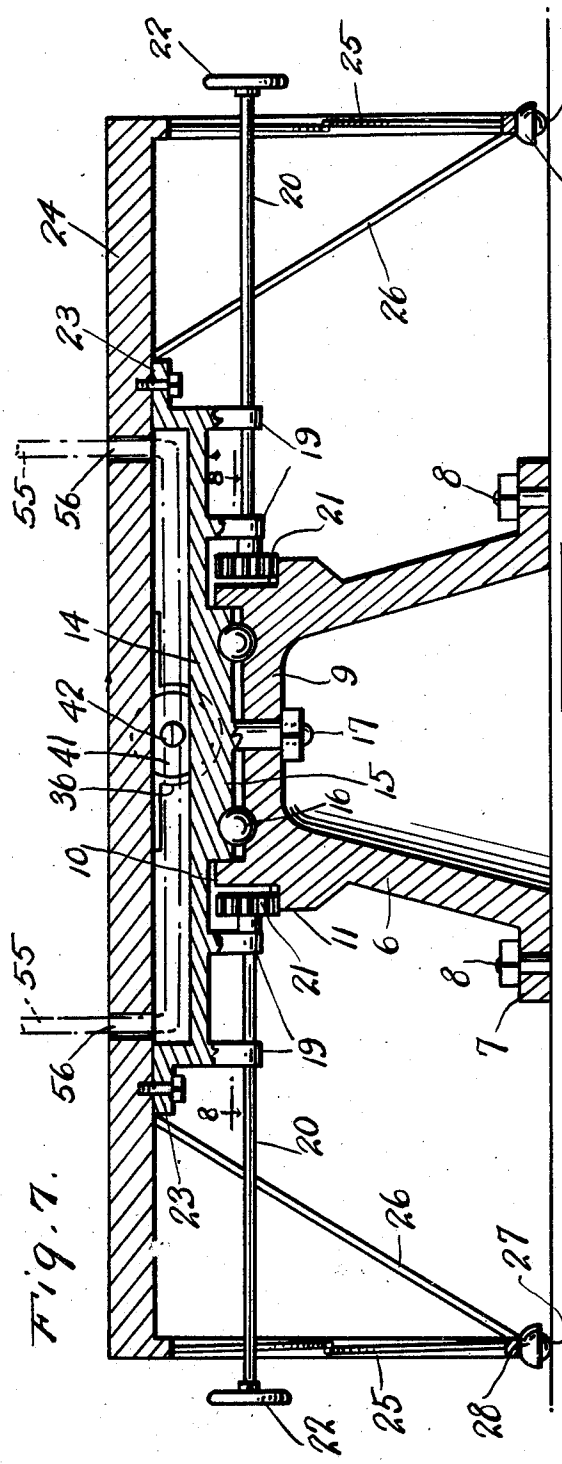


Fig. 7.

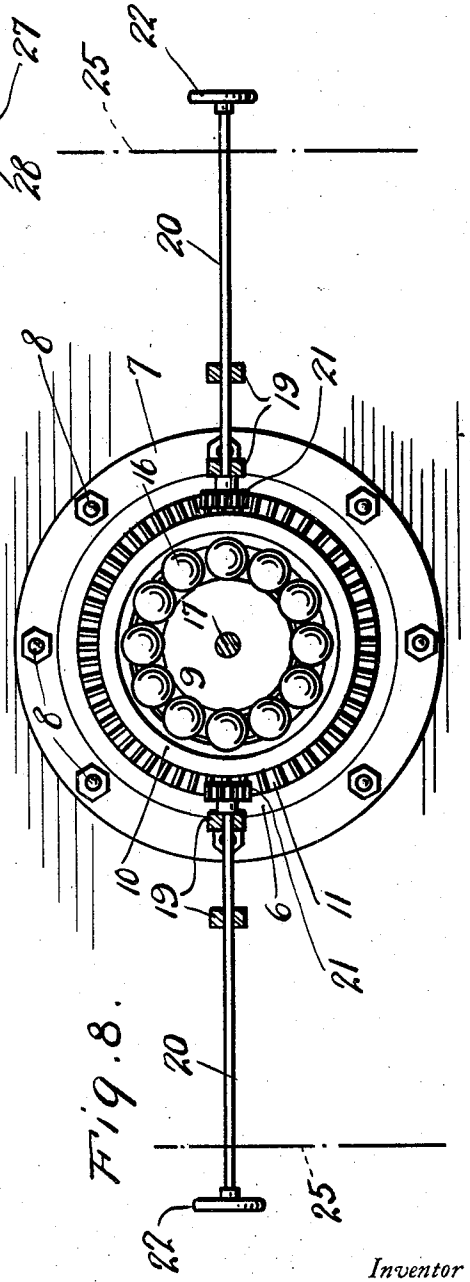


Fig. 8.

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AEROPLANE CATAPULT

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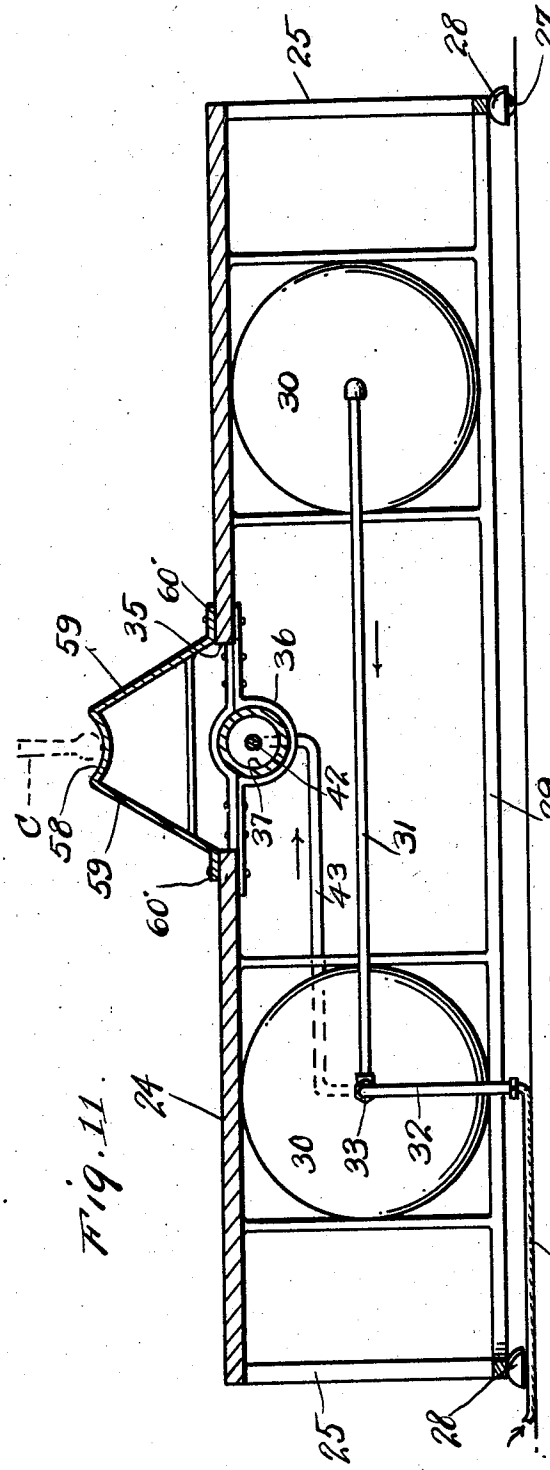


Fig. 11.

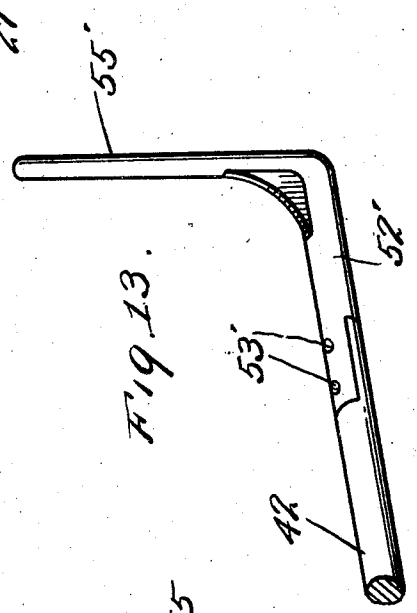


Fig. 13.

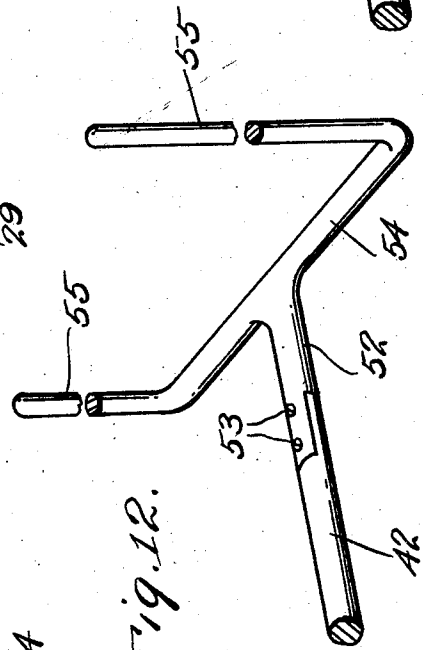


Fig. 12.

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Patented June 17, 1930 1,765,210

UNITED STATES PATENT OFFICE

FIDEL FRANK DANIEL, OF IRONWOOD, MICHIGAN

AEROPLANE CATAPULT

Application filed November 28, 1928. Serial No. 322,392.

The present invention relates to a catapult for launching aeroplanes and has for its prime object to provide an apparatus of this nature which is actuated by means of air under pressure which may be controlled for operating the catapult to launch an aeroplane in the air and may also be controlled for resetting the apparatus.

Another very important object of the invention resides in the provision of an aeroplane launching catapult of this nature which may be turned to direct the launching of the aeroplane in any desired direction.

Another very important object of the invention resides in the provision of a stopper mechanism for holding the aeroplane on the catapult and the electro-magneto means for releasing the stop mechanism at the desired moment.

A still further object of the invention resides in the provision of an aeroplane launching catapult of this nature which has its parts arranged in an exceedingly compact and convenient manner and which is comparatively simple in its construction, strong and durable, easy to manipulate, thoroughly efficient and reliable in use and operation, and otherwise well adapted to the purpose for which it is designed.

With the above and numerous other objects in view as will appear as the description proceeds, the invention resides in certain novel features of construction, and in the combination and arrangement of parts as will be hereinafter more fully described and claimed.

In the drawing:

Figure 1 is a side elevation of an aeroplane launching catapult embodying the features of my invention,

Figure 2 is a top plan view thereof,

Figure 3 is a longitudinal vertical section taken substantially on the line 3—3 of Figure 2,

Figure 4 is a longitudinal vertical section through the cylinder,

Figure 5 is an enlarged detail longitudinal section showing one of the stop devices,

Figure 6 is an enlarged detail transverse section taken substantially on the line 6—6 of Figure 5,

Figure 7 is a transverse vertical section taken substantially on the line 7—7 of Figure 1,

Figure 8 is a horizontal section taken substantially on the line 8—8 of Figure 7,

Figure 9 is a detail view of the air control valve,

Figure 10 is a sectional view therethrough taken substantially on the line 10—10 of Figure 9,

Figure 11 is a vertical transverse section taken substantially on the line 11—11 of Figure 3,

Figure 12 is a perspective view of one of the aeroplane running gear engaging members, and

Figure 13 is a perspective view of another embodiment thereof.

Referring to the drawing in detail, it will be seen that the numeral 5 denotes the deck of a vessel or any other suitable base on which it might be desired to mount an aeroplane launching catapult.

A pedestal 6 is formed with a frusto-conical body at the lower end of which is an outwardly directed annular flange 7 anchored to the deck 5 or the like by suitable means 8.

The top of the pedestal is formed with a plate 9 from which rises an annular flange 10. An annular shoulder 11 is formed about the upper end of the pedestal to provide a circular rack. A turn table 14 has a central circular thickened portion 15 rotatable on the plate 9 within the flange 10 and ball bearings 16 are arranged in a circular series as clearly shown in Figure 8 in concentric grooves formed in the opposed faces of plates 9 and portion 15.

A pintle 17 depends from the center of the portion 15 through a central opening in the plate 9 and a nut 18 may be engaged on the bottom end thereof to prevent upward movement of the turn table in respect to the pedestal.

Two pairs of brackets 19 depend from the turn table one pair to each side of the pedestal. Shafts 20 are journaled in the

brackets 19 and have rack gears 21 on their inner ends meshing with the circular rack 11.

At the outer ends of the shaft 20 are hand wheels 22. Obviously by turning either or both of the hand wheels 22 the turn table may be moved in respect to the pedestal 6 for pointing the catapult in the desired direction.

Upwardly offset ears 23 are provided on the ends of the turn table 14 and are fixed to platform 24 which is of an oblong formation as is clearly indicated in Figure 2.

Longitudinally extending supporting structures 25 depend from the longitudinal sides of the platform 24 and are braced in respect thereto as at 26. Bearings 27 are mounted in sockets 28 at the corners of the supporting structure to engage with the deck 5 or the like thereby allowing the platform and the turn table to be directed in the desired direction by the mechanism just previously described.

Cross frames 29 are mounted under the platform 24 between the supporting structures 25 and in the present instance two of these cross frames 25 support a pair of longitudinally extending tanks 30 below the rear portion of the platform.

The forward ends of the tanks are connected together by a pipe 31. A pipe 32 is coupled as at 33 with the pipe 31 adjacent the front end of one of the tanks 30 and may be connected by any suitable conduit means 34 with an air pump for supplying air under pressure to the tank 30.

The rear portion of the platform 24 is formed with a longitudinally extending oblong opening which is spanned transversely by suitable brackets 36 for supporting a cylinder 37 in which is mounted for rectilinear movement a piston 38.

The rear end of the cylinder 37 is closed as at 40. The forward end of the cylinder 37 has a threaded end 41 therein. A rod 42 extends forwardly from the piston 38 and is slidable through the head 41.

A pipe 43 is engaged as at 44 in the closed end 40 to communicate with the interior of the cylinder 37 and leads to a valve V. A pipe 45 is engaged with the cylinder 37 immediately adjacent the head 41 as at 46 to communicate with the cylinder 37 and leads to said valve V.

A pipe 47 leads from one of the tanks 30 to the valve V. An exhaust pipe 48 leads from the valve V. This valve V includes a cylindrical casing 49 with a core 50 rockable therein on a stem 51 journaled in the casing and controlled by a hand crank or the like 52.

This core, as is clearly shown in Figure 10 is rectangular in cross section having its ends arcuate to conform with the interior of the casing. The pipe 47 is diametrically opposed to the pipe 48 in its connection with the valve while pipes 43 and 45 are diametrically opposed in their connection with the valve V at points ninety degrees from the connections of the pipes 47 and 48 therewith.

When the core 50 is disposed as shown in Figure 10 it will be seen that the air from the cylinder is free to flow through the pipe 47 through the casing 49 and through the pipe 43 thereby urging the piston 38 forwardly and the air in front of the piston will be forced from the cylinder 37 through the pipe 45, through the casing 49 and exhausted through the pipe 48.

To return the piston 38 it is necessary to rotate the core 50 ninety degrees in a counterclockwise direction so that air would flow from the pipe 47 through the pipe 45 into the front end of the cylinder 37 to force the piston 38 rearwardly thereby exhausting air to the rear of this piston through the pipe 43, through the casing 49 and exhaust the same through the pipe 48.

On the forward outer end of the piston rod 42 there is fixed a running gear engaging member which includes a shank 52 fixed to the piston rod as at 53 and having a transversely disposed U-shaped member comprising a bight 54 and legs 55.

The legs 55 project upwardly through longitudinally extending slots 56 in the forward portion of the platform 24 to engage behind the running gear for pushing the aeroplane forwardly by the movement of the piston 38 as previously explained.

If desired only a single slot 56 may be used in conjunction with the running gear engaging member shown in Figure 13 which is L-shaped to include a shank 52′ and an upwardly extending leg 55′, the shank being attached to the rod as at 53′ and the leg extending up through the slot as will be apparent.

A trough like slideway 58 is mounted longitudinally over the opening 35 by means of rearwardly tapering sides 59 preferably formed integrally with the slideway and depending downwardly therefrom and diverging downwardly from each other and terminating in longitudinally outwardly directed flanges 60 fixed to the platform 24 to the sides of the opening 35.

Thus the trough like slideway inclines upwardly and forwardly. A pair of chock-like stops 60 are slidable vertically through openings 61 in the platform 24.

These openings are located to the outer sides of the rear ends of the slots 56. U-shaped brackets 62 have their upper extremities fixed as at 63 to the platform 24 so that the brackets depend downwardly immediately below the openings 61.

Stems 64 depend from the stops 60 and are slidable through the bights of the brack-

ets 62 and springs 65 are disposed about the stems 64 impinging against the bights of the brackets 62 and washers or the like 66 on the lower ends of the stems.

Arms 67 depend from the bights of the brackets 62 and have catches 68 pivoted on the lower ends thereof and springs 69 are associated with these catches to urge them normally in engaging position with the member 66 for holding the chock-like stops in an upwardly projecting position with the springs 65 under compression.

The catches 68 have armatures 70 and electro-magnets 71 are mounted on the brackets 62 by means of sleeve extensions 72 and when energized will attract the armatures 70 to rock the catches 68 against the tension of the springs 69 and disengage the members 66 so that the springs 65 will cause a quick downward movement of the chock-like stops 60.

The electro-magnets 71 are controlled by a suitable switch 74 on one of the supporting structures 25. It will be noted that the valve V is on the same supporting structure 25 as the switch 74 for the purpose of convenience. In Figure 1 I have illustrated a conventional aeroplane A which includes a conventional running gear B and a conventional drag or tail skid C.

The wheels of the running gear B are located in engagement with the chock-like stops 60, the valve V is set as shown in Figure 10, the switch 74 is open and the tail skid C is located in the trough like slideway 58.

The attendants of the apparatus will now manipulate the turn table 14 by means of the hand wheels 22 to direct the aeroplane A in the proper direction in which it is desired to take off.

When the catapult has been properly directed and the aviator has his engine running at proper take off speed, the switch 74 is closed and the chock-like stops 60 are caused to quickly gravitate downwardly out of the way of the wheels of the running gear so that the piston 38 may drive the running gear engaging member forwardly.

The legs of this member are shown engaged with the running gear to advantage in Figure 6 so that the aeroplane will be driven forwardly along the runway platform 24. As the aeroplane moves forwardly the tail thereof is elevated because of the incline of the trough like slideway in which is sliding the tail skid C.

This is important because it prevents the tail from striking the end of the runway platform after the running gear has left the same. Otherwise, it is thought that the construction, operation, utility and advantages of this invention will be thoroughly understood without a more detailed description thereof.

The present embodiment of the invention has been disclosed in considerable detail because in actual practice it attains the features of advantage enumerated as desirable in the statement of the invention and the above description.

This embodiment of the construction and relative arrangement of the parts discloses an apparatus which is obviously simple, strong, durable, convenient, easy to manipulate, and otherwise well adapted to the purpose for which it is designed. However, I do not desire to be understood as confining myself to the specific construction and relative arrangement of parts inasmuch as in the future practice of the invention various changes and modifications may be made such as fall within the scope of my invention as defined in my appended claims.

Having thus described my invention, what I claim as new is:

1. An aeroplane launching catapult apparatus including a runway platform, means for urging movement of an aeroplane along the platform, a pair of chock-like stops slidable vertically through openings in the platform to chock the wheels of the running gear of the aeroplane and to hold the areoplane stationary on the platform, brackets depending from the platform below said openings, stems depending from the stops and slidable through the brackets, springs engaged with the stems to normally urge the stops downwardly, a pivoted catch on each bracket to engage the stems to hold the stops upwardly against the tension of said spring, said catches having armatures, and electro-magnets for attracting the armatures to release the catches.

2. An aeroplane launching catapult apparatus including a runway platform having a longitudinally extending slot, a member projecting through the slot to engage the running gear of an aeroplane, a cylinder mounted below the platform, a piston slidable in the cylinder, a rod extending from the piston and connected with the member, a tank for air under compression, and means for connecting the tank with the cylinder to cause the movement of the piston, the rod and the member to urge movement of the aeroplane along the platform, and releasable means to hold the aeroplane stationary on the platform.

3. An aeroplane launching catapult apparatus including a runway platform having an oblong longitudinally extending opening in one end thereof, a slideway disposed over the opening and inclining upwardly away from said end, sides depending from the slideway and fixed to the platform alongside of the opening, said platform in the other end portion thereof being provided with a longitudinally extending slot, a member extending through the slot to engage

the running gear of an aeroplane on the platform with its tail skid in the slideway and means in the opening operatively connected with the member for urging movement of the aeroplane along the platform.

4. An aeroplane launching catapult apparatus including a pedestal, a turn table on the pedestal, a runway platform mounted on the turntable, a slideway supported on said platform, said slideway inclining upwardly away from one end of said platform and terminating at its highest point inwardly from the opposite end of said platform, said platform being provided with a longitudinally extending slot extending from adjacent said highest end of the slideway, said cylinder mounted beneath the platform longitudinally of the platform, a piston slidable in the cylinder, a member projecting through said slot to engage the running gear of an aeroplane, means operatively connecting said member with said piston, means for imparting movement to said piston for moving said member in a reciprocatory manner within said slot, a pair of stops slidable vertically through openings in said platform at the raised end of said slideway to attract the wheels of the running gear of the aeroplane to hold the aeroplane stationary on said platform, spring means operatively connected with said track, normally urging the track upwardly through said opening, catch members having operative connection with said tracks for holding said tracks upwardly against the tension of said springs, said catches having armatures, and electromagnets for attracting the armatures to release said catches.

5. An aeroplane launching catapult apparatus including a pedestal, a turn table on the pedestal, a runway mounted on said turntable having an oblong longitudinally extending opening in one end thereof, a slideway extending over said opening and inclining upwardly away from said end, means for supporting said slideway on said platform, said platform on the other end portion thereof provided with a longitudinally extending slot, a member adapted for reciprocatory movement in the slot, means for actuating said member, said member being adapted for engagement with the running gear of the aeroplane, for imparting movement to the aeroplane, a pair of stops slidable vertically through openings in said platform at the forward end of the slideway to stop the wheels of the running gear of the aeroplane for holding the aeroplane stationary on said platform, brackets depending from the platform below said openings, stems depending from the slots and slidable through the brackets, springs engaged with the stems to normally urge the chock downwardly, a pivoted catch on each bracket to engage the stems for holding said chocks upwardly against tension of said spring, said catches having armatures, and electromagnets for attracting said armatures to release the catches.

6. An aeroplane launching catapult apparatus including a pedestal, a turn table on the pedestal, a runway mounted on said turntable having an oblong longitudinally extending opening in one end thereof, a slideway disposed over said opening and inclining upwardly away from said end, sides depending from the slideway and fixed to the platform alongside of the opening, said platform in the other end portion thereof being provided with a longitudinally extending slot, a cylinder mounted in the opening within said slideway, a piston slidable in the cylinder, a member projecting through said slot to engage the running gear of an aeroplane, a rod extending from the piston and connected with said member, a tank for air under compression, valve control means for connecting the tank with the cylinder for imparting reciprocatory movement to said piston rod and member for imparting movement to the aeroplane along the platform when said member is moved in one direction, a pair of chock stops slidable vertically through openings in said platform at the forward end of said slideway, the wheels of the running gear of the aeroplane holding said aeroplane stationarily on said platform, stems depending from the chock, means for slidably supporting said chock in the said opening, said last mentioned means including springs engageable with the stem for normally urging the chock downwardly, means engageable with the stem for holding said chock upwardly against the tension of said spring means, and magnetic means for freeing said stem whereby said chock may be moved downwardly under the pressure of said spring.

In testimony whereof I affix my signature.

FIDEL FRANK DANIEL.