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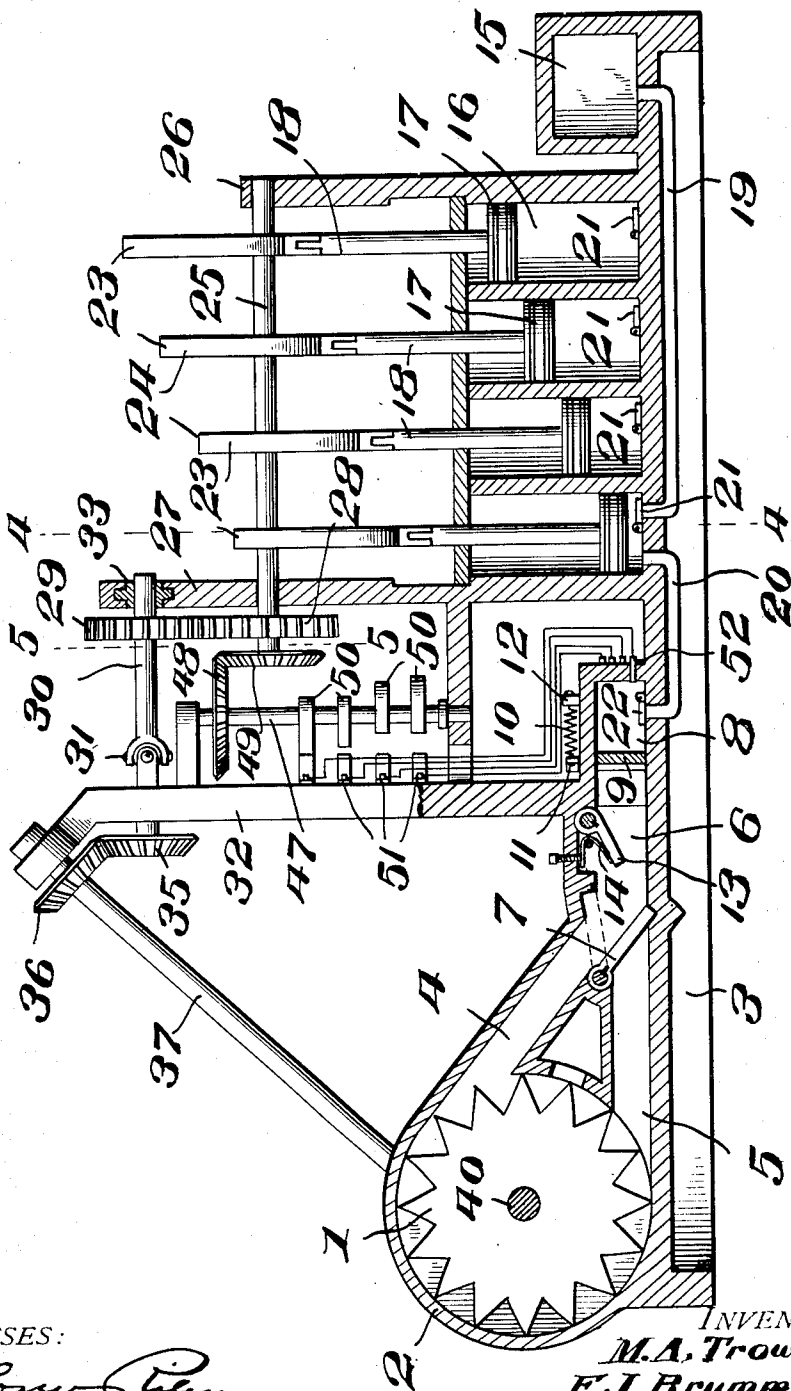
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M. A. TROW & F. J. BRUMMER.
AUTOMATIC CHARGING MECHANISM FOR ENGINES.

APPLICATION FILED MAY 16, 1907.

4 SHEETS—SHEET 1.

Fig. 1.



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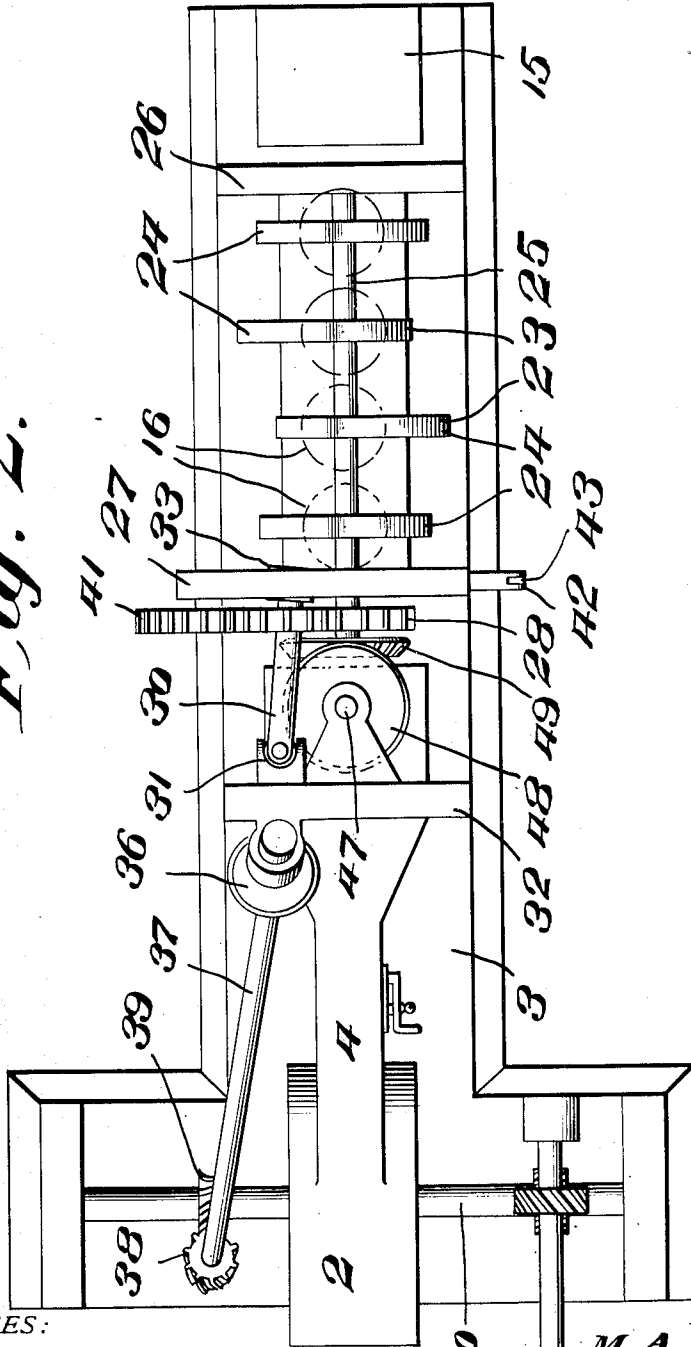
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Fig. 2.



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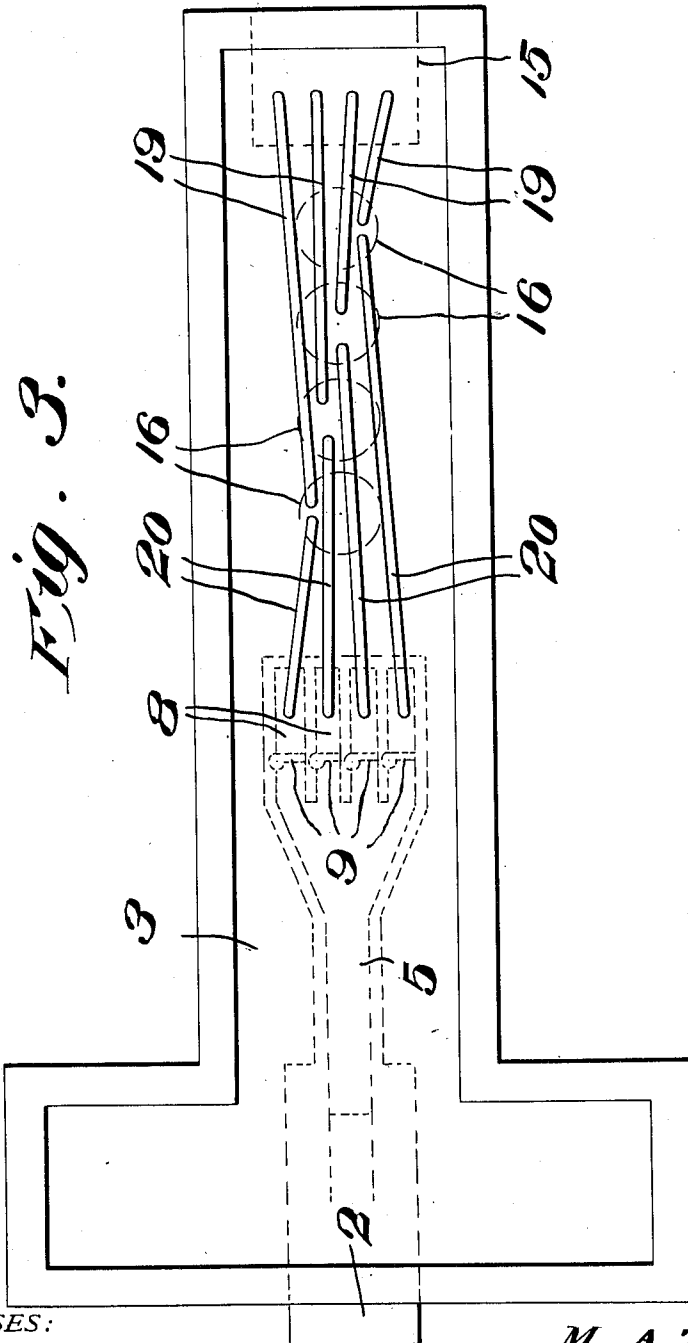
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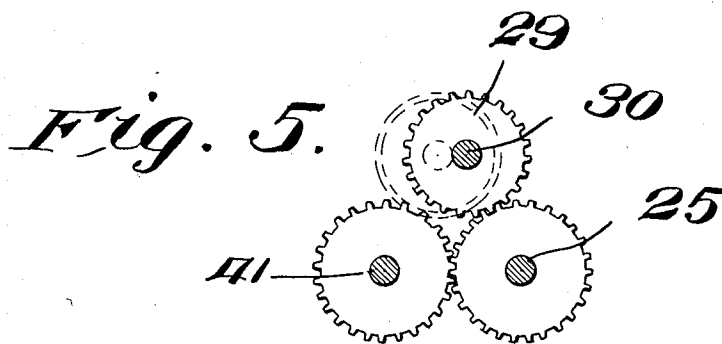
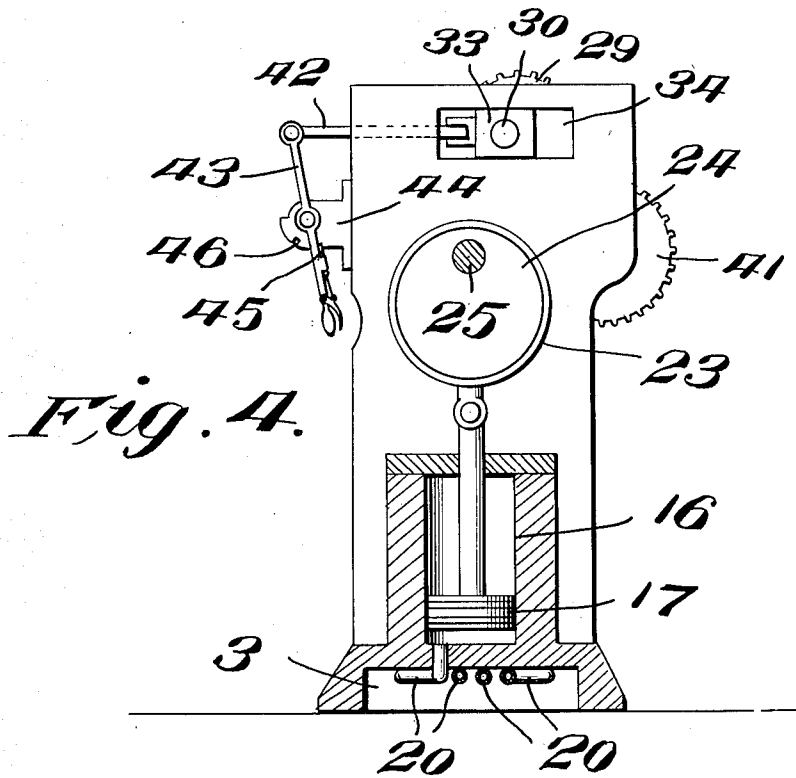
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

MILTON A. TROW AND FREDRICK J. BRUMMER, OF AVOCA, MINNESOTA.

AUTOMATIC CHARGING MECHANISM FOR ENGINES.

No. 895,603.

Specification of Letters Patent.

Patented Aug. 11, 1908.

Application filed May 16, 1907. Serial No. 374,065.

To all whom it may concern:

Be it known that we, MILTON A. TROW and FREDRICK J. BRUMMER, citizens of the United States, residing at Avoca, in the county of Murray and State of Minnesota, have invented certain new and useful Improvements in Automatic Charging Mechanism for Engines; and we 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.

Our invention relates to new and useful improvements in automatic charging mechanism for combustion engines and is an improvement over our former invention as applied for under date of August 20, 1906 and bearing Serial Number 331,392, and our object is to provide means for continuously feeding an explosive to the combustion chamber of the engine.

A further object is to provide means for rotating the charging mechanism in the same direction at all times.

A still further object is to provide means for igniting the fuel when deposited in the combustion chamber.

Other objects and advantages will be hereinafter referred to and more particularly pointed out in the claims.

In the accompanying drawings which are made a part of this application, Figure 1 is a longitudinal central sectional view through our improved charging mechanism and showing the same attached to a gas engine. Fig. 2 is a top plan view thereof. Fig. 3 is a bottom plan view thereof. Fig. 4 is a sectional view as seen on line 4—4 Fig. 1, and, Fig. 5 is a sectional view as seen on line, 5—5 Fig. 1.

Referring to the drawings in which similar reference numerals designate corresponding parts throughout the several views, 1 indicates a piston of that class adapted to be used in connection with rotary engines which is mounted in a suitable cylinder 2, said cylinder in turn being carried at one end of a base member 3, and is provided with inlet ports 4 and 5 through which the power medium is entered into the cylinder to drive the piston, the port 4 being at an angle to the base member, the power medium will be carried to the upper portion of the cylinder to drive the piston in one direction while port 5 is parallel with the base member and enters the cylinder at the lower edge of the piston so that when the power medium is entering

through the port 5, the piston will be driven in the opposite direction, the two ports terminating at one end in a chamber extension or conduit and in order to control the movement of the piston 1, we provide a gate 7 which is pivoted at the point of juncture of the two ports and is so located that it can be moved to close either of the ports desired and as best shown in Fig. 1 the gate is shown in position to close the port 5, in full lines and when the gate is in this position the piston will rotate to the left, while if the gate were swung to the position shown in dotted lines the piston would be rotated in the opposite direction.

One end of the extension or conduit 6 is divided into a plurality of combustion chambers 8 which are closed at one end and in communication with the chamber extension or conduit at their opposite ends and in order to compress the fuel in the chambers until the same is exploded we provide each of the chambers with a valve 9 which is pivoted at one edge and normally held across the mouth of the combustion chambers by means of a tension spring 10 which is located above the combustion chambers and is connected to the valve by directing the stem of the valve through the wall of the extension or conduit and securing a lever 11 thereto to which is attached one end of the spring 10, the opposite end of said spring being secured to a lug 12 on the combustion chamber.

In order to prevent back pressure on the valves 9 we locate in the chamber extension or conduit at the ends of the combustion chambers a swinging closure 13 which is normally held closed by means of a spring 14 so that as soon as the explosion occurs and has passed into one of the ports 4 or 5, the closure 13 will immediately descend and cover the ends of the combustion chambers, the closure receiving the force of the back pressure.

A mixing chamber 15 is located on the opposite end of the base member 3 from that occupied by the cylinder and in order to convey the fuel from the mixing chamber to the combustion chambers, we provide a plurality of cylinders 16 in each of which is located a piston 17 which pistons are adapted to reciprocate in the cylinders and are provided with upwardly extended piston rods 18.

Each of the cylinders 16 is connected to the mixing chamber by means of a feeding pipe 19 so that when the pistons are on their upward stroke in the cylinder a supply of the

fuel will be drawn into the cylinder and likewise when the piston descends the fuel in the cylinder will be discharged into its respective combustion chamber through discharge pipes 20 there being one discharge pipe for each of the cylinders and the number of combustion chambers are in proportion to the number of cylinders employed so that each cylinder is provided with its own individual combustion chamber.

The fuel is prevented from returning to the mixing chamber after being drawn into the cylinder by disposing over that end of the feed pipe entering the cylinder, a valve 21 while the fuel is prevented from returning to the cylinders after being discharged into combustion chambers by disposing a similar valve 22 over that end of the discharge pipes entering the combustion chambers.

The object in providing a plurality of cylinders for charging the combustion chambers is to direct a new charge of material into each combustion chamber as fast as one charge is exploded and to this end we have provided means whereby when the piston nearest the combustion chamber is at its lowest stroke, the piston farthest from the combustion chamber will be at its upward stroke and the pistons between the two end pistons will be proportionately raised or lowered and to accomplish this result we secure to the upper ends of the piston rods 18, eccentric straps 23 which are in turn mounted upon eccentrics 24 which are mounted upon a shaft 25 carried in the upper end of standards 26 and 27 extending upwardly from the base member 3, said eccentrics being varied in such manner as to accomplish the result above described.

That end of the shaft 25 extending through the standard 27 is provided with a driving gear 28 with which is adapted to mesh a shifting gear 29, said gear being mounted upon a shaft 30 which is provided in its length with a universal joint 31, one end of the shaft 30 finding a bearing in a standard 32 extending upwardly from the base member 3 while the opposite end thereof is mounted in a bearing block 33 which is in turn slidably mounted in a slot 34 formed in the upper end of the standard 27, the gear 29 being located between the block 33 and joint 31.

The shaft 30 is of sufficient length to extend entirely through the standard 32 and is provided with a beveled gear 35 which meshes with a similar gear 36 on one end of a shaft 37, the opposite end of said shaft having a worm 38 thereon which meshes with a gear 39 on the main driving shaft 40 and it will be seen that when the piston 1 is rotated that the driving shaft 25 will be likewise rotated and in order to reverse the piston 1 without affecting the rotation of the driving shaft, we provide an idler 41 which is rotatably mounted on the standard 27 and in

mesh with the gear 28 and by moving the bearing block 33 longitudinally in its slot 34, the shifting gear 29 will be moved into engagement with the idler 41 so that when the piston 1 is rotated in the opposite direction, the driving shaft 25 will not be reversed.

The block 33 is adjusted in the slot 34 by means of a link 42 which extends laterally from the block and beyond one edge of the standard 27 where it is secured to one end of a lever 43 which is in turn pivotally mounted upon a rack 44, the lever 43 being provided with the usual form of spring latch 45 which is adapted to engage with notches 46 on the rack 44, there being preferably three notches on the rack, the two end notches being so arranged that when the latch is in engagement with one or the other thereof, the block will be at one end or the other of the slot while the middle notch is so arranged that when the latch is in engagement therewith, the shifting gear 29 will be midway between the driving gear 28 and the idler 41 thereby disconnecting the power from the shaft 25 and stopping the feeding mechanism which will result in the immediate stoppage of the engine.

In order to explode the material as soon as discharged into combustion chambers, we provide a vertically disposed shaft 47 to the upper end of which is secured a beveled gear 48 which is adapted to mesh with a similar gear 49 on the end of the driving shaft 25, that portion of the shaft 47 below the gear 48 being provided with a plurality of cams 50 which are adapted to engage individual contact points 51, said contact points being electrically connected to sparking plugs 52 extending into the auxiliary combustion chambers 8, the cams being mounted upon the shaft 47 in such a manner as to coincide with the movement of the eccentrics on the shaft 25 whereby the cam will engage the contact points 51 when the piston is at its lowest stroke, the cams and contact points being equal in number to the number of eccentrics on the shaft 25.

From the foregoing it will be seen that we have provided a very cheap and accurate means for conveying the combustible material from the mixing chamber to the combustion chamber the charges being so timed that a continuous explosion will occur and thereby giving a steady drive to the engine and at the same time enabling us to employ a minimum amount of the explosive material at each charge.

What we claim is:

1. The herein described charging mechanism for engines comprising the combination with a mixing chamber and combustion chambers; of a plurality of cylinders between said mixing chamber and combustion chamber, pistons in said cylinders and means to operate said pistons whereby the fuel will be drawn from the mixing chamber and de-

posited in the combustion chamber, said pistons having a stepped relation to each other.

2. In a charging device for engines the combination with a mixing chamber and 5 combustion chambers; of a plurality of cylinders between said mixing chamber and said combustion chambers, a feed pipe for each of said cylinders common to and communicating with said mixing chamber, a discharge 10 pipe for each of said cylinders, extending into one of said combustion chambers, valves on said feed pipes and discharge pipes, means to normally close the auxiliary combustion chambers, a piston for each of 15 said cylinders, means to operate said pistons said pistons having a staggered relation one with the other.

3. The herein described charging mechanism for engines comprising a plurality of combustion chambers, a mixing chamber, means 20 between said mixing chamber and said combustion chambers embracing cylinders and pistons having stepped relation one with the other, and correspondingly arranged eccentrics having connection with said pistons to 25 intermittently feed fuel from the mixing chamber to said combustion chambers, and means to explode the fuel in the combustion chambers.

30 4. In a charging mechanism for engines the combination with combustion chambers, and means to normally close the open ends of said combustion chambers; of a plurality of cylinders, a discharge pipe extending 35 from each of said cylinders to one of said combustion chambers, pistons in said cylinders adapted to direct fuel through the discharge pipes, a driving shaft for said pistons, a plurality of eccentrics on said driving shaft,

means to connect said pistons with the eccentrics, said pistons and eccentrics having 40 a stepped relation to each other and means to rotate said driving shaft.

5. In a charging device for engines, the combination with a plurality of combustion 45 chambers at one end thereof, means for charging the said combustion chambers, comprising cylinders, pistons in said cylinders, a driving shaft above said cylinders, means to operatively connect said pistons to 50 the driving shaft, a driving gear on said driving shaft, an idler meshing with said driving gear, a shaft having a universal joint therein mounted above said driving gear and idler, a 55 shifting gear on said shaft and means to move said shifting gear laterally whereby the same may be directed into engagement with the driving gear, or idler, at will or entirely out 60 of engagement with both the driving gear and idler.

6. In a charging mechanism for engines the combination with an engine having combustion chambers and means to reverse the 65 rotation of the engine; means for charging said combustion chambers a plurality of cylinders, pistons in said cylinders, a driving shaft for said pistons, means to operatively connect said pistons to the driving shaft and means to prevent inverse rotation of the 70 driving shaft when the engine is reversed.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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FREDRICK J. BRUMMER.

Witnesses:

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