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FLUID DRIVE MECHANISM FOR AUTOMOBILES.

APPLICATION FILED DEC. 15, 1916.

1,316,164.

Patented Sept. 16, 1919.

9 SHEETS—SHEET 1.

Fig. 1.

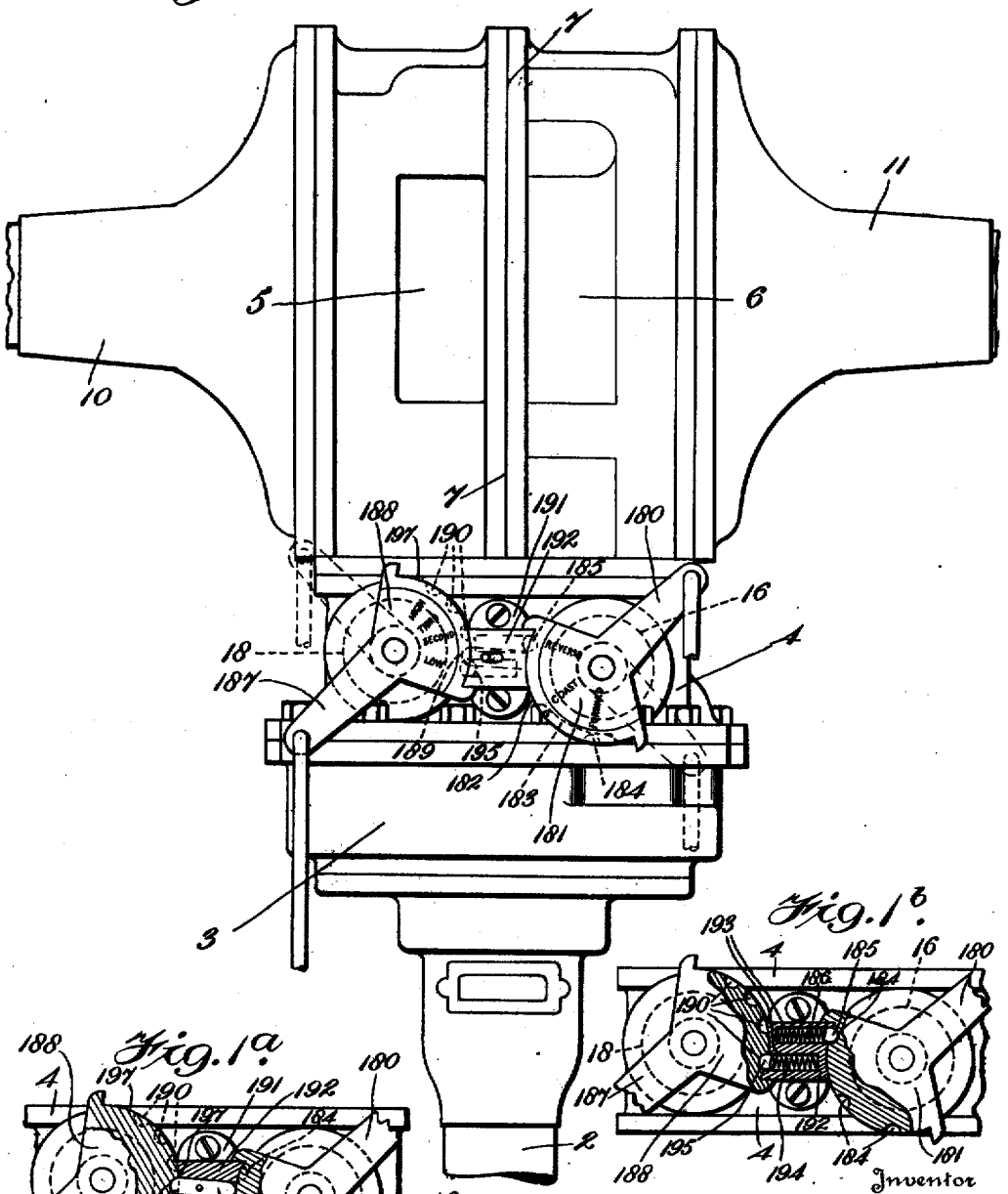


Fig. 1a.

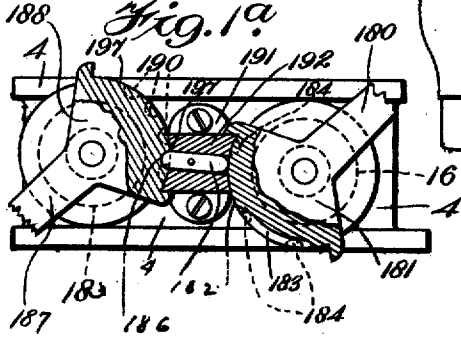


Fig. 1b.

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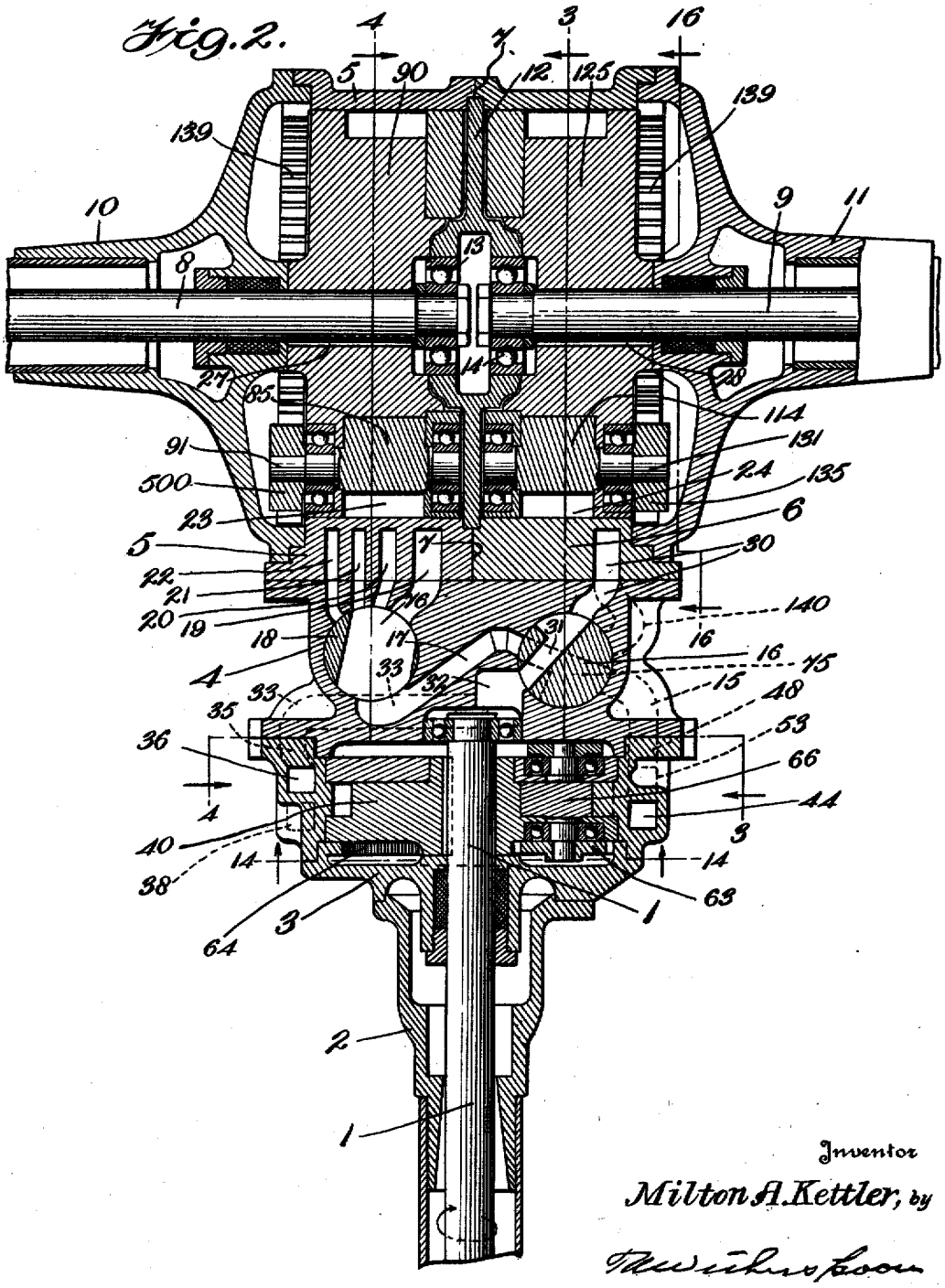
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9 SHEETS—SHEET 2.

Fig. 2.



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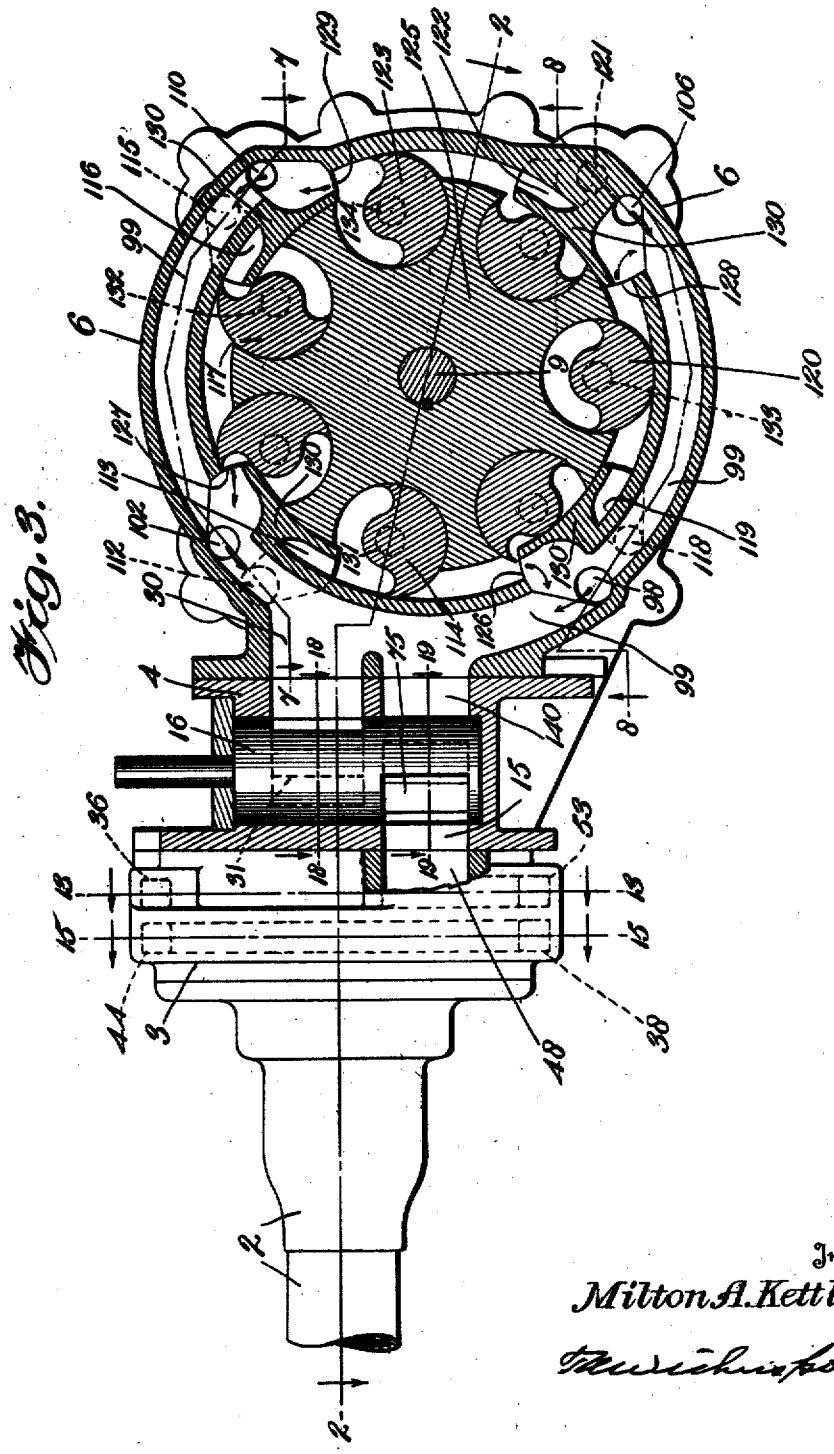


Fig. 3.

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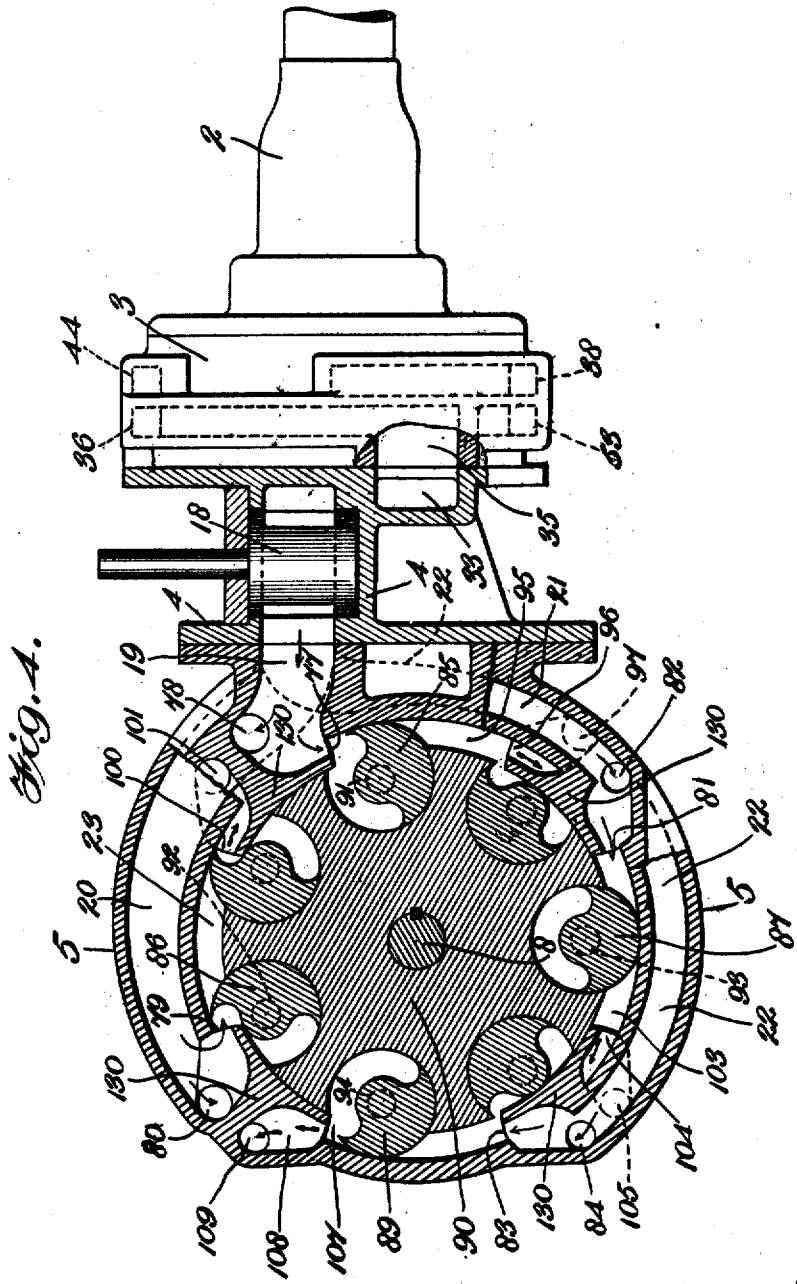
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9 SHEETS—SHEET 4.

Fig. 4.



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9 SHEETS—SHEET 5.

Fig. 6.

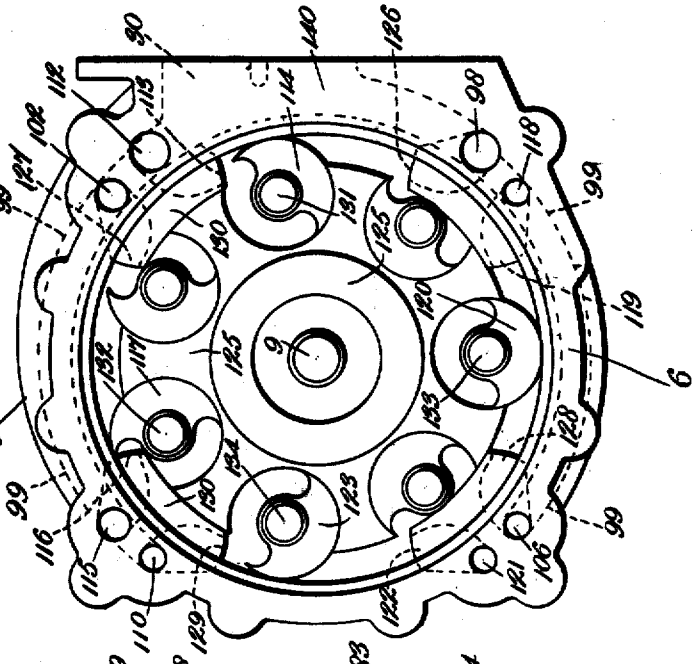
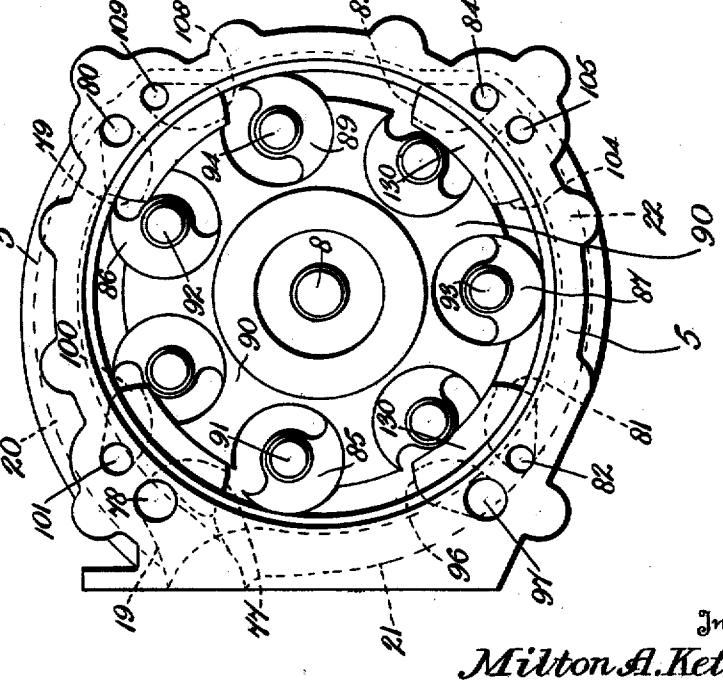


Fig. 5.



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9 SHEETS—SHEET 6.

Fig. 8.

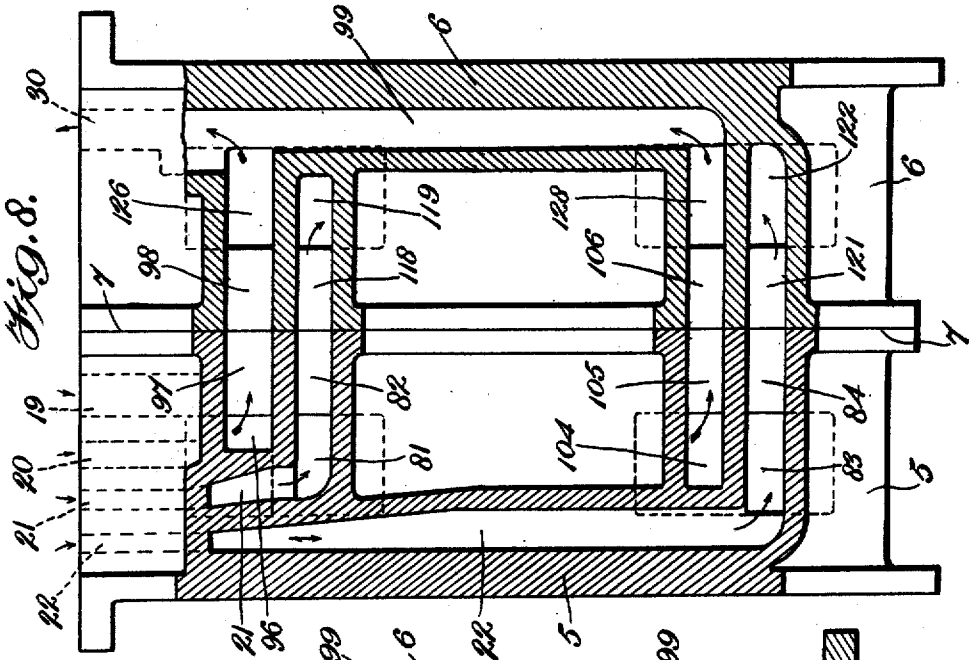
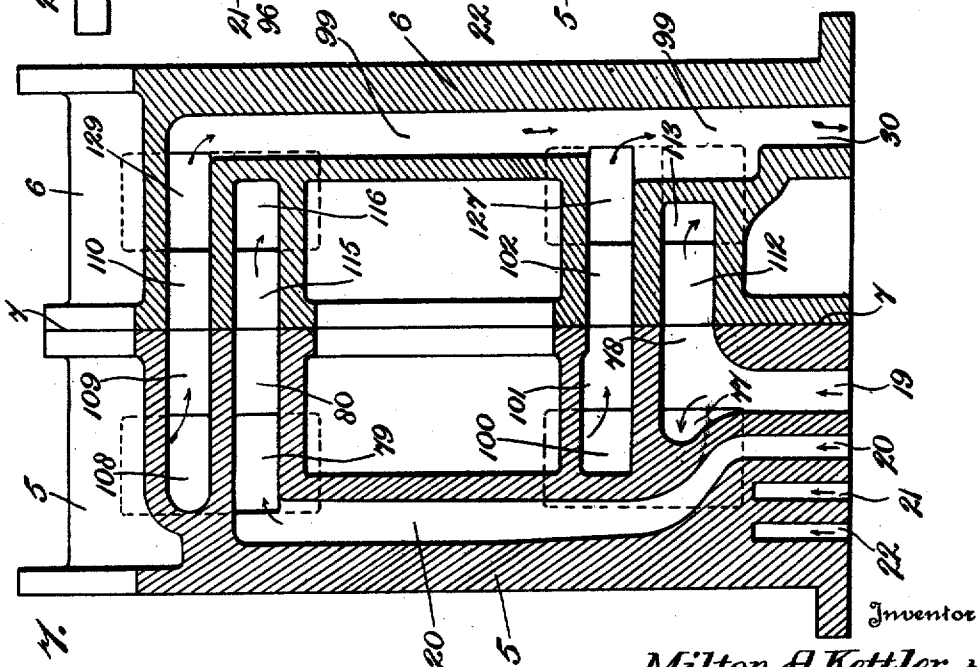


Fig. 1.



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Fig. 9.

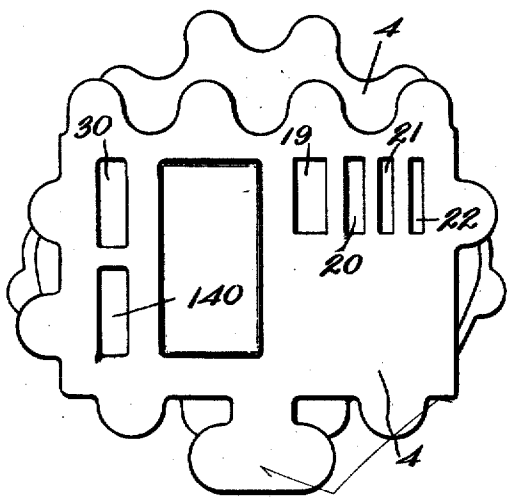


Fig. 10.

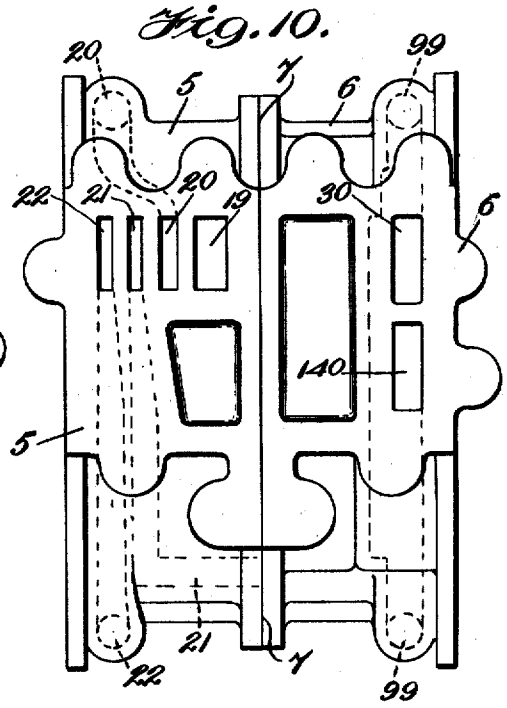


Fig. 11.

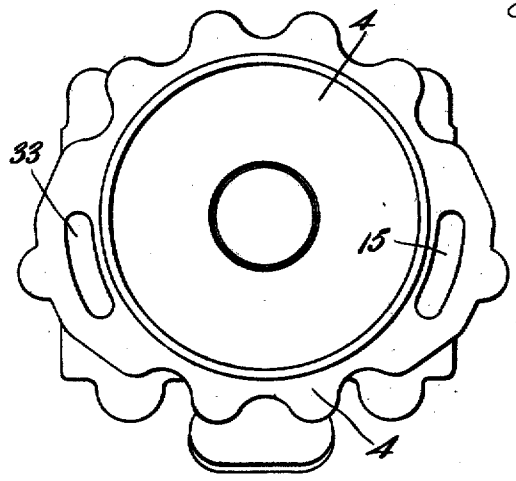
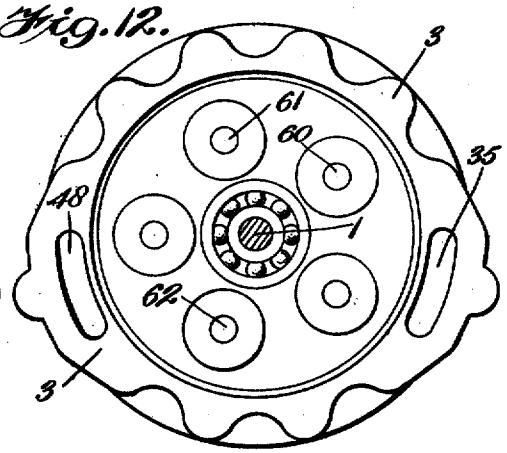


Fig. 12.



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9 SHEETS—SHEET 8.

Fig. 13.

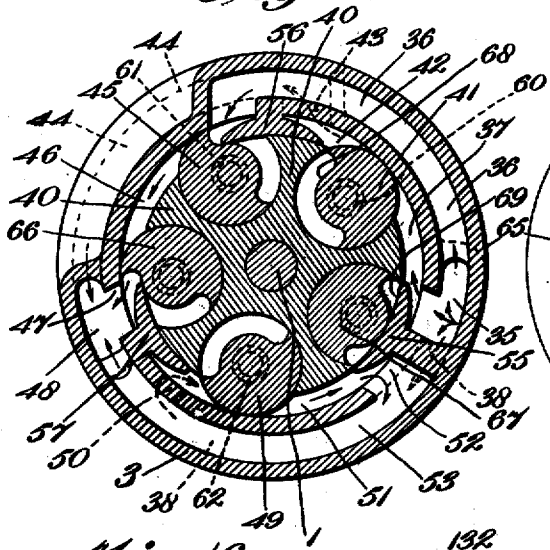


Fig. 14.

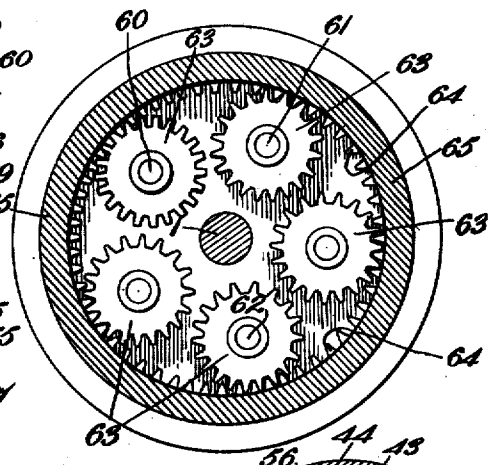


Fig. 15.

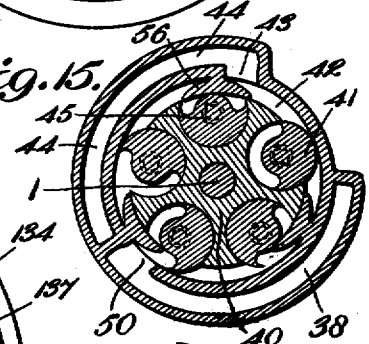


Fig. 16.

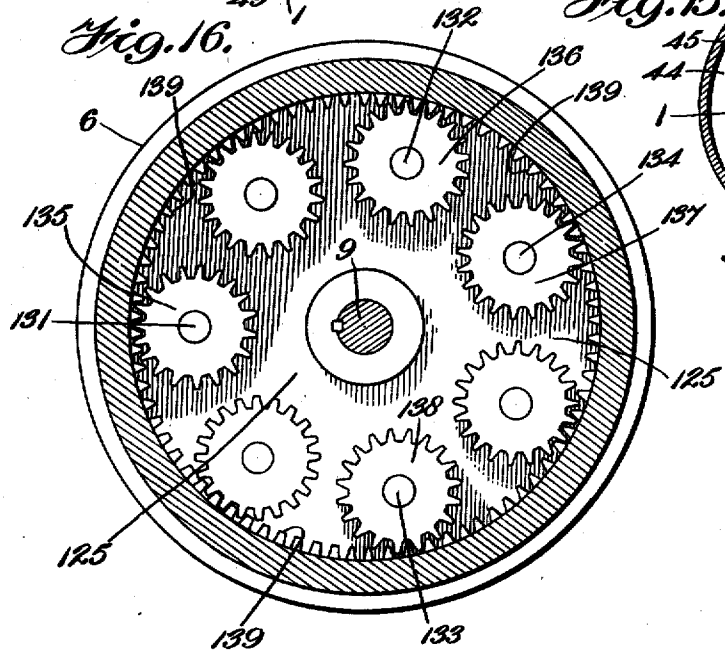
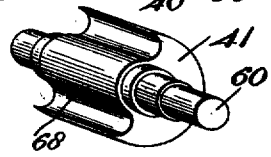


Fig. 17.



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Fig. 18.

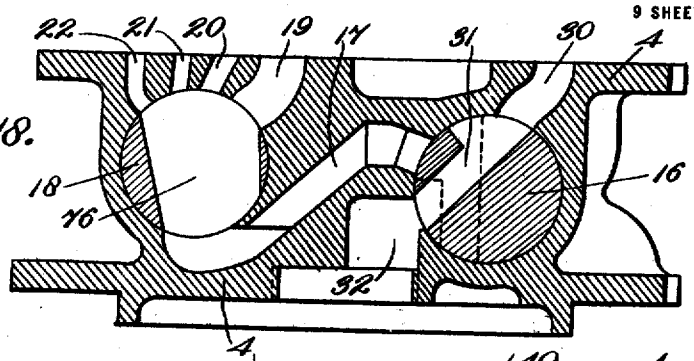


Fig. 19.

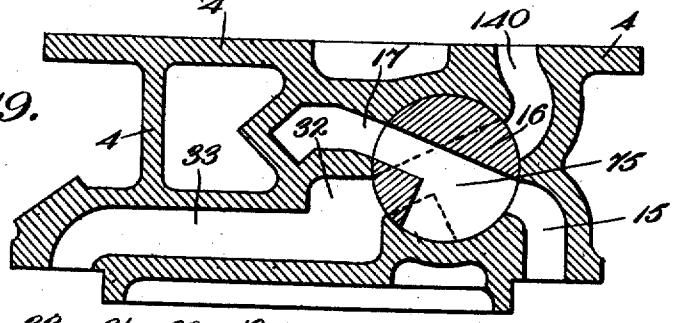


Fig. 20.

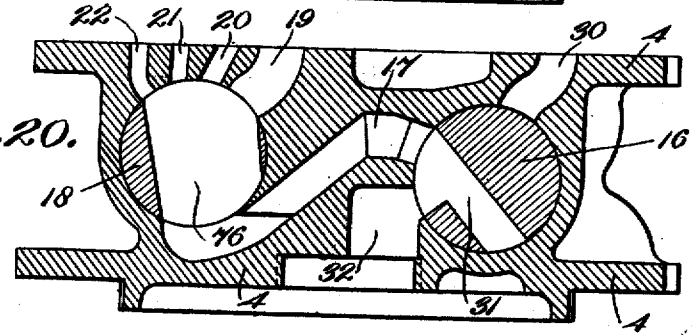
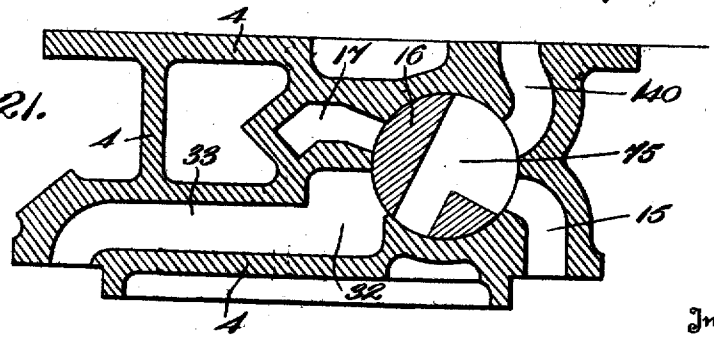


Fig. 21.



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UNITED STATES PATENT OFFICE.

MILTON A. KETTLER, OF WASHINGTON, DISTRICT OF COLUMBIA.

FLUID-DRIVE MECHANISM FOR AUTOMOBILES.

1,316,164. Specification of Letters Patent. **Patented Sept. 16, 1919.**

Application filed December 15, 1916. Serial No. 137,248.

To all whom it may concern:

Be it known that I, MILTON A. KETTLER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Fluid-Drive Mechanism for Automobiles; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a fluid drive mechanism especially adapted for automobiles and has for its object to provide a means of this nature which will be certain in operation, comparatively inexpensive to manufacture and more efficient in action than those heretofore proposed.

With these and other objects in view the invention consists in the novel details of construction and combinations of parts more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the accompanying drawings forming a part of this specification in which like numerals designate like parts in all the views:—

Figure 1 is a plan view of a fluid driving means made in accordance with this invention;

Fig. 1ª is a partially sectional partially plan view of the interlocking mechanism between the controlling valves;

Fig. 1ᵇ is a view similar to Fig. 1ª but showing the interlocking mechanism on a lower plane;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 3, looking in the direction of the arrows;

Fig. 3 is a longitudinal sectional view taken on the line 3—3 of Fig. 2, looking in the direction of the arrows;

Fig. 4 is a view similar to Fig. 3 but taken on the line 4—4 of Fig. 2, looking in the direction of the arrows;

Fig. 5 is an elevational view of the left hand motor as seen in Fig. 2 and showing the same after being separated from the right hand motor along the plane indicated by the numeral 7;

Fig. 6 is an elevational view similar to Fig. 5 of the right hand motor also separated along the plane 7;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 3, looking in the direction of the arrows, and showing the ports and passages of the two driving motors;

Fig. 8 is a sectional view similar to Fig. 7, but taken on the line 8—8 of Fig. 3, looking in the direction of the arrows;

Fig. 9 is an end elevational view of the valve casing adapted to fit against the faces of the casings of the two driving motors illustrated in Fig. 10;

Fig. 10 is an end elevational view of the casings of the motors shown in Figs. 5 and 6, and illustrates the faces against which the parts shown in Fig. 9 fit;

Fig. 11 is a view of the valve casing shown in Fig. 9 but illustrating the opposite face thereof;

Fig. 12 is a view of a portion of the pump casing and mechanism illustrating the face which fits against the valve casing shown in Fig. 11;

Fig. 13 is a sectional view taken on the line 13—13 of Fig. 3, looking in the direction of the arrows;

Fig. 14 is a sectional view on the line 14—14 of Fig. 2, illustrating the gearing with which the parts shown in Fig. 13 are associated;

Fig. 15 is a sectional view similar to Fig. 13 but taken on the line 15—15 of Fig. 3;

Fig. 16 is a sectional view taken on the line 16—16 of Fig. 2, looking in the direction of the arrows;

Fig. 17 is a perspective view of one of the rotating abutments;

Fig. 18 is a sectional view taken on the line 18—18 of Fig. 3, showing the parts in position for forward driving;

Fig. 19 is a sectional view taken on the line 19—19 of Fig. 3, showing the parts in the same position as in Fig. 18;

Fig. 20 is a sectional view similar to Fig. 18 but showing the parts in position for driving to the rear; and

Fig. 21 is a sectional view similar to Fig. 19 and likewise showing the parts in position for reverse driving.

In order that the invention may be the more clearly understood it is said:—The mechanism consists of the main power shaft 1 of the automobile including its casing 2 and a rotary fluid compression pump indicated in general by the reference numeral 3. This said pump 3 is joined as by the valve casing 4 with a pair of rotary fluid motors designated in general by the nu-

merals 5 and 6 respectively. These said fluid driving motors 5 and 6 meet or are joined together along the plane indicated at 7 and the motor 5 is associated with and drives the rear axle 8 while the motor 6 is associated with and drives the rear axle 9. The rear axle 8 is provided with the casing 10. The rear axle 9 is provided with the casing 11, and between the two fluid motors 5 and 6 is located the disk or plate 12 carrying the ball bearings 13 and 14 for the axles 8 and 9 respectively, all as will be clear from the drawings.

Likewise in order to render the description clearer it is said:—In general, fluid is compressed by the pump 3 and is delivered under pressure into the passage 15 (see Fig. 2, dotted lines) whereupon it passes the valve 16 and next passes along the passage 17 through the valve 18 and into one or more of the passages 19, 20, 21 or 22, all as will be more fully disclosed below.

From the passages 19, 20, 21 or 22, a portion of the fluid next enters the passage or space 23 with which the motor 5 is provided and another portion divides in said passages and enters the corresponding annular passage 24 with which the motor 6 is provided, so that the two motors 5 and 6 are joined in multiple and are rotated in the same direction, keys 27 and 28 serving to fix the rotors 90 and 125 of said motors to the axles 8 and 9 respectively all as will presently appear. After the fluid under pressure has thus rotated the motors 5 and 6, it escapes from said motors to the common return passage 99 and enters the passage 30, whence it returns through the passage 31 of the valve 16 into the space 32, into the passage 33, (see dotted lines Fig. 2), and finally returns to the pump 3, thus completing the cycle all as will be now disclosed in detail.

Coming now to the specific construction of the pump 3 and referring particularly to Fig. 13, of the drawings, the fluid to be compressed enters the pump through the passage 35, whence it divides and a portion of the same flows into the passage 36, another portion flows into the passage 37 and a third portion flows through the passage 38, (see dotted lines Fig. 13, and full lines Fig. 15).

Supposing the pump rotor 40 is turning in a counterclockwise direction, as seen in Fig. 13, the rotary abutment 41 thereof will have caught fluid in the space 42 which had previously entered the passage 37, and said fluid will be forced by said abutment 41 through the port 43 into the passage 44, indicated by dotted lines in Fig. 13 and full lines in Fig. 15. In like manner the abutment 45 will force fluid which had previously entered the passage 46 from the passage 36, through the port 47 into the passage 48. In the same way the abutment 49 will catch fluid which has been previously delivered through the passage 38 and the port 50 into the space 51, and force the same through the port 52 into the passage 53. It will be further observed that each of the passages 44, 46 or 53 communicates with the passage 48 so that said passage 48 will receive compressed fluid from all the abutments such as 41, 45 and 49.

In order to enable the abutments such as 41, 45 and 49 to put the fluid under pressure, the pump is provided with the stationary abutments 55, 56, and 57 and the rotary abutments such as 41, 45, and 49 are so connected together, by suitable gearing, that they rotate on their own axes and pass said stationary abutments while maintaining fluid tight joints in the manner well known.

Stated in other language, and referring to Fig. 14 of the drawings, the abutment 41 is mounted on the stud shaft 60, while the abutment 45 is mounted on the stud shaft 61 and the abutment 49 is mounted on the stud shaft 62. Each of the stud shafts is provided with a pinion or gear 63 as shown in Fig. 14, and these pinions mesh with the internal gear 64 carried by the outer casing member 65 so that as the rotor 40 rotates on the shaft 1, the abutments revolve around said shaft and rotate on their own particular stud shafts, as will be clear from Fig. 14.

In like manner the abutments 66 and 67 are provided with stud shafts and gears meshing with the internal gear 64, and the parts are so timed that each rotary abutment will pass its corresponding stationary abutment while maintaining a liquid tight contact between its surfaces such as 68 and the surface such as 69 of the corresponding stationary abutment in the manner well known.

The liquid having been brought under pressure to the passage 48, (see Figs. 13, 2, and 3,) in the manner disclosed above, it is forced from said passage 48 into the passage 15, (see dotted lines Fig. 2,) to and through the valve 16, which being in its go ahead position (shown in Fig. 19) permits the liquid to follow the passage 75 with which said valve 16 is provided and to enter the passage 17 in the valve casing 4. From said passage 17 the said liquid enters the passage 76 in the valve 18, whence it passes to the said individual passages 19, 20, 21, and 22 above mentioned, (see Figs. 2, 4, 18, 19 and 20.)

Referring more particularly to Fig. 4 it will be observed that the passage 19, for example, leads the liquid to the port 77 and also to the port 78. The passage 20 leads the liquid in like manner to the ports 79 80. The passage 21 leads the liquid to the ports 81 82, while the passage 22 leads the liquid to the ports 83 84. Accordingly, it will be

clear from Figs. 4, 7, and 8, that as the liquid under pressure passes through the ports 77, 79, 81 and 83, it strikes the respective rotary abutments 85, 86, 87 and 89, and that the said abutments will be bodily revolved around the rear axle 8 as a center thus carrying the disk or rotor 90 with them.

Further, as explained in connection with Fig. 13 of the drawings, the respective abutments shown in Fig. 4 are mounted on stud shafts such as 91, 92, 93 and 94, which stud shafts carry respectively pinions or gear wheels disposed in a manner similar to those shown in Fig. 14, and which will be more fully explained later in connection with Fig. 16.

These said pinions or gear wheels one of which 500 is shown in Fig. 2, as mounted on the stud shaft 91 and as meshing with the internal gear 139 serve to rotate their respective stud shafts in such a manner as to cause the respective rotary abutments such as 85, 86, 87 and 89 to make liquid tight joints with their corresponding stationary abutments 130. The rotor 90 and rear axle 8 being thus revolved under the pressure of the liquid on the said rotary abutments the said liquid escapes from the motor 5 in the following manner:—

The liquid pressing on the rotary abutment 85 for example, enters the passage 95, passes into the passage 96, and finally escapes through the passage 97, to the passage 98 and into the passage 99 or common return chamber with which the motor 6 is provided, (see Figs. 3, 4, 5, 6, 7 and 8.) As above stated, Figs. 5 and 6 represent the driving motors 5 and 6 separated along their dividing plane 7 (see Figs. 1, 2, 7 and 8) and their normally meeting surfaces in said plane are shown uppermost in each figure.

In the same manner the liquid under pressure in the passage 23 of motor 5, passes into the passage 100 through the port 101, through the port 102 of motor 6, (Figs. 6 and 7) and from port 102 to said common return passage 99. Likewise liquid under pressure from abutment 87 in the passage 103, escapes through passage 104, port 105 in motor 5 and port 106 in motor 6 to said common return 99. The liquid being compressed by abutment 89 in passage 107 in motor 5, escapes through the chamber or passage 108, port 109 in motor 5, to port 110 in motor 6, and to said common return passage 99.

The liquid under pressure from motor 5 being thus delivered to passage 99 in motor 6, said liquid passes through passage 30 of said motor, through passage 31 of valve 16 and into port or passage 32 of the valve casing 4, (see Figs. 2, 18 and 19) and from said passage 32 along passage 33 to passage 35 of the pump casing 3, thus completing the circuit.

Going back to the fluid in passage 19, (Figs. 2 and 7,) as above stated, the said fluid divides between the motors 5 and 6, a part serving to revolve the motor 5 in the manner just disclosed, and another part revolving the motor 6 in the manner now to be described.

That is to say:—Referring to Figs. 3, 4, 5, 7 and 8, and especially to Figs. 4 and 7, that portion of the liquid from passage 19 which drives motor 6, reaches the said motor through the passages 78 and 112, (see full lines Fig. 7 and dotted lines Fig. 3) and from said passage 112 this portion of said liquid enters port 113, (Fig. 3) and exerts pressure against the rotary abutment 114. In the same way another portion of liquid from passage 20 enters port 80 in motor 5, as above stated, and goes to passage or port 115 of motor 6 through port 116 and exerts pressure on abutment 117. Likewise that portion of the liquid from passage 21, passing through the port 82 in motor 5, enters port 118 in motor 6 and through port 119 exerts pressure on abutment 120. Again, that portion of the liquid from passage 22, going through port 84 in motor 5, passes through passage or port 121 in motor 6 and through port 122 and exerts pressure on abutment 123.

The pressures thus exerted on the abutments in motor 6 such as 114, 117, 120 and 123, will turn the rotor 125 of said motor 6 in a counterclockwise direction (as seen in Fig. 3) and will correspondingly turn the rear axle 9 on which said motor is mounted.

After the abutment 114 passes the port 126, its impelling liquid escapes through said port into said common return 99. After said abutment 117 passes the port 127 its impelling liquid likewise escapes into said common return 99. And in the same manner, after the abutments 120 and 123 pass their respective ports 128 and 129, their corresponding impelling liquids likewise escape into said common return 99. The liquid from motor 6 being thus all delivered into said return 99, it passes through the valve 16, and back to the pump 3 in the manner above disclosed.

As above mentioned, the rotary abutments in the motors 5 and 6 maintain liquid tight connections as they pass their corresponding stationary abutments such as 130, and this is accomplished in a manner similar to that explained in connection with Fig. 13. That is to say, each rotary abutment is provided with a stud shaft such as 91, 92, 93 and 94 in motor 5, and such as 131, 132, 133 and 134 in motor 6.

Each stud shaft carries a pinion or gear wheel, those corresponding to the stud shafts of motor 5 not being illustrated except pinion 500 in Fig. 2, but those corresponding to the stud shafts of motor 6 are illustrated

in Fig. 16, and are lettered respectively 135, 136, 137 and 138. Of course, each motor 5 and 6 carries an annular gear 139 with which the pinions of each stud shaft engage. And further, the parts are so timed, as explained in connection with Fig. 13, that each rotary abutment of each motor is turned on its own axis at just the right speed to maintain a liquid tight joint between its surface and the surface of its corresponding stationary abutment 130, all in the manner well known.

When it is desired to reverse the rotation of the rear axles 8 and 9, it is only necessary to turn the valve 16 (see Figs. 2, 18 and 19) from the go ahead position there shown to the reverse, or backing position illustrated in Figs. 20 and 21. When this reversal of the valve 16 occurs, fluid will pass from the pump 3 along the passage 15 through the passage 75 of said valve 16, (see Fig. 21), and into the passage 140 of the valve casing 4. From the passage 140, the fluid will enter the passage 99 of the motor 6, and one portion of the fluid will enter the port or passage 98 in a direction opposite to that indicated by the arrow in Fig. 3. This portion of the fluid will directly operate the motor 5 in the manner to be referred to presently. The other portion of the fluid in the passage 99 will traverse the passages and ports of said motor 6 in directions opposite from those of the forwardly driving fluid described above. In fact, fluid from said return passage 99 will now be distributed through the various appropriate ports and passages in the motor 6 in directions precisely opposite to those described above in connection with said forwardly driving fluid, and it will go from said motor 6 to the motor 5 and finally enter the passages 19, 20, 21 and 22 of said motor 5, and thence will pass in directions opposite to those above described, and enter the port 76 of the valve 18, the passage 17 of the valve casing 4, and from said passage 17 will pass through the port 31 of the valve 16, the passage 32 of said valve casing, the passage 33 of said valve casing, (see Fig. 21) and back into the pump 3. The other portion of the fluid in the common return 99 which was stated to have entered the port 98 in a direction opposite to that indicated by the arrow in Fig. 3, passes from said port 98 directly into the motor 5, whence it traverses the various ports and passages of said motor in directions opposite to those described above in connection with the first mentioned compressed fluid, and exerts pressure upon the various rotary abutments of said motor 5, whence it is exhausted from said motor 5 into the above mentioned passages 19, 20, 21 and 22, whence it follows the course of the other reverse driving fluid just mentioned.

As above stated, the reverse driving fluid from passage 140 enters the passage 99, and the fluid just traced back to the pump refers to that portion which entered the motor 5 through the ports 98, and 97. But as will be clear from Fig. 3, other ports such as 106, 110 and 102 are also fed from passage 99, and each portion of reverse driving fluid through said last mentioned ports will likewise take a reverse direction through motor 5 and operate the other abutments such as 86, 87 and 89, whereupon these last mentioned portions of reversing fluid will return finally through the passages 20, 21 and 22 to the valve 18 and back to the pump in the manner just described in connection with the said first portion of reversing fluid.

Coming now to the method of changing the speed of this improved fluid driving mechanism, it is accomplished as follows: Supposing the rear axles 8 and 9 are being driven in their forward direction at a low speed and it is desired to increase the same. It is only necessary to turn the valve 18 in a clockwise direction as shown in Fig. 2, whereupon one or more passages such as 20, 21 will be cut out. The effect of thus reducing the number of passages for the fluid under pressure entering the motor 5 is to increase the velocity of the remaining fluid such as that passing through the passage 19, for example, and this increased velocity in the driving fluid will cause a corresponding increase in the velocity of the rotor 90 as well as in the rotor 125 and therefore, the said rear axles 8 and 9 will be speeded up. On the other hand, when it is desired to cut down the speed of the rear axles 8 and 9, it is only necessary to open one or more of the ports such as 20, 21 and 22, thus permitting a freer passage of the driving fluid, and thereby lowering the speed of travel of the same. The same operations could be employed to change the speed when the motors are reversed. But for practical reasons, the valves 16 and 18 are so geared together that it is only possible to reverse the motors after having attained the lowest speed. The manner in which this is accomplished is as follows:—

Referring particularly to Figs. 1, 1^a and 1^b, it will be observed that the valve 16 is provided with the operating lever 180 which carries the sector 181, which sector carries the smooth surface 182 extending about 45°, and also carries the slot 183, extending a lesser number of degrees. In a lower plane, as is indicated in Fig. 1^b, the said sector 181 is provided with a plurality, preferably three, semi-spherical depressions 184 adapted to receive when in different angular positions, the detent ball 185 controlled by the spring 186.

In like manner, the valve 18 is provided with a controlling lever 187 provided with a similar sector 188, and which last named sector carries a single semi-spherical notch

189 in the same horizontal plane as the groove 183. Below this said notch 189, however, the said sector 188 carries on its vertical face a plurality of semi-spherical depressions 190 preferably four in number, or one for each change of speed desired. These last named semi-spherical notches 190 are preferably located in the same horizontal plane as the semi-spherical notches 184 carried by the sector 181.

Between the two valves 16 and 18 is located the bracket member 191 provided with the vertical extension 192 and which extension is further provided with two bores 193 accommodating the two springs 186 and 194. The detent ball 185 serves to hold the valve 16 in any position to which it may be turned, and the detent ball 195 serves a similar purpose in connection with the valve 18. But, referring to Fig. 18, for example, when the valve 18 is in the position shown, its sector 188 will be in the position shown in Figs. 1, 1^a and 1^b, and when in this last mentioned position the detent pin 196 carried by the bracket extension 192 will at one end engage the single notch 189, and at its other end engage the curved surface 182 on the sector 181. It thus follows that the valve 18 being in its slowest speed position, or the position in which the compressed fluid entering the motors has its lowest predetermined speed, the said valve cannot be turned until the valve 16 is so turned as to bring the groove 183 opposite said other end of said detent pin 196. But when the said curved surface 182 thus locks the valve 18, the valve 16 is in its reversing position shown in Figs. 20 and 21.

In other words, it follows that the valves 16 and 18 are so connected that the motors cannot be reversed until their compressed fluid is first brought to its lowest predetermined speed. Again, when the valve 16 is in either its forward or neutral position, (see full and dotted lines Figs. 19 and 20), the valve 18 may be freely turned to any desired position, one end of the detent 196 being in such case accommodated by the slot 183 while its other end rides on the smooth surface 197.

The operation and construction of this improved fluid driving mechanism will be readily understood from the foregoing but may be briefly summarized as follows:—

Referring more particularly to Figs. 1, 2 and 9 to 12, 3 represents any suitable form of rotary compression pump adapted to place fluid fed thereto under pressure, and adapted to operate in a closed fluid circuit. The outer casing of said pump is provided with a surface such as is shown in Fig. 12, for example, and against this surface fits, as along the plane indicated by the beginning of the section lines 3 and 4, a valve casing lettered 4, the contacting surface of which is illustrated in Fig. 11. The said valve casing 4 is provided with another flat surface indicated in Fig. 9 which surface fits against a corresponding surface of the casings of motors 5 and 6, and which corresponding surface is illustrated in Fig. 10. The parts being thus assembled as best illustrated in Fig. 2, and a given quantity of fluid being confined in the passages and ports of the assembled mechanism, upon starting the rotor 40 of the pump, fluid will be compressed in the passage 15, whence it will be forced through the passage 75 of the valve 16 into the channel 17 and into the channel 76 of the valve 18, whence said fluid will be distributed through the passages in multiple lettered 19, 20, 21 and 22. These said passages, as will be clear from Figs. 2, 4, 7 and 8, extend considerable distances into the motor casing around the rotor 90.

Further, each passage such as 19, for example (see Fig. 4), has leading away from it, a port such as 78 and which port registers with a corresponding port such as 112 in the casing of the companion motor 6, see especially Fig. 7. It thus results that as the fluid under pressure is passing through the said multiple passages 19, 20, 21 and 22, it divides in each passage and a portion thereof serves to turn the rotor 90 of the motor 5, while another portion thereof passes on through the casing of motor 6, and serves to simultaneously turn the rotor 125 of said motor 6. The fluid under pressure after having served its function in turning the rotor 90 is exhausted, or rather escapes into the passage, or common return 99 (see Figs. 3, 7 and 8) and the other portion of the fluid which turns the rotor 125 of the motor 6, likewise escapes from said rotor into the same passage 99, as will be clear from Figs. 7 and 8. The said common return passage 99, as is best illustrated in Fig. 3, communicates with the common return passage 30 which communicates with the return passage 31 of the valve 16, (see Fig. 2), with the passage of chamber 32, and with the passage 33 of the valve casing whence it finds its way into the return passage 35 of the pump and thus its circuit is completed.

When it is desired to reverse the motors 5 and 6, it is only necessary to turn the valve 16, say 90°, whereupon instead of the ports and passages being disposed as illustrated in Figs. 18 and 19, they will be disposed as illustrated in Figs. 20 and 21. When in these last named positions, the fluid will take a reverse course through the various ports and passages of the two motors and valve casing, and will be returned to the same chamber or passage 32, passage 33 and passage 35 of the pump whereupon its circuit will be again completed.

However, for practical reasons it is not desired to go from a high forward speed to

a reversal of the motors and for this reason the mechanism shown in Figs. 1, 1ª and 1ᵇ is provided. That is to say:—As fully explained above, the valves 16 and 18 are so interlocked that a change of speed in a forward direction is readily accomplished but a reversal of the motors can only be had when the said motors are running at a predetermined low speed.

In addition to the above, when it is desired to stop the motors without stopping the pump, it is only necessary to turn the valve 16 from the full line position shown in Fig. 18 through an angle of 45° or until its port 31 occupies the position indicated in dotted lines in Fig. 18. In the same way, when the valve 16 is thus moved through an angle of 45°, the port 75 shown in full lines in Fig. 19, will occupy the position indicated in dotted lines in said Fig. 19. When the said valve 16 has been thus moved through an angle of 45° and its ports 31 and 75 occupy the respective positions indicated in dotted lines in Figs. 18 and 19, fluid will be passed directly from the passage 15, (see Fig. 19) through the port 75 occupying its dotted line position into the chamber 32 and through the passage 33 into the passage 35 of the pump, and thus the said fluid will be circulated around and around without exerting any pressure upon the motors 5 and 6.

When going around curves and under other similar conditions, as is well known, it is necessary for one wheel or axle to move faster than the other wheel, or axle. In mechanical drives this contingency is provided for by the well known differential gearing employed. This compressed fluid drive, however, provides for the same differential movement or differences in speed between the two wheels, as will be clear from the above description and the drawings, for the outer casings of the two motors remain fixed and the two rotors 90 and 125 can move at different speeds independently of each other.

In other language, said rotors each can move at any speed they may be driven at without disturbing the other in the least. Therefore, should the rotor 90, for example, encounter less resistance in turning its shaft 8 than the rotor 125 encounters in turning its shaft 9, the said rotor 90 will speed up and therefore turn faster than will the rotor 125; and since the ports and passages illustrated in Figs. 7 and 8, are all in the fixed casings of the said rotors 90 and 125, they are not brought out of register, and it follows that the motors function precisely the same whether they are driven at the same speed or at different speeds.

It will also be clear that with this improved fluid driving mechanism, should one wheel get stuck in the mud or in a rut, if different brakes are provided for the wheels, it is a simple matter to apply the proper brake to the wheel which is in the rut and thus prevent it absolutely from turning. The stuck wheel being thus held fast the other wheel will receive double the power and therefore, a powerful effort can be exerted to extricate the machine.

It will now be clear that this improved fluid compressed driving mechanism does away with the usual clutch between the engine shaft and the propelling shaft of automobiles. It further does away with the change speed gears which are usually employed in automobiles and it likewise does away with the mechanical differential mechanism which is usually employed on the rear axle to drive the same. These said changes in the driving mechanism of automobiles enables the omission of the usual clutch pedals in front of the chauffeur as well as the doing away with the gear changing lever, and therefore, it makes the operation of an automobile much simpler than is now required in the machines in general use.

It is obvious that those skilled in the art may vary the details of construction as well as the arrangement of parts without departing from the spirit of the invention and therefore, I do not wish to be limited to the above disclosure except as may be required by the claims.

What I claim is:—

1. In a fluid driving means for automobiles the combination of a rotary pump adapted to place the fluid under compression; a rotary power shaft for rotating said pump; a motor having rotary abutments adapted to be driven by said fluid; a connection between said pump and motor comprising driving and return passages and a plurality of channels in multiple within the casing of said motor; and rotary means adapted to cut off one or more of said channels to change the speed of said motor, substantially as described.

2. In a fluid driving means for automobiles the combination of a fluid compressing pump; a pair of motors having rotors; casings and multiple connections between said pump and one of said rotors; rotary means to close at will one or more of said connections and thereby cause the fluid in the other connections to move at a higher velocity; additional multiple connections between said motors; a driven shaft rigid with each rotor; and means for supporting the ends of said shafts within said casings, substantially as described.

3. In a fluid driving means for automobiles the combination of a pair of independent axles; a motor on each axle adapted to drive the same independently of the other axle; a pump for supplying fluid under pressure to each motor; connections in multiple between said pump and one of said motors;

additional connections between said pump and the other of said motors; and means comprising a pair of valves adapted to independently control both sets of connections and thereby to regulate the speed of, as well as to readily reverse the flow of fluid through said motors, substantially as described.

4. In a fluid driving means for automobiles the combination of a pair of axles; a pair of motors mounted on said axles; means for supplying compressed fluid to said motors; means comprising a plurality of channels in multiple and a rotary controlling valve for changing the speed of travel of said fluid through said motors; means comprising an independent rotary valve for reversing the direction of flow of said fluid through said motors; and means including spring detents for preventing the operation of said reversing means except when said fluid is flowing at a predetermined minimum speed through said motors, substantially as described.

5. In a fluid driving means for automobiles the combination of a pair of axles; a pair of motors mounted on said axles; casings for said motors; means for supplying compressed fluid to said motors; means comprising a plurality of channels in multiple in one of said motor casings and a rotary valve for changing the speed of travel of said fluid through said motors; means comprising a plurality of passages in the other of said motor casings and an independent rotary valve for reversing the direction of flow of said fluid through said motors; and means including a slidable detent coacting with said valves for preventing the operation of said reversing valve means except when said fluid is flowing at a predetermined minimum speed through said motors, substantially as described.

6. In an apparatus of the class described the combination of a pair of valves controlling fluid passages; means coacting with said valves adapted to hold each of the same in any desired adjusted position; and interlocking means between said valves adapted to prevent the one valve from turning until the other valve has reached a predetermined position, substantially as described.

7. In a fluid drive mechanism for automobiles the combination of a pair of independent axles; a rotor on each axle adapted to drive the same independently of the other axle; a casing surrounding one of said rotors provided with a plurality of fluid passages in multiple; a second casing surrounding the other of said rotors, provided with a common return and with a reversing fluid passage; connections in multiple between said casings; a rotary valve adapted to successively cut in and cut out the passages in said first named casing and to thereby control the speed of said rotors; a second rotary valve associated with the pasasges of said second casing adapted to control the direction of the fluid in all of said passages; and a rotary pump adapted to furnish fluid under pressure to said valves, substantially as described.

In testimony whereof I affix my signature, in presence of two witnesses.

MILTON A. KETTLER.

Witnesses:
WM. P. HARTLEY,
C. C. ADAMS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."