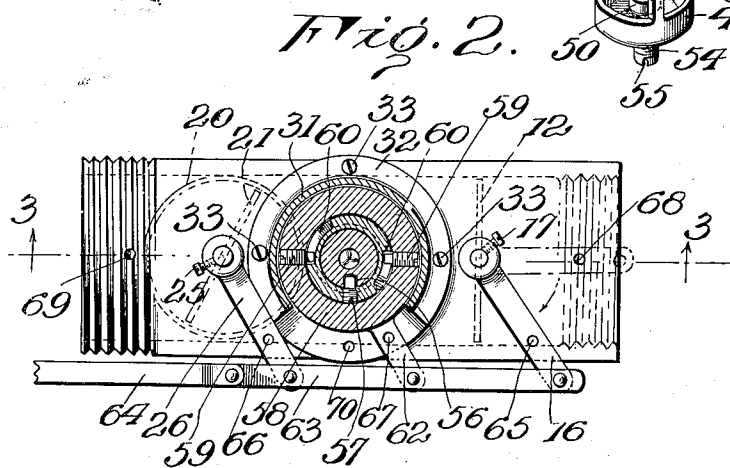
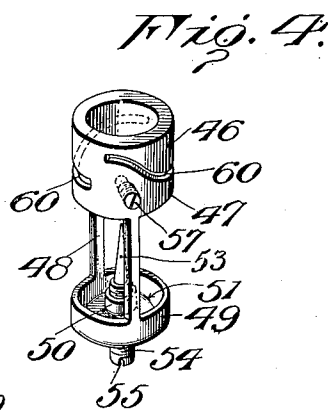
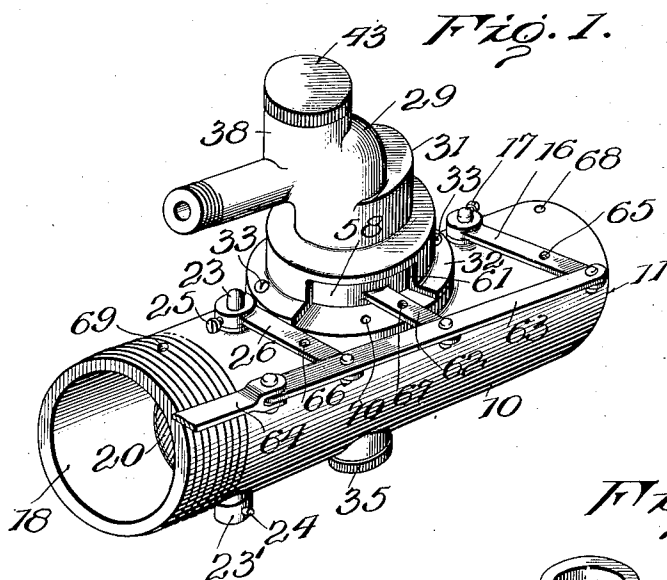


W. W. GRANT.
CARBURETER.
APPLICATION FILED OCT. 23, 1916.

1,327,233.

Patented Jan. 6, 1920.
2 SHEETS—SHEET 1.



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2 SHEETS—SHEET 2.

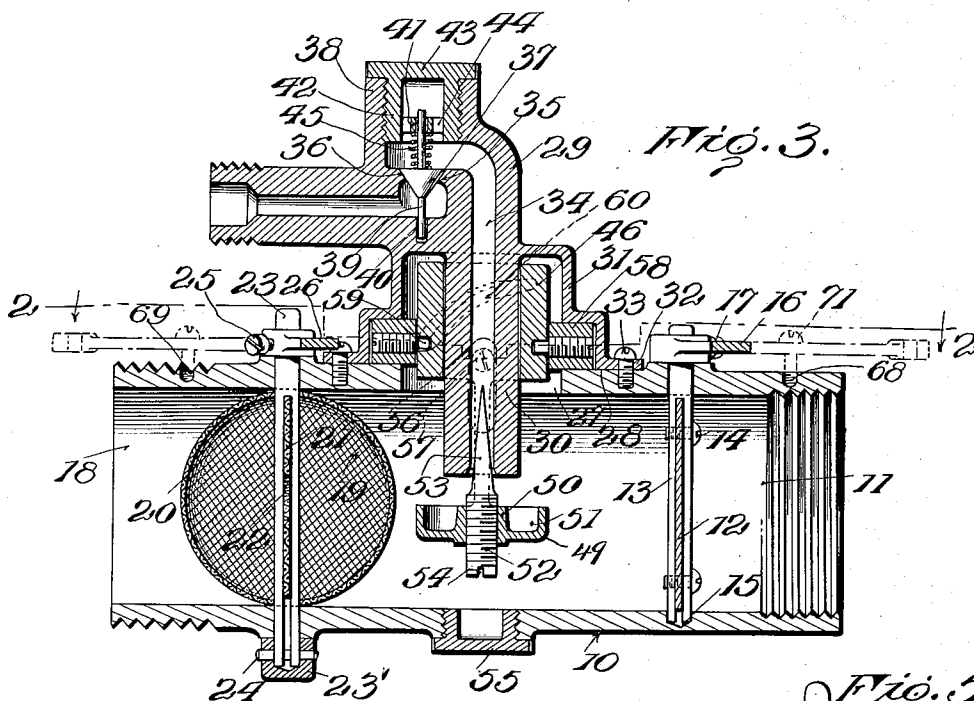


Fig. 3.

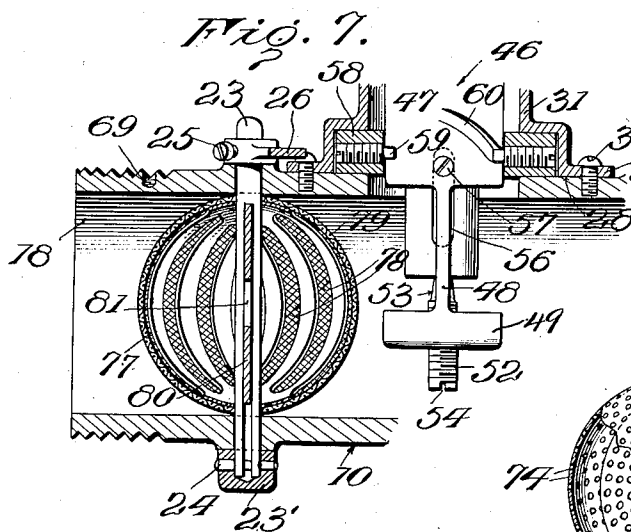


Fig. 7.

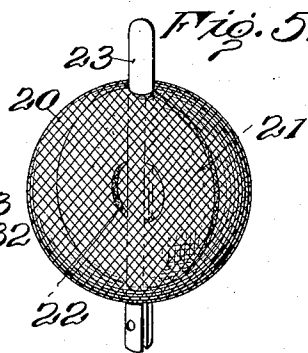


Fig. 5.

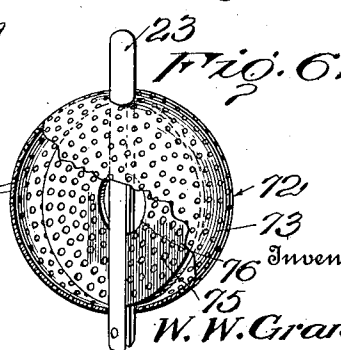


Fig. 6.

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CARBURETER.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM W. GRANT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Carbureters, of which the following is a specification.

This invention relates to new and useful improvements in carbureters and more particularly in carbureters for use in connection with internal combustion engines of motor vehicles, the special objects of my invention being the provision of a carbureter wherein the fuel supply is independent of any float valve, wherein the parts are so arranged that, as a result, the carbureter may be employed in any position, such as horizontally, vertically, at any inclination or even inverted, as shall best adapt it for use in whatever space it must occupy, and wherein an improved form of outlet valve will be employed for controlling the discharge of fuel mixture and air from the carbureter.

And the invention has as a further object to so construct the casing or body of the carbureter as to render each and all of the parts readily accessible for adjustment, inspection or repairs, making complete dismantling of the carbureter unnecessary.

With these and other objects in view, my invention will be more fully described, illustrated in the accompanying drawings, and then specifically pointed out in the claims which are attached to and form a part of this application.

In the drawings:

Figure 1 is a perspective view of my improved carbureter;

Fig. 2 is a plan view, partially in section, on the line 2—2 of Fig. 3;

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

Fig. 4 is a perspective view of the needle valve controlling flow of fuel, together with its supporting and actuating cage;

Fig. 5 is a perspective view of the combined valve and mixer employed;

Fig. 6 is a corresponding view, showing a modified form of mixer;

Fig. 7 is a sectional view of a portion of the carbureter showing a further modified form of mixer.

Corresponding and like parts are referred

to in the following description and indicated in all the views of the drawings by the same reference characters.

In the preferred form of my invention I employ a tubular body or casing 10 which is preferably of uniform circular cross sectional area and the ends of which are adapted in any preferred manner for proper connection with the intake manifold of an internal combustion engine and, preferably, with a pipe for supplying heated air from any suitable source to the carbureter. Disposed in the inlet passage 11, adjacent one end of the casing, is a disk-shaped butterfly valve 12 which is secured to a valve stem 13 by screws or other suitable fastening means 14, one end of the stem, which extends diametrically of the casing, being journaled in a recess or pocket 15 formed in the inner face of the casing and the other end being projected through the upper wall of the casing to receive the valve lever 16 which is secured at any desired angular adjustment with respect to the valve by a set screw 17.

Mounted in the outlet passage 18, adjacent the other end of the casing, is a combined mixture outlet controlling valve and mixer, indicated as a whole by the numeral 19. This valve includes a hollow, spherical, foraminous body 20 fitting closely within the passage and divided by a diametrically disposed baffle vane or valve 21 also of foraminous material and formed with a central circular opening 22. A valve stem 23 is bifurcated throughout the greater portion of its length and its bifurcated end is passed through the top wall of the casing, through the wall of the spherical body 20 of the mixer to straddle the vane or valve 21, through the opposite wall of the mixer and through the lower wall of the casing, as shown. This valve stem, therefore, not only serves to hold the body of the mixer against longitudinal movement in the casing, but also serves to center the vane 21 within the body of the mixer. Furthermore, if care is taken that the arms of the stem straddle one or more of the wires of the wire gauze, which preferably forms the body of the mixer, it will be clear that such body may be turned by turning of the valve stem in order to expose different portions of its surface to the passage of an explosive mixture through the carbureter. A hollow cap

23' surrounds the projecting lower end of the valve stem and a pin 24 is passed through this cap and stem to secure the parts in place. Secured at any desired angular position with respect to the valve or vane 21, upon the upper portion of the stem and by means of the set screw 25, is the lever 26 by means of which the combined valve and mixer may be operated.

10 The upper wall of the casing, intermediate these valves, is formed with an opening 27 and about this opening is widened and thickened to provide a plane surfaced circular seat 28. An elbow fitting, indicated as a whole by the numeral 29, and including the fuel supply pipe 30, is applied to the casing in such a manner that one end of this pipe will extend radially into the casing between the valves 12 and 19. This fitting includes a housing 31 which is spaced from a portion of the pipe 30 and which, at its free edge, is provided with a peripheral flange 32 which engages the seat 28 and through which screws 33 are passed and threaded into the casing 10 to secure the fitting in place. This housing 31 is so formed as to provide with the pipe 30 an annular chamber immediately above the casing 10 and a further annular chamber communicating with the first but of less dimensions. The fuel passage 34 formed in this fitting is intercepted near the bend of the fitting by a web 35 having an opening forming a frusto-conical valve seat 36 for the controlling valve 37 and the fitting in alignment with the passage through this seat is provided with a tubular internally threaded extension 38 forming a valve chamber. One end of the valve stem 39 of the valve 37 is journaled in a pocket 40 and its opposite end in a spider 41 formed interiorly of the threaded flange 42 of a closure cap 43 for the valve chamber, this spider being provided with openings 44 for passage of fuel in order to prevent interference with the movement of the valve. A light helical spring 45 surrounds the valve stem between the spider and valve and tends to normally hold the valve against its seat. The free end of the fitting or supply pipe is threaded or otherwise adapted for connection with the fuel supply pipe proper leading from a fuel tank.

Mounted within the annular chambers 55 formed between the housing 31 and pipe 30 is a tubular sleeve 46 which fits relatively snugly about the pipe, although it is free for movement thereon. This sleeve forms the main body portion of a valve cage, indicated as a whole by the numeral 47 and best shown in Fig. 4 of the drawings. Diametrically disposed arms 48 depend from the lower edge of the sleeve at either side of the pipe 30, project below the free 65 end of the pipe and connect with a drip

cup 49 disposed in axial alinement with the pipe and spaced therefrom. This drip cup is thickened centrally to provide a boss 50 and resultant annular fuel receiving chamber 51 and the cylindrical stem 52 of a needle valve 53 is threaded through the boss so that the valve projects into the adjacent end of the pipe 30. The opposite end of the needle valve stem is slotted, as shown at 54, for engagement with a screw driver in order that the valve may be adjusted relative to the pipe for any given position of the valve cage and the lower wall of the casing is formed with a threaded opening permitting access to the needle valve, this opening being normally closed by a screw plug or cap 55. Further, the drip cup 49 being, as best shown in Fig. 3, wholly disposed or housed within the tubular body 10, is subjected to any heated air within or passing through the body and will thereby be heated to form a volatilizer materially contributing to the evaporation of any fuel that may be contained within the cup.

The outer face of the depending portion of the pipe 30 is formed throughout a portion of its length with a longitudinal slot 56 to seat a stud 57, the shank of which is threaded into the sleeve 46 so that its slotted outer end will lie flush with the outer face of the sleeve. By this means, the vertical movement of the sleeve, upon the depending end of the pipe 30, is limited and the sleeve is held against turning movement about the pipe. An actuating collar 58 surrounds the sleeve fitting in the larger annular chamber between the housing and pipe and is provided at diametrically opposite points with tapped radial openings to receive the threaded shanks of pins 59, the inner ends of which seat in opposed helical cam grooves 60 formed in the outer face of the sleeve 46. The outer ends of these pins or their shanks lie flush with the outer face of the actuating collar, as clearly shown in Fig. 3. The housing, at one side, has its walls slotted, as shown at 61 in Fig. 1, to permit limited swinging movement of a lever arm 62 which projects radially from one side of the actuating collar 58. Obviously, turning of this collar by means of its lever will act through the pin and groove connections between it and the sleeve and between the sleeve and pipe 30 to cause a reciprocation of the sleeve and, consequently, of the entire valve cage and the needle valve carried thereby.

A link 63 is pivotally connected to the free ends of all of the levers 16, 26 and 62 and its free end may, in turn, be connected to any suitable operating mechanism or linkage, a part of such mechanism being conventionally shown at 64. These lever arms, intermediate their length, are formed

with screw receiving openings 65, 66 and 67, respectively, and the wall of the casing 10 is formed with cooperating internally threaded sockets 68, 69 and 70. Screws 71 are provided which may be passed through the intermediate openings of the lever arms and into these sockets to secure the lever arms in permanent adjusted position, if desired, it being, of course, understood that any lever arm so secured will be first disconnected from the link 63. Inasmuch as the lever arms of the valves 12 and 19 may be adjustably secured to such valve stems, it will be clear that these valves may be fixed in any desired position relative to each other and to the needle valve by proper adjustment of the lever arms upon the valve stems and subsequent securing of the valve stems by the screws 71.

In Fig. 6, I have illustrated a modified form of combined mixture controlling valve and mixer, indicated as a whole by the numeral 72. As there shown, the combined valve and mixer includes a hollow spherical body 73, preferably formed of sheet metal and having its wall minutely perforated, as shown at 74. With this form of mixer body a valve or vane 75, of perforate sheet metal having a central circular opening 76, may be employed.

In Fig. 7 I have illustrated a still further form of combined valve and mixer, indicated as a whole by the numeral 77. This comprises a mixer body of sheet metal, the body being in the form of a hollow sphere with its wall formed with vertically disposed slots 78 peripherally spaced from each other and tapering toward their ends. This body is provided exteriorly with a covering of foraminous material 79, such as wire gauze and the valve or vane proper is in the form of an imperforate sheet metal disk 80 having a single central opening 81. Obviously, any of the various valves or vanes shown may be employed in any of the mixer bodies shown, without departing from the spirit of my invention which primarily resides in the provision of a compartmental perforate body spherical in shape and hollow in construction and having a diametric baffle formed with a central opening and constituting a valve and mixer.

In operation, assuming that the various valve actuating levers are properly connected, the link 63 is moved to turn the actuating collar 58 in a clockwise direction to move the needle valve from its seat and, consequently, the air inlet valve 12 and the combined valve and mixer 19 to an open position. Under these circumstances, the suction of the engine will draw air into the casing through the air inlet passage 11 and this air rushing past the end of the fuel pipe 30 will create a suction in such pipe which, in connection with the pressure of

liquid fuel against the valve 37, will cause it to open. Liquid fuel will, therefore, pass from the pipe 30 into the mixing chamber of the carbureter and become mingled with the passing air, the resultant explosive mixture then passing through the combined valve and mixing device 19, being thereby thoroughly broken up and intermixed. Obviously, by proper adjustments, the valve 12 may be arranged to open to any desired extent relative to the needle valve and the valve 19 may be adjusted to open to any desired extent relative to the other valves. The valve 19, although primarily serving as a secondary mixing chamber, also serves to restrict the passage of the explosive mixture, due to its baffle vane or valve proper 21.

It will be apparent that any desired proportion of air and liquid fuel may be mixed together and the suction force exerted by the engine may be varied by varying the relative positions of the valves 12 and 19. For instance, by turning the valve 19 to bring its valve proper in the plane of the axis of the casing, it will offer a minimum resistance to the passage of the explosive mixture from the carbureter and the suction exerted will be governed entirely by the adjustment of the valve 12. With the valve 12 set axially of the casing, as well as the valve 19, the lowest degree of suction will be attained.

It will be clear that for any given position of the valve 12, the suction of the engine tending to draw fuel past the needle valve will increase in proportion to the opening of the combined valve and mixer 19 and that for any given position of this combined valve and mixer, the suction will increase in proportion to the closing of the valve 12. By proper relative adjustments of these valves, it is, therefore, possible to obtain any desired degree of suction. Although ordinarily all of the valve levers are connected to the common actuating link, one or more of them may be disconnected from the link set to the desired angle with respect to the controlled valve and then locked by the screw 71.

The automatically operating controlling valve 37 is designed to unseat through pressure of fuel passing to the needle valve and is of such weight that it will automatically seat by gravity if supply of fuel is interrupted or abated. The spring 45 is provided to balance or oppose forces acting to unseat the valve except at such times as it should unseat and the valve and spring together provide safety and an efficient control and proportioning of fuel. When the engine is not running, the spring will seat this controlling valve and prevent leakage of fuel, even if the needle valve is left open. In some instances, such as when the desired feed of fuel is to be by gravity only and not

controlled by suction, the spring may be omitted, but for ordinary uses it should be employed.

Notice should be taken of the fact that upon removal of the screws 33 and release of the link 63 the elbow fitting 29 is readily removable from the body of the carbureter and that the needle valve and its actuating mechanism will be removed with it. Because of this, the carbureter is capable of being cleaned or repaired with great ease and the needle valve and its operating mechanism may be rendered accessible without any necessity of disconnecting the carbureter from the intake manifold or other connections upon or about the engine.

Although I have illustrated my invention in all its details of construction, it will be apparent that various changes such, for instance, as the substitution of one of the forms of combined valve and mixing device for the other may be made without in the slightest degree departing from the spirit of my invention and I therefore reserve the right to make any changes, either in construction or arrangement of parts, such as may fall within the scope of the appended claims.

Having thus described the invention, what is claimed as new is:

1. In a carbureter, a casing providing a mixing chamber, an air inlet and a mixture outlet, a fuel supply pipe extending into the chamber, a cage mounted for reciprocation upon the pipe, a needle valve disposed wholly within the chamber governing the flow of fuel from the pipe and having adjustable threaded engagement with the cage, the casing being formed with an opening in alinement with the needle valve to render the needle valve accessible and adjustable with respect to the cage without removing the parts from the casing, and means normally closing such opening.

2. In a carbureter construction, a casing providing a mixing chamber, an air inlet and a mixture outlet, a fuel supply pipe depending into the chamber, a sleeve reciprocally mounted on the pipe within the casing, means for holding the sleeve against turning movement on the pipe, a drip cup supported by the sleeve in the chamber and in spaced relation below the end of the pipe, and a needle valve carried by the drip cup and co-operating with the pipe to control passage of fuel therethrough.

3. In a carbureter construction, a casing providing a mixing chamber, an air inlet and a mixture outlet, a fuel supply pipe projecting into the chamber, a sleeve mounted for reciprocation upon the pipe within the casing, a needle valve movable with the sleeve to control passage of fuel through the pipe, a cam groove formed in the sleeve, a rotatable collar mounted about the sleeve,

a pin carried by the collar and seating in the cam groove, and means holding the sleeve against turning whereby turning of the collar will reciprocate the sleeve and consequently the needle valve.

4. In a carbureter, a casing providing a mixing chamber, an air inlet and a mixture outlet, a fuel supply pipe projecting into the chamber, a spring pressed valve in the pipe opening in the direction of the chamber against its spring to cut off communication between the mixing chamber and source of fuel in case of back firing, a cage mounted for reciprocation upon the pipe within the chamber, and a valve supported by the cage and movable through movement of the cage into and out of active position with respect to the end of the pipe to control rate of supply of fuel to the mixing chamber.

5. In a carbureter construction, a casing providing a mixing chamber, an air inlet and a mixture outlet, a fuel supply pipe depending into the chamber, a sleeve mounted for reciprocation upon the pipe, means for actuating the sleeve, arms depending from the sleeve, a drip cup supported by the arms in spaced relation below the free end of the pipe, and a needle valve adjustably threaded through the drip cup and operating in the adjacent end of the pipe.

6. In a carbureter, a tubular casing open at its ends to provide an air inlet and a mixture outlet and formed at the top with an opening, an air controlling valve mounted in the casing adjacent one end, a combined mixture outlet controlling valve and mixer mounted in the casing adjacent its opposite end, an elbow fitting removably secured to the casing about the top opening therein and including a fuel supply pipe, one end of which projects into the casing, a controlling valve in the length of the supply pipe opening in the direction of the casing and adapted to remain seated except under engine suction, a cage reciprocally mounted upon the fuel supply pipe and projecting into the casing beyond the pipe, a needle valve carried by the cage co-operating with the pipe to control escape of fuel into the casing, and means imposed within the fitting and co-operating with the cage for reciprocating the cage to open and close the needle valve.

7. In a carbureter construction, a body providing a mixing chamber, an air inlet and a mixture outlet, a fuel supply pipe leading into the chamber, a drip cup supported in the chamber to receive fuel passing from the pipe into the chamber, a valve mounted in the pipe and opening toward the chamber under suction, and a valve supported by the cup and controlling rate of passage of fuel from the pipe.

8. In a carbureter, a tubular body open at its ends and provided near one end with an air throttle valve and near its other end

with a fuel throttle valve and between such valves with an opening, and a fitting adapted for detachable connection to the body to close the opening, said fitting carrying fuel supply means, a fuel valve and actuating mechanism for the fuel valve whereby all of said parts may be removed as a unit from the body of the carbureter for inspection and adjustment by removing the fitting.

9. In a carbureter, a tubular body open at its ends and provided near one end with an air throttle valve and near its other end with a fuel throttle valve and between such valves with an opening; and a fitting adapted for detachable connection to the body to close the opening, said fitting carrying fuel supply means, a fuel valve, and actuating mechanism for the fuel valve whereby all of said parts may be removed as a unit from

the body of the carbureter by removing the fitting, the fuel valve when the fitting is applied being supported substantially midway of the body of the carbureter.

10. In carbureter construction, a tubular body providing a continuous passage, a butterfly valve and a foraminous valve for inlet and outlet control of fluid through the passage, a fuel inlet pipe penetrating the passage between the valves, a drip cup arranged in juxtaposition to said pipe, a needle valve supported by said cup for controlling the fuel from said pipe, the needle valve and drip cup being both wholly inclosed within the passage, and means for controlling all of said valves.

In testimony whereof I affix my signature.

WILLIAM W. GRANT. [L. s.]