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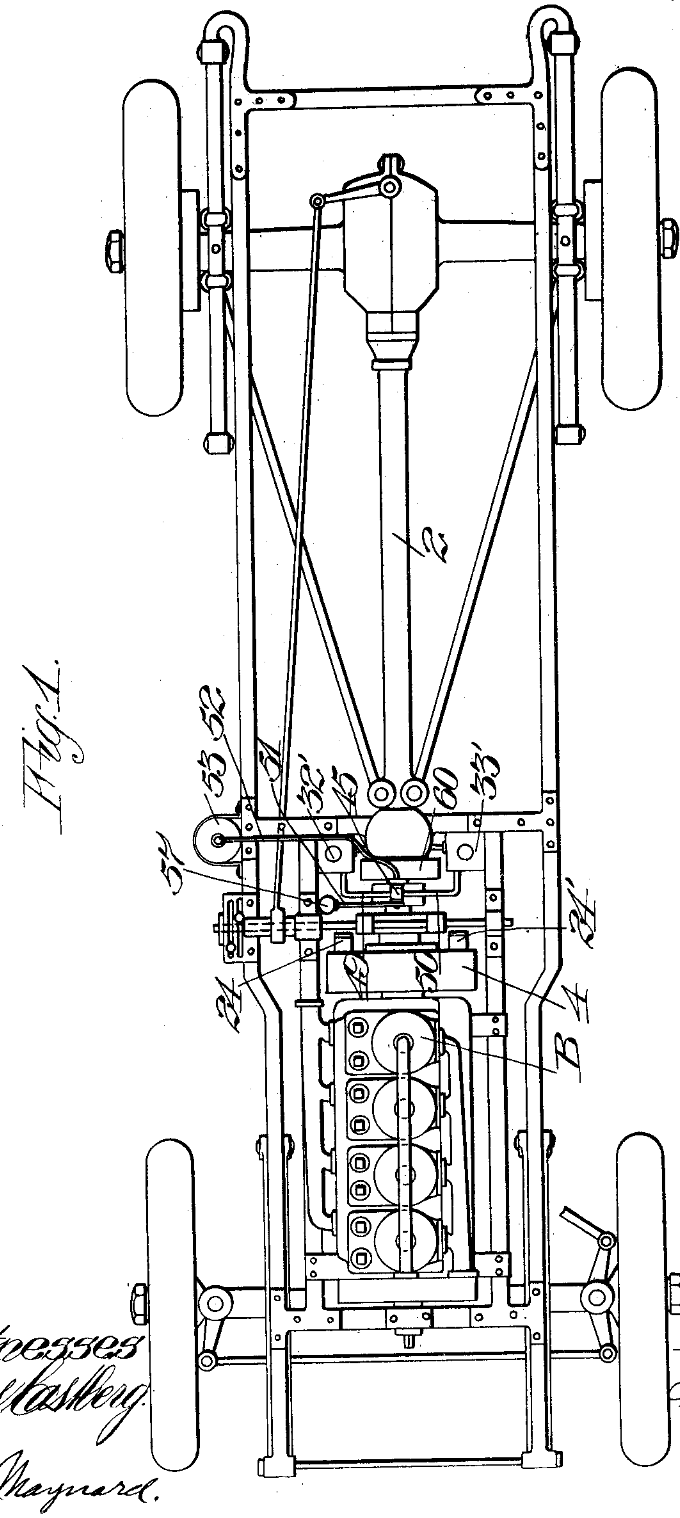
STARTING MECHANISM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED AUG. 29, 1910.

1,053,800.

Patented Feb. 18, 1913.

7 SHEETS—SHEET 1.



Witnesses

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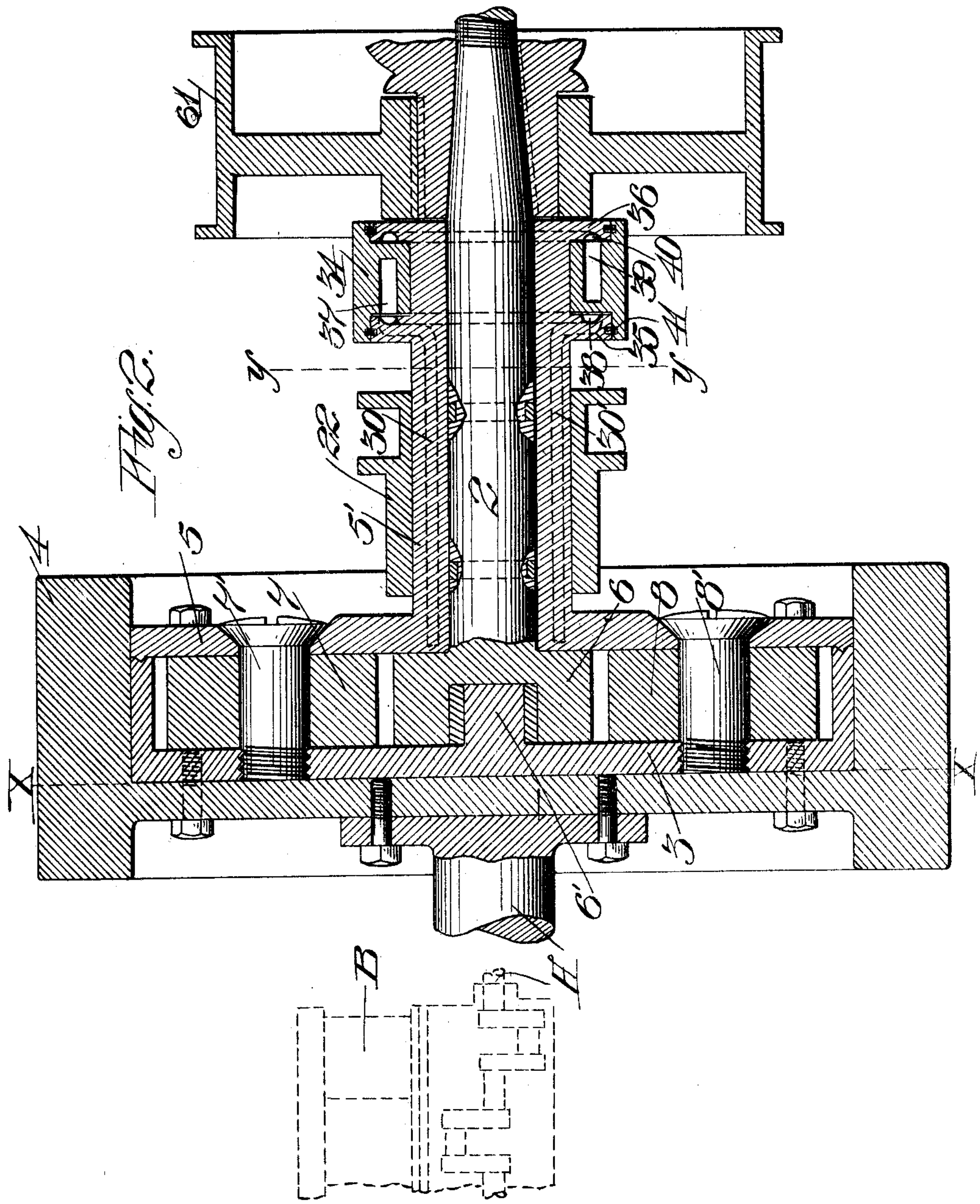

Fig. 2.

Witnesses.
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7 SHEETS—SHEET 3.

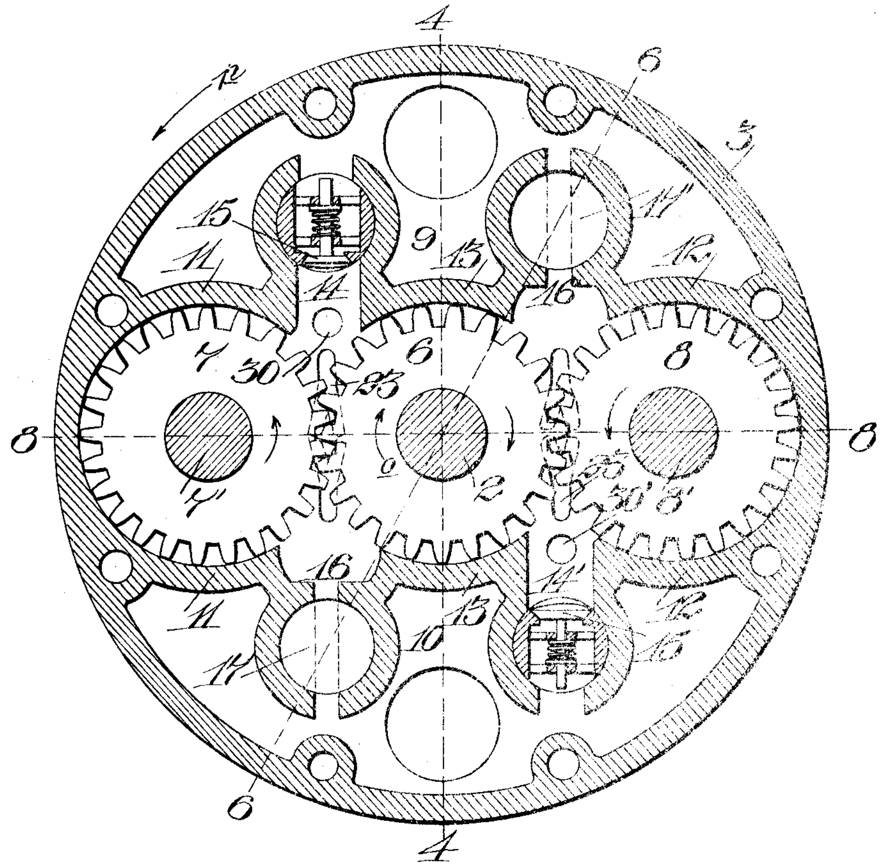

Fig. 3.

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7 SHEETS—SHEET 4.

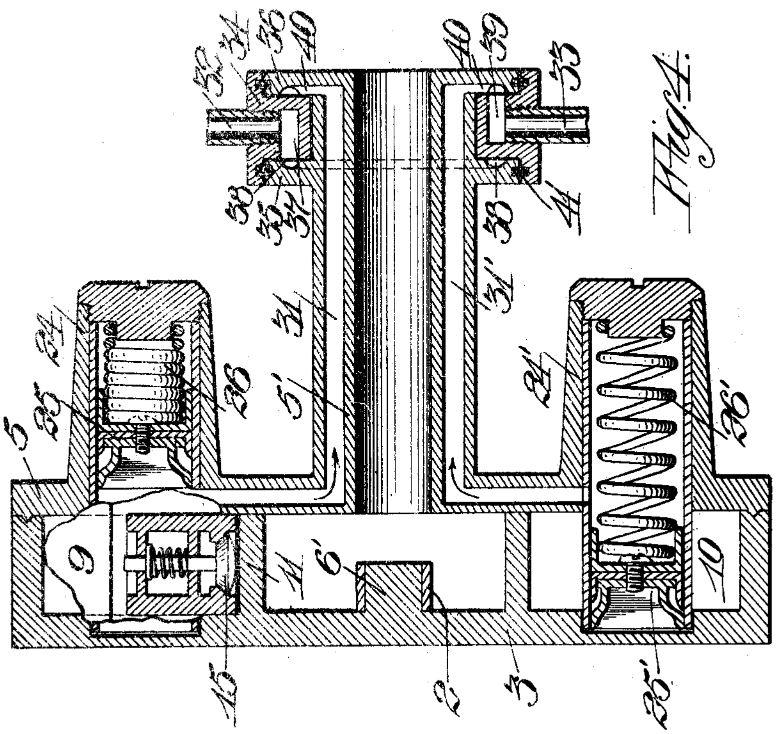

Fig. 4.

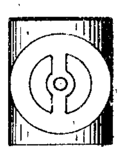

Fig. 5.

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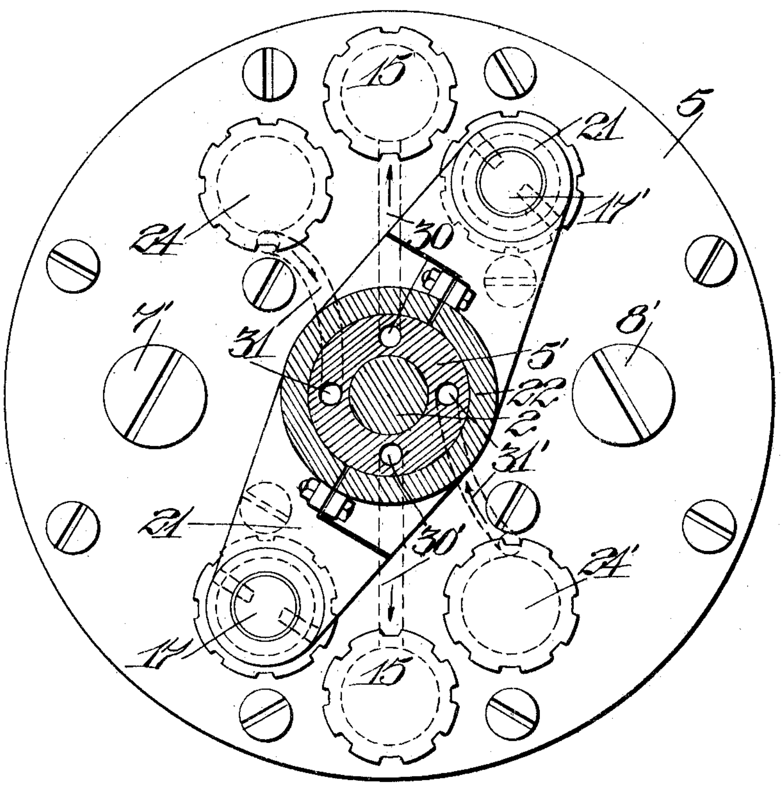
Fig. 6.



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7 SHEETS—SHEET 6.

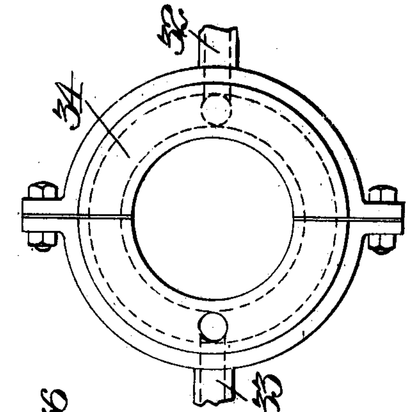

Fig. 8.

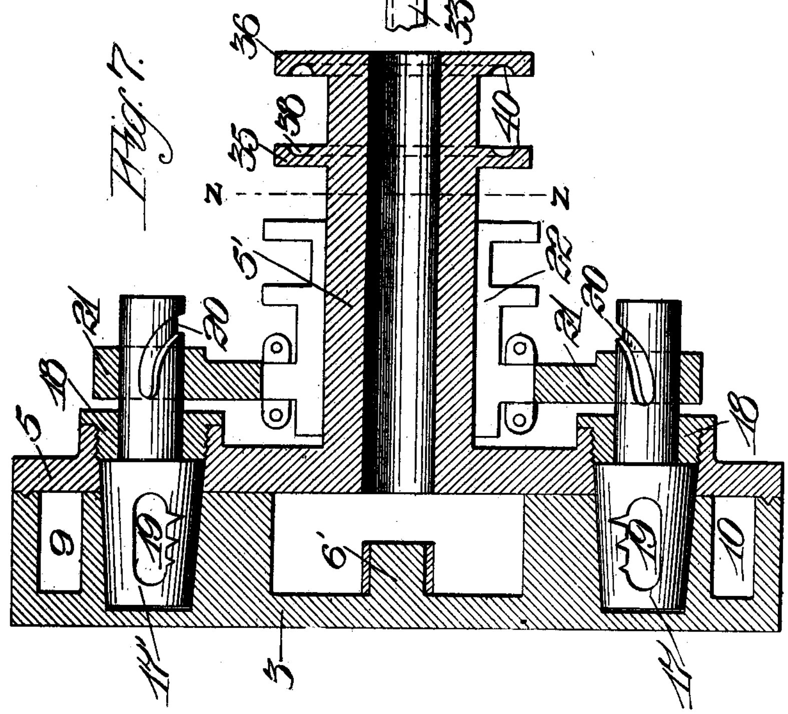

Fig. 7.

Witnesses.
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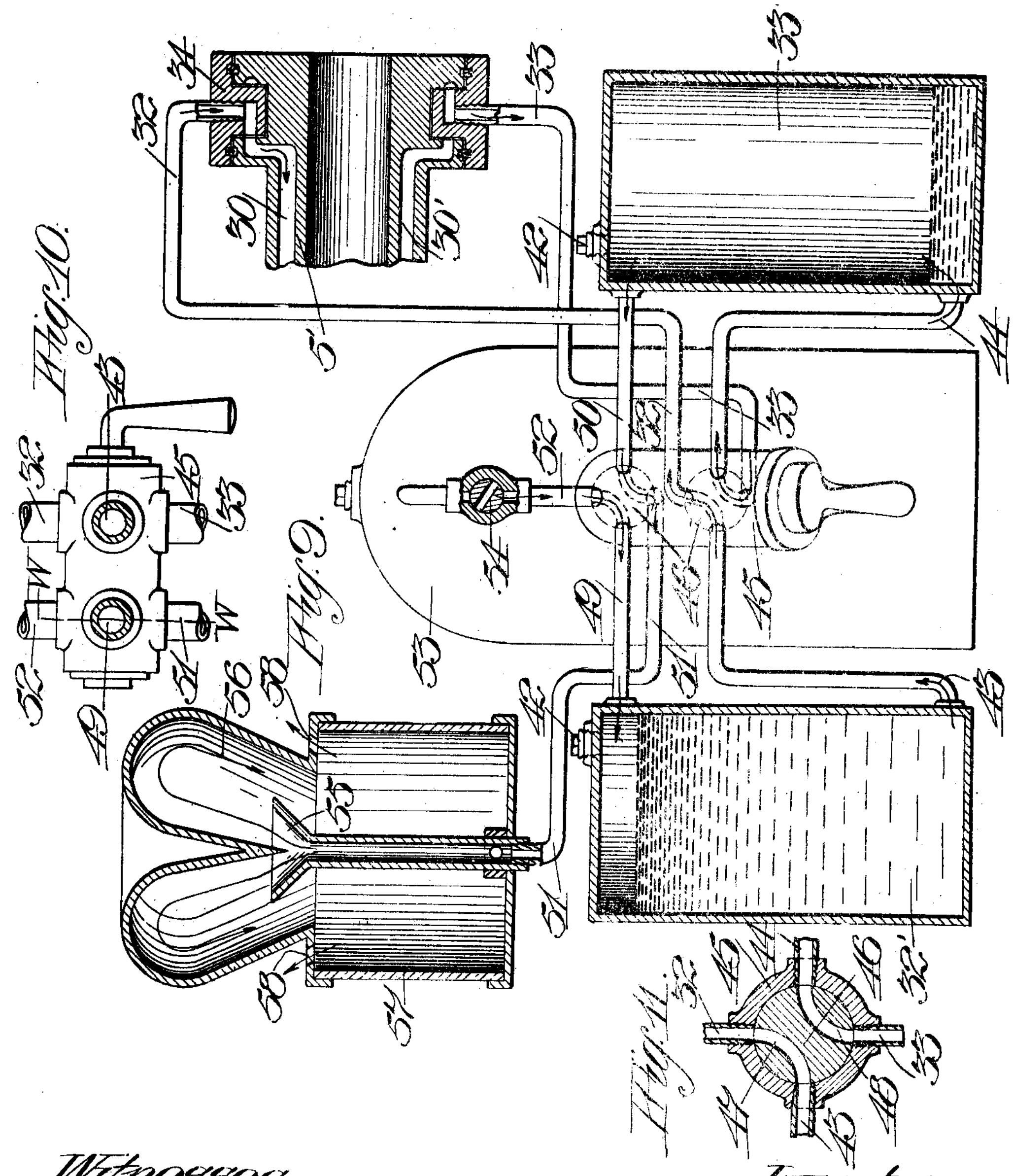
7 SHEETS—SHEET 7.



Witnesses

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UNITED STATES PATENT OFFICE.

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STARTING MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

1,053,800. Specification of Letters Patent. **Patented Feb. 18, 1913.**

Application filed August 29, 1910. Serial No. 579,562.

To all whom it may concern:

Be it known that I, ADOLPH F. FELLER, citizen of the United States, residing at Berkeley, in the county of Alameda and State of California, have invented new and useful Improvements in Starting Mechanism for Internal-Combustion Engines, of which the following is a specification.

The invention relates to a starting mechanism for gasolene or gas engines and the like, and is especially designed for use on automobiles for starting the engine from the seat through the medium of fluid pressure.

The object of the invention is to provide a simple, practical means whereby the engine may be started automatically by simply turning a valve, and do away with the dangerous practice of cranking.

The invention embodies in its combination a hydraulic or fluid transmission, and it is a particular object to provide for the re-use of the air, gas or other fluid under pressure, employed in starting.

The invention has numerous other advantages and objects which will be apparent hereinafter.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which—

Figure 1 is a side view of an automobile representing the application of the invention. Fig. 2 is a vertical, longitudinal section on line 8—8, Fig. 3. Fig. 3 is a section on line X—X, Fig. 2. Fig. 4 is a longitudinal section on line 4—4, Fig. 3, taken through the pressure regulators with one regulator shown compressed and the other expanded to illustrate their operation; also the casing of one of the check valves broken away. Fig. 5 is a plan of a check valve cage. Fig. 6 is an elevation taken on the section line corresponding to y—y, Fig. 2 and z—z, Fig. 7. Fig. 7 is a section of a transmission case on line 6—6 Fig. 3. Fig. 8 is a side elevation of a coupling ring. Fig. 9 is a side elevation in partial section and part of the starting mechanism. Fig. 10 is a plan of a valve used to effect the transfer of the fluid for starting the engine from one supply tank to the other. Fig. 11 is a section on line w—w, Fig. 10.

A is a drive shaft operated from a gasolene motor or other suitable source of power, and 2 is the driven shaft adapted to be intermittently connected and disconnected with the engine or drive shaft A, operated from engine B.

3 is a gear-case, here shown as fastened to the fly-wheel 4 which latter is carried by shaft A; the gear-case, fly-wheel and shaft A revolving in unison. The case 3 has a cover plate 5 which has a sleeve or hub projection 5′ forming a bearing for and in which shaft 2 revolves.

Shaft 2 carries a gear 6 inside the gear-case 3 and is in constant mesh with two other gears 7—8 which are inside of, and carried by, the gear-case 3; the case 3 forming a housing for the gears 6—7—8 and inclosing two liquid containing chambers or reservoirs 9—10 arranged one on each side of the gears and traveling always with the gear-case and drive shaft. These reservoirs or chambers are each adapted to hold a liquid, such as oil or equivalent; this oil being circulated by the gears back and forth, as will be later described.

Inside of the casing 3 is a central lug or trunnion member 6′ in line with the shafts A and 2, and fitting a central recess in the end of gear 6. The gears 7—8 turn loose on the bolts 7′—8′. The gear 7 is partially inclosed by the segmental walls 11, Fig. 3, and gear 8 is partially inclosed by similar segmental walls 12. Likewise gear 6 is partially inclosed on opposite sides by the segmental walls 13. These wall sections 11—12—13 are approximately tangential, but out of actual friction contact with the gears 6—7—8, which gears co-act on the principle of a gear pump to circulate the oil back and forth between the chambers 9—10, as will be shortly described, and it is by the control of this circulation that motion is imparted to the shaft 2 and the latter operated at any desired speed.

The wall sections 11—13 on one side of gears 6—7 approach each other and are so shaped as to form a starting pressure-chamber 14 adjacent to the point of intermeshing of the teeth of the gears 6—7. This chamber 14 is small compared with the reservoir 9 and communication from the reservoir 9 is had with the starting pressure-chamber 14 through the check valve 15, which valve 15 opens inwardly into chamber 14 and closes so that back-flow cannot take place from 14 into 9. Diagonally opposite chamber 14 the walls 13—12 correspondingly coöperate to form a starting pressure-chamber 14′ on the other side of the gears, which starting pressure-chamber 14′ is in communication with chamber 10 for a liquid flow in one direction through the check valve 15. On the opposite side from chamber 14 the walls 11—13 coöperate to form a regulating chamber 16, outlet from which into 10 is controlled by a valve 17. Similarly the walls 12—13 opposite chamber 14′ form a regulating chamber 16′ controlled by a valve 17′. In the location of the chambers 14—14′—16—16′ and their respective valves 15—15′—17—17′ it is assumed that the fly-wheel casing revolves in the direction of the arrow p and that shaft 2 is ordinarily to be revolved in the direction of the arrow O.

From the foregoing it is understood that if the valves 17—17′ are wide open and the crank case 3 is running at engine speed, the gear 6 and shaft 2 will be stationary and the gears 7—8 will run idle around gear 6. By throttling the valves 17—17′ more or less, the flow of the liquid pumped by the gears would be correspondingly arrested, causing the gear 6 to assume motion consistent with the amount of retardation of the oil flow. The valves 17—17′ are so operated that they will open and close in unison and correspondingly retard more or less the circulation between the chambers 9—10, which valves 17—17′, as here shown, comprise a rotatable plug suitably held in position by gaskets 18. Each plug has a port 19 through which flow takes place and the stem of each plug is spirally grooved, as shown at 20, engaged by a pin carried by the arms 21 on the collar 22, which latter is slidable lengthwise on, and turnable with, hub 5′. Any suitable form of yoke lever may be engaged with the sleeve 22 to move it in and out, and so correspondingly cause the valve plug 17—17′ to open or close ports 19.

When the valves 17—17′ are opened, there is a free and unrestricted circulation between the reservoirs 10—9, because the springs which hold the check valve 15—15′ closed are so light as to practically afford no resistance to the flow from reservoir 9 into chamber 14 and from reservoir 10 into chamber 14′; the pressure being then equalized on opposite sides of gear 6 so that the latter remains stationary and the gears 7—8 run as idle gears around gear 6. By closing or partly closing the valves 17—17′ free circulation of the fluid back and forth between chambers 9—10 is correspondingly restricted, creating a pressure in the regulating chambers 16—16′ which will react on gear 6 to set it in motion and consequently revolve shaft 2; the speed of gear 6 and shaft 2 varying as the valves 21 are opened or closed more or less.

23 represent Y-grooves in the walls of the several chambers 14—16—14′—16′ with branches terminating at the point where the extremities of two teeth come together. They are for the purpose of providing avenues of escape for any liquid which might be otherwise trapped and held in the interdental spaces at these points.

In order to provide for expansion and contraction of the contained circulating fluid due to the alternate heating and cooling of the same, and also to allow escape of the liquid used in starting the engine, as hereinafter described, I provide for each reservoir 9—10, respective automatic relief pressure cylinders 24—24′, each having a respective plunger 25—25′ acted on by the respective springs 26—26′. The inner end of each cylinder is in communication with its respective reservoir, so that the fluid pressure in each reservoir acts directly on the under side of a plunger and tends to force it outward against the action of its springs 26 or 26′. These plungers each have leather packing rings to prevent leaking, and act with yielding force against the contained liquid so that the reservoirs are always practically full of liquid.

The foregoing constitute the essential features of the fluid transmission mechanism by which power is transmitted from the driving member A to the driven member 2; it being assumed that the engine is already started and running. But the important part of the present invention is the provision of means for starting the engine in the first place, and to hold the shaft 2 and gear 6 against turning, whereupon the reactance of the confined fluid in the chambers 14 will set the gears 7—8 in motion by reason of the inequality of pressures on the opposite sides of the gears. This holding the gear 6 stationary results in that case of the gears 7—8 traveling around the gear 6. As the gears 7—8 are carried by, and moved with, the case and crank shaft, the transmission becomes in effect an engine or motor and reacts on the gas engine or prime mover to start it. The means for applying this initial pressure to the transmission and its relationship thereto will now be described.

The cover plate 5 and hub 5′ are provided with two pairs of ducts 30—30′—31—31′. The ducts 30—30′ are fluid pressure inlet passages connecting respectively the starting pressure-chambers 14—14′ with a suitable source of fluid pressure supply admitted through pipe 32. The ducts 31—31′ connect respectively with the interior relief pressure cylinders 24—24′, and are generally out of communication with the respective fluid reservoirs 9—10 by means of the valve plungers 25—25′, as seen by the position of the valve 25′ at the bottom of Fig. 4. The top valve 25 in Fig. 4 is shown as pushed back under the pressure of the fluid in chamber 9 so as to uncover port 31 and allow discharge of fluid from reservoir 9 to take place back to the original source of fluid supply through discharge pipe 33.

The inlet passages 30—30′ are always out of communication with the outlet passages 31—31′, except as above described, through the reservoirs 9—10 and the plungers 25, when the latter are in the position shown at the top of Fig. 4. Of course, it is to be understood that usually both the plunger 25—25′ are opened or closed approximately together, inasmuch as the pressure in the two chambers 9—10 is always approximately equal, and the showing of the plungers in Fig. 4 is simply to represent two different conditions not usually present at the same time. Ordinarily, with the engine running, the plungers would be approximately at the position of the plunger 25′ at the bottom of Fig. 4. It is only in starting the engine, when the excess of fluid is forced into chambers 14—14′ that these plungers take the position represented by 25 at the top of Fig. 4. The fluid used in starting the engine is the same as used in the transmission and is admitted at 32 and discharged at 33. The source of fluid supply to pipe 32 and the manner of the return to pipe 33 for re-use will be described shortly.

In order to connect the pipes 32—33 so that they will always be in communication with their respective ducts 30—30′, 31—31′, with the hub 5′ and transmission case turning, I prefer to employ a coupling ring 34, Figs. 4—8. This ring is preferably made in two parts bolted together and embracing the hub 5′ between the two annular flanges 35—36 formed thereon. The pipes 32—33 are tapped into the ring, and pipe 32 communicates through a lateral port 37 with an annular groove 38 formed in the adjacent face of flange 35; this groove 38 surrounding the hub and communicating with ports 30—30′. Similarly pipe 33 communicates by a port 39 extending laterally in the opposite direction to port 37, with an annular groove 40 formed on the inner face of flange 36 around the hub; this groove 40 communicating with ports 31—31′. Suitable packings 41 are employed to maintain a tight joint between the coupling ring 34 and the coupling flanges 35—36, as it is understood that the ring 34 and pipes 32—33 remain stationary while the hub revolves within the ring. Any suitable means may be employed to deliver oil or other fluid under sufficient pressure through pipe 32 and return it through pipe 33.

In Figs. 9—10—11, I represent a suitable mechanism whereby the liquid used for starting and operating the clutch may be stored and admitted to the clutch and discharged therefrom in a circulating system appropriate for practical purposes. I prefer to employ a pair of tanks 32′—33′ suitably located and connected with one another and with the transmission, so that the contents of one tank delivered to the transmission through the ports 30—30′ may be returned to the other tank through the ports 31—31′. Tanks 32′—33′ may be filled through openings at the top which are normally closed by the plugs 42. The tanks are provided with respective pipes 43—44 near the bottom, these pipes connecting each with a valve casing 45 in which is a valve 46. The pipes 32—33 also connect with the valve casing 45 in the same plane with the pipes 43—44, and the plug is cored, as shown at 47—48, so that any two of these pipes can be brought into communication, as shown in Fig. 11. Valve 46 is a double valve and controls four other pipes, 49—50—51—52. Pipes 49—50 are air pressure supply pipes and connect respectively with the top of the tanks 32′—33′. Pipe 52 connects with a suitable source of air pressure supply, as the air bottle 53. 51 is a vent pipe. 54 is a valve in pipe 52 controlling the admission of air under pressure from the bottle 53 into one or the other of the tanks 32′—33′. When valve 46 stands in one position and cock 54 is open, air will flow from air bottle 53 to the top of tank 32′ and force oil out through pipe 43 and pipe 32 to start the engine. Return oil from the transmission will flow through pipe 33, valve 46 and pipe 44 into tank 33′. If the position of valve 46 is reversed, the flow of liquid will be from tank 33′ through the transmission and back to tank 32′. In order to indicate when the liquid in either of the tanks 32′—33′ has run low, so that ~~the~~ withdrawal of more liquid from the tanks would cause air to be blown into the transmission, which would be quite undesirable, I provide an indicator as follows: Pipe 51 terminates in an inverted, bell-shaped mouth 55, over which is placed a hollow, heart-shaped hood 56, which latter has a discharge back into the glass cylinder 57. 58 are suitable air vents to allow the air which is forced out of the tank as the liquid level rises therein, to escape from the glass gage 57. The pipes 49—50 enter the tanks 32′—33′ a little below their tops, so that as the liquid rises in one tank, say tank 33′, and overflows into pipe 50, the liquid can pass through pipe 50 and valve 46 into the glass gage 57; the presence of any oil flowing into the glass 57 indicating that one tank is nearly full and the other nearly empty, and that it is necessary to reverse the valve 46 and cause a reverse flow of liquid between the tanks.

The operation of the device is as follows: Assuming that it is desired to start the engine, and the parts are in the position indicated in Fig. 9, the operator first locks shaft

2 and gear 6 against rotation, as by applying band-brake 60 to the drum 61 on shaft 2; then the operator turns cock 54 so as to admit air from the pressure bottle or receiver 53 through pipe 49 into the top of tank 32′. The receiver 53 may be an ordinary air bottle in which it is common to store up air pressures up to 3000 pounds per square inch. The admission of this high pressure of air into the top of tank 32′ forces out the liquid from 32′ through pipe 43 and duct 47, Fig. 11, and pipe 32 to the coupling ring 34 and ports 30—30′ to the initial pressure chambers 14—14′. The valves close outwardly so that the only escape for the liquid admitted from tank 32′ into chambers 14—14′ is around the gears 6—7—8. As the gear 6 cannot move by reason of its being held stationary by means of the brake 60 and band pulley 61, or equivalent means, the gears 7—8 are made to travel around gear 6; the oil in chambers 14—14′ finally seeking outlet in the chambers 16—16′ through the open valves 17—17′ into the chambers 10—9. Since the valves 15—15′ are closed, the return of the oil from chambers 10—9 back between the gears is prevented, and the pressure of the oil in chambers 10—9 is gradually stored up until this pressure acts sufficiently on the plungers 25—25′ to push them back into the position represented by 25 at the top of Fig. 4, whereupon this excess of oil in chambers 10—9 flows through ports 31′—31—40 and pipes 33—44 into tank 33′; the oil rising in tank 33′ as it falls in tank 32′. The reactance created by the oil in the chambers 14—14′ against gears 7—8 and the consequent travel of the gears 7—8 around gear 6 carries the casing 3 and engine shaft A around, and results in setting the engine in operation. The moment the engine fires, valve 54 is turned off, whereupon the further flow of oil from the tank 32′ ceases. This operation is repeated whenever it is desired to start the engine, provided the engine will not start on the spark. After repeated operation of starting the engine, the oil in tank 32′ is lowered and the oil in tank 33′ raised, until the operator notices any overflow from tank 33′ at the indicator 55, whereupon valve 46 is reversed so that the air flow from the receiver 53 is into tank 33′ and the return of oil is into tank 32′. Since the transmission uses only a small quantity of liquid in starting, it is manifest that the tanks 32′—33′ need not be very large.

While I described this system of starting in conjunction with my particular type of hydraulic transmission, it is manifest that the same principle is applicable to other systems. The essential idea is the use of the liquid acted on by high pressure through the medium of a suitable transmission mechanism to start the engine. Incidental to this is the transfer of this liquid from one storage tank to another and vice versa, so as to enable a comparatively small quantity of liquid to be used any number of times.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. In a starting mechanism, the combination of an engine, a crank shaft connected therewith, a driven shaft, a gear case carried by one shaft, a fixed gear carried by the other shaft, loose gears in the gear case meshing with the first named gear, said several gears and gear case coöperating to produce fluid passages, and means for applying fluid pressure into the gear case to act on the gears to start the engine.

2. In a starting mechanism, the combination of an engine, a crank shaft connected therewith, a driven shaft, a gear case carried by one shaft, a fixed gear carried by the other shaft, loose gears in the gear case meshing with the first named gear, said several gears and gear case coöperating to produce fluid passages, means for applying fluid pressure into the gear case to act on the gears to start the engine, and means for repeatedly utilizing the fluid so used in starting the engine.

3. In a starting mechanism, the combination of an engine, a crank shaft, a fluid transmission connected therewith, and comprising intermeshing gears co-acting with a gear pump, means for holding one of the gears against rotation, said mechanism inclosing initial starting pressure-chambers, and means independent of the engine for forcing a fluid into said pressure-chambers under pressure for rotating the other gears and starting the engine.

4. The combination of a driving member, a casing secured thereto, a fluid pressure transmission in said casing, a driven member extending from the casing, and means to force a liquid into and out of said casing to rotate the driving member when the driven member is held stationary, said means including an initial source of high pressure, independent liquid reservoirs connectible separately with the initial source and fluid, delivery and return conductors connecting the reservoirs and the casing.

5. The combination of a driving member, a casing secured thereto, a fluid pressure transmission in said casing, a driven member extending from the casing, means to force a liquid into and out of said casing to rotate the driving member when the driven member is held stationary, said means including an initial source of high pressure, independent liquid reservoirs connectible separately with the initial source and fluid, delivery and return conductors

connecting the reservoirs and the casing, and means to collect the fluid so used for use again.

6. In a hydraulic transmission, a driving member, a casing secured thereto, a plurality of gears in said casing forming a gear pump, a shaft secured to one of said gears and extending out of said casing in line with the axis thereof, and means to force a fluid into said casing and around said gears to rotate the driving member when the driven member is held stationary.

7. In a hydraulic transmission, a driving member, a casing secured thereto, a plurality of gears in said casing, means for holding one gear against rotation, and means to force a fluid into said casing and to rotate the other gears.

8. In a hydraulic transmission, a driving member, a casing secured thereto, a plurality of gears in said casing, means for holding one gear against rotation, means to force a fluid into said casing and to rotate the other gears, and means to collect the fluid passed through said casing for use again.

9. In a hydraulic transmission, a driving member, a casing secured thereto, a plurality of gears in said casing, a shaft secured to one of said gears and extending from said casing in line with the axis thereof, a cover for said casing having inlet and exhaust ducts therein, and an automatic pressure regulating piston adapted to uncover the exhaust ducts when a given maximum pressure is exceeded.

10. In a hydraulic transmission, a driving member, a casing secured thereto, a plurality of meshing gears in said casing, a driven member secured to one of said gears and extending from said casing, means to force a fluid into said casing and around said gears to rotate the driving member when the driven member is held stationary, and means to maintain a pressure upon a fluid in said casing above a given minimum at all times.

11. In a hydraulic transmission, a driving member, a casing secured thereto, a plurality of meshing gears in said casing, a driven member secured to one of said gears and extending from said casing in line with the axis thereof, and means to force a fluid into said casing and around said gears to rotate the driving member when the driven member is held stationary.

12. In a hydraulic transmission, a driving member, a casing secured thereto, a plurality of meshing gears in said casing forming a fluid pump, a shaft secured to one of said gears and extending from said casing axially in line therewith, means to force a fluid into said casing and around said gears to rotate the driving member when the shaft is held stationary, and means to maintain a pressure upon the fluid in said casing above a given minimum at all times.

13. In a hydraulic transmission, a driving member, a casing secured thereto, three intermeshing gears in said casing, a driven member secured to the central gear and projecting from the casing in line with the axis thereof, a check valve and a regulating valve adjacent to the point of contact of said gears, and means whereby fluid may be forced into the space between the gears and said check valve to rotate the driving member when the shaft connected with one of said gears is held stationary.

14. In a transmission mechanism, a shaft, a casing secured thereto, a plurality of intermeshing gears in said casing, a shaft secured to a central gear and projecting from said casing axially therewith, said casing having two ducts leading from the hub of the casing to the space adjacent to the contact point of said gears, a check valve adjacent to the end of said duct, means to force a fluid into the space between the gears and said check valves to rotate the driving shaft when the shaft connected with one of said gears is held stationary, and means to collect the fluid used after its removal from said casing.

15. In a hydraulic transmission device, a driving member, a casing secured thereto, a plurality of revoluble pump or engine members in said casing, an outwardly extending shaft connected with one of said members and projecting axially from the casing, said casing having ducts leading from pressure-chambers within said casing, a check valve and a regulating valve in each of said ducts, two fluid supply tanks, and means whereby fluid may be delivered under pressure from one of said tanks into said pressure-chamber, and from the latter to the second fluid-supply tank, to drive the driving shaft when the driven shaft is held in a fixed position.

16. The combination with a transmission mechanism having a driving member, a casing secured thereto, a plurality of intermeshing gears in said casing and forming a gear pump, a shaft leading from the central gear axially away from said casing, of ducts leading from pressure-chambers in the casing, a check valve and a regulating valve in each of said ducts, two fluid supply tanks, and a series of pipes connected with a portion of said casing and adapted to deliver fluid under pressure into and through said ducts and to the other of said fluid supply tanks.

17. The combination with a transmission mechanism, a driving member, a casing secured thereto, a plurality of gears in said casing and forming a gear pump, two fluid supply tanks, an air pressure tank, means to deliver air from said air pressure tank into

either one of said fluid supply tanks, and means connected with said fluid supply tanks to force fluid into and from said casing to operate said driving member.

18. The combination with a transmission mechanism, a driven member, a casing secured thereto, a plurality of gears therein forming a gear pump, a shaft secured to one of said gears and extending away from said casing, a pair of fluid supply tanks, an air pressure tank, means to deliver air from said air pressure tank into said fluid tanks, and means to deliver fluid from either of said pressure tanks into said casing and return the same into the other of said fluid tanks, as will start the driven member.

19. In a starting device for explosion engines comprising a transmission adapted to rotate the engine shaft upon the passage of a fluid therethrough, a pair of fluid tanks, an air pressure tank, a double four-way valve adapted to deliver air pressure upon the fluid in either of said fluid tanks at will and to direct said fluid into said transmission from either of said tanks at will, and pipe connections whereby the fluid passing through said transmission will be returned to said four-way valve and to the other fluid supply tank.

20. In a starting mechanism for explosion engines, a transmission adapted to rotate the engine shaft by means of the passage of a fluid therethrough, a pair of fluid supply tanks, an air pressure tank, a double four-way valve, and pipe connections with the transmission casing, the fluid supply tanks and the air supply tanks whereby said four-way valve may cause the delivery of air under pressure to either of said fluid supply tanks thereby moving fluid from one of said tanks into and through said transmission casing and returning the same to one of the fluid supply tanks.

21. In a starting mechanism, the combination with a hydraulic transmission, of two liquid supply tanks, an air pressure reservoir, fluid connection between the tanks and transmission, and means to admit air from the reservoir to either tank to drive the liquid from one tank through the transmission and return it to the other tank.

22. In a starting mechanism, the combination with a hydraulic transmission, of two liquid supply tanks, an air pressure reservoir, fluid connection between the tanks and transmission, means to admit air from the reservoir to either tank to drive the liquid from one tank through the transmission and return it to the other tank, and an indicator through which the air admitted to either tank is exhausted, said indicator having means for indicating the depletion of the liquid in either tank.

23. In a starting mechanism, the combination with a hydraulic transmission, of two liquid supply tanks, an air pressure reservoir, fluid connection between the tanks and transmission, means to admit air from the reservoir to either tank to drive the liquid from one tank through the transmission and return it to the other tank, an indicator through which the air admitted to either tank is exhausted, said indicator having means for indicating the depletion of the liquid in either tank, said last-named means comprising a glass gage, an air exhaust pipe terminating therein, and a heart-shaped hood over the exhaust pipe to direct the liquid discharged by the latter back into the gage.

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

ADOLPH F. FELLER.

Witnesses:

CHARLES A. PENFIELD,

CHARLES EDELMAN.