May 21, 1929. R. B. STITZER ET AL 1,714,284

GAS BLENDING DEVICE

Filed March 14, 1928 2 Sheets-Sheet 1

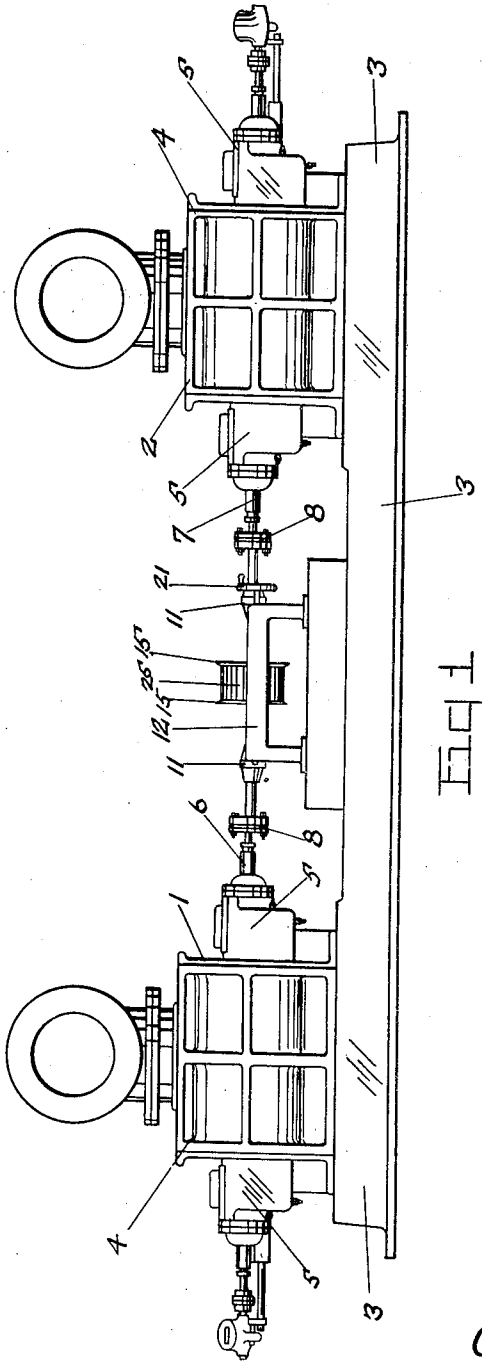


Fig 1

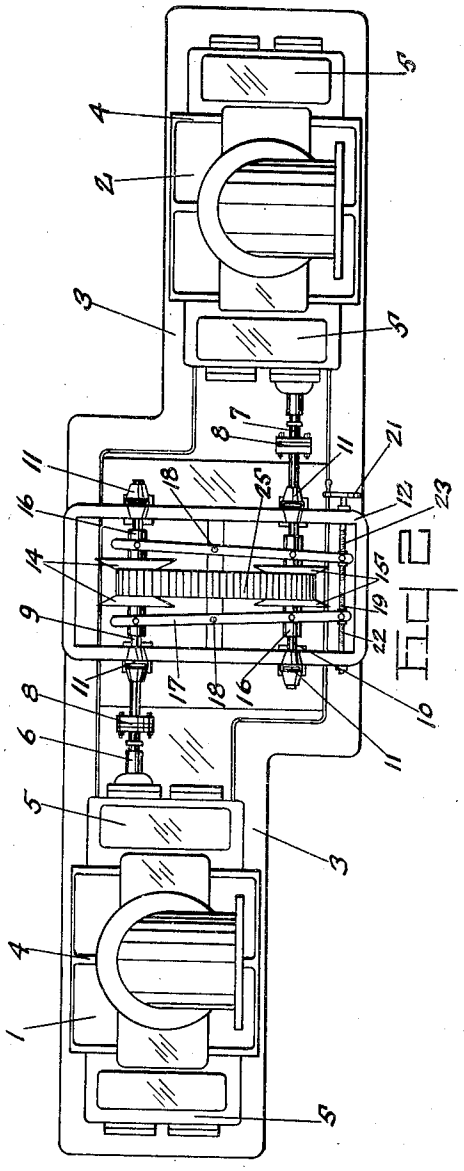


Fig 2

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GAS BLENDING DEVICE

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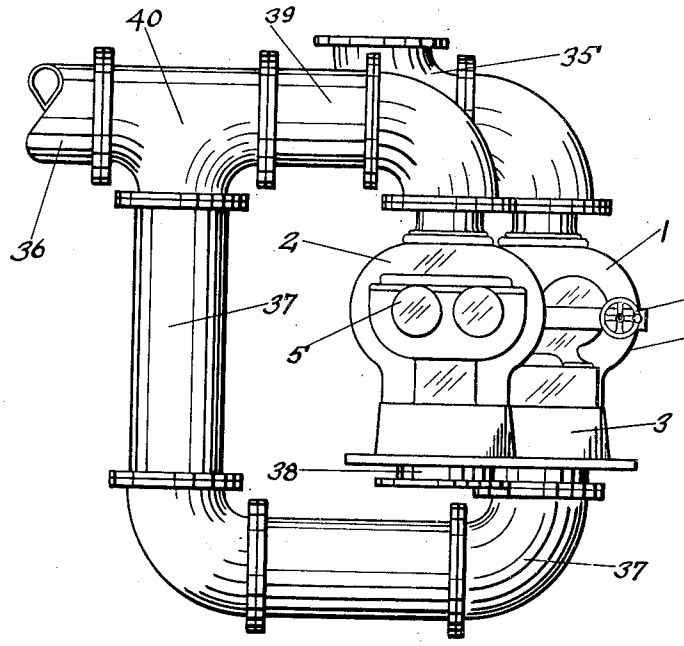


Fig 3

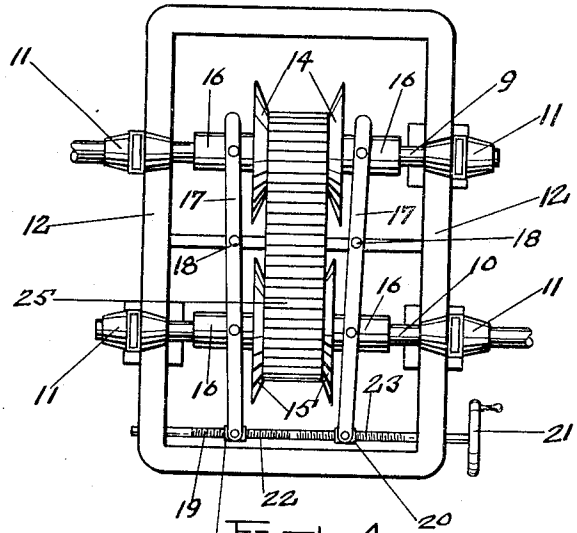


Fig 4

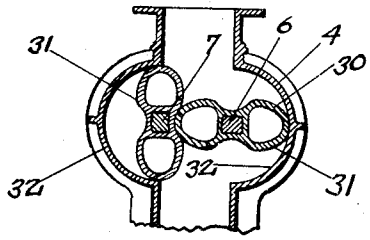


Fig 5

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Patented May 21, 1929. 1,714,284

UNITED STATES PATENT OFFICE.

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GAS-BLENDING DEVICE.

Application filed March 14, 1928. Serial No. 261,580.

Our invention has for its object to provide a mechanism for producing accurately a desired proportionate mixture of two gases, such as two fuel gases or a fuel gas and air. The invention particularly provides a means for maintaining with certainty an exact proportionate mixture of a fuel gas which is rich in combustible materials and has high B. t. units, with air, to reduce the B. t. units to an amount substantially the same as that commonly found in gas supplied for domestic and commercial consumption, whereby gas produced by processes, that more efficiently produce a gas high in B. t. units, may be directed into the established supply mains that distribute the ordinary commercial gas without varying the B. t. u.'s of the gas supply that would otherwise greatly disturb the efficiency of the heating apparatus of the consumers, such as stoves, furnaces, etc. Thus, by our invention, we have provided a means whereby the established systems of distribution may be utilized and without encountering the disadvantage of requiring the installation of special burners or the resetting of burners used by the consumers.

The invention may be contained in structures of different forms and, to illustrate a practical application of the invention, we have selected a mechanism illustrative of the various forms of mechanism that embody the invention and shall describe it hereinafter. The mechanism selected, and an apparatus containing the selected mechanism, are shown in the accompanying drawings.

Fig. 1 of the drawings illustrates a side view of the mechanism embodying our invention. Fig. 2 illustrates a top view of the mechanism illustrated in Fig. 1. Fig. 3 illustrates an end view of the mechanism illustrated in Figs. 1 and 2 and also illustrates the apparatus in which the mechanism is connected. Fig. 4 is a top view of the proportionate regulating mechanism for controlling the ratio of the gases that enter the supply line. Fig. 5 illustrates a section of one of the gas controlling elements.

The mechanism shown in the drawings consists primarily of a plurality of interconnecting elements that operate to trap and deliver pre-determined and uniform quantities of different gases and to continuously deliver the gases at uniform rates into a gas supply line and which will propel and be propelled by the gas according to the relative pressure conditions. The elements may be contained in rotary gas pumps in each of which two rotary elements are each provided with two hollow blades having interfitting surfaces that fit oppositely disposed semi-cylindrical surfaces whereby measured quantities of a gas are trapped by the blades of the elements within substantially semi-cylindrical spaces and discharged therefrom through an outlet as the elements rotate.

Thus rotary gas pumps 1 and 2 may be supported on a suitable base 3. They each comprise a pump casing 4 in the ends of which are located suitable bearings 5 for a pair of shafts 6 and 7. The shaft 6 of the pump 1 and the shaft 7 of the pump 2 extend through an end wall of the respective casings 4 of the pumps 1 and 2 and are connected by flexible joints 8 to the shafts 9 and 10 that are rotatably supported in bearings 11 formed in the frame 12 that is supported on the base 3 of the mechanism and means is provided for interconnecting the protruding shafts 6 and 7 so that they will rotate in a predetermined ratio and thus will cause the gas pumps 1 and 2 to operate at rates that have the said predetermined ratio.

The shafts 9 and 10 are provided with cones 14 and 15 that are rotatably connected to the blocks 16. The cones 14 and 15 are splined or slip-keyed to the shafts 9 and 10 and so that the cones 14 and 15 may be slid along the shafts 9 and 10 and yet rotate or be rotated by the shafts 9 and 10. The blocks 16 are connected together by means of a pair of levers 17 that are pivotally connected to the frame 12 substantially at their centers, as at 18. Two of the ends of the levers 17 are connected together by means of a spindle 19 that is rotatably supported in the frame 12 so as to be rotated by means of the hand wheel 21. The spindle 19 is provided with threaded parts one of which, the part 22, is provided with right hand thread and the other, or the part 23, is provided with left hand thread. The ends of the levers 17 are provided with nuts 20 that are located on the threaded parts 22 and 23 and, upon rotation of the spindle 19 in one direction, the connected ends of the levers 17 will be drawn towards each other and upon rotation of the spindle 19 in the opposite direction, the ends of the levers 17 will be separated. The levers 17 are connected to the blocks 16 at points that are located on opposite sides of and equidistant from the pivot points 18 of the levers 17 and, consequently, the cones 14 will be

separated to the same extent that the cones 15 are brought together and vice versa.

The cone faces of each pair of cones 14 and 15 are located in opposition to each other and a belt 25 substantially fitting the cone faces interconnects the pairs of cones 14 and 15. Thus when the cones 14 are adjusted in their relation to each other, the belt 25 will automatically position itself so as to move on a circle that is described by each of two points on the cones 14 that are spaced from each other a distance equal to the width of the belt 25. The same is true with reference to the cones 15 and, consequently, when the spindle 19 is rotated, there will be produced a corresponding adjustment of the ratio of the rotation of the cones 14 and 15 and, consequently, of the shafts 6 and 7 to which the cones 14 and 15 are connected.

The shafts 6 and 7 are connected to a means for propelling the shafts 6 and 7 and which may trap and propel the gas through each casing 4. Thus the shafts 6 and 7 are connected to the two-bladed elements 30 having interfitting surfaces 31 so formed as to produce a substantially rolling contact on each other as the shafts 6 and 7 are rotated. Each casing 4 is provided with opposing walls that have interior substantially semi-cylindrical surfaces 32, the diameters of which are substantially the same as the width of the elements 30 so that one edge of each of the blades of the elements 30 is at all times in contact with its associated cylindrical surface 32. Thus the elements 30 roll, one on the other, and slide along the semi-cylindrical surfaces 32 and alternately trap and release predetermined volumes of the gas as determined by the space formed between the blade elements 30 and their associated semi-cylindrical surfaces 32 of the walls of the casings 4 when the tips of each blade element 30 are both in contact with the semi-cylindrical surface 32 of its associated wall. As each blade element 30 continues in its rotative movement, it allows the escape of the gas that is thus trapped and discharges or permits its discharge, according to pressure conditions, through the outlet of the casing 4.

Thus the elements 30 and the shafts 6 and 7 may be caused to be rotated by the pressure of one gas and by the transmission through the belt 25 of the power thus produced may operate to draw and discharge the other gas through the other casing 4. Thus gas may be introduced into the casing 4 of the pump 1 through the pipe 35 and discharged into a main supply pipe 36 by means of the pipe 37 and cause the shafts 6 and 7 of the two pumps 1 and 2 to rotate. The pump 2 may draw another gas, as air, through the pipe 38 and direct it through the pipe 39 into the main supply pipe 36, the two gases mixing at the point of union 40 of the pipes 39 and 37. Owing to the fact that the elements 30 of the pumps 1 and 2 are rotated at desired predetermined ratios that may be adjustably varied as may be desired, there is always produced in the main supply a mixture of air and a gas, or of two gases, that has a desired ratio, such ratio being ordinarily determined according to the British thermal units contained within the gas, or gases. The supply line 36 may be connected with the commercial supply lines or mains through which the gas alone, or intermixed with other gases, is supplied to the consumers.

Thus, by our invention, we have provided a mechanism for the mixture of a flammable gas and air, or of two gases, so arranged that air or gas will be introduced into the supply system only when gas is flowing therein and at a rate that will produce a perfectly safe gas mixture, and wherein two gases may be mixed in a predetermined and adjustable ratio. Thus our invention provides a means whereby the calorific value of a gas can be reduced to or adjusted to the conditions existing in connection with a gas of lower calorific value or wherein the calorific value of a gas may be maintained constant by the addition of a regulated mixture with a gas having a high calorific value. Our invention also provides a means whereby a more efficient combustion of a combustible gas is attained by premixing air with the gas before the gas reaches the burner or instruments in which the gas is consumed by burning. Where gas is used in connection with gas burners, our invention provides a means for increasing the inspirating power of the ordinary gas burner commonly used for the consumption of the ordinary commercial gas whereby a greater volume of the gas producing a given calorific volume may be introduced into the burner and mixed with a greater amount of primary air.

We claim:

1. In a gas mixer, a plurality of pairs of rotatable gas measuring and propelling and gas propelled elements, casings for containing the said elements, and means interconnecting the said elements for maintaining a constant ratio in the rates of rotation of the said elements, and means for adjusting said means for varying the said ratio, and comprising members having substantially conical surfaces connected to the said elements and means for shifting the said members one relative to the other to progressively vary the diameters of the circles of contact between the members to progressively decrease the speed of rotation of one element as the speed of rotation of the other element is increased and means for directing the gas into each casing, and a means for intermixing the gases delivered from the said casings.

2. In a gas mixer, a pair of rotary pumps, each having a pair of shafts, each shaft having a pair of blades whose surfaces inter-

fit to form a rolling contact of varying radii, a casing for containing each pair of blades and having substantially semi-cylindrical surfaces, the blades being so disposed that the ends of each pair of blades will intermittently make contact with one of the semi-cylindrical surfaces, a pair of cones adjustably located on a shaft of each pair, and a cone belt interfitting the faces of the cones on each shaft, and a pair of levers connected to the cones and to each other to adjust the cones relative to each other and to cause one of each pair to move towards or away from the other of the pair to the same extent that the other pair are moved towards or away from each other, and means for directing a gas into each casing, and a means for intermixing the gases delivered from the casings.

In witness whereof we have hereunto signed our names to this specification.

RALPH B. STITZER.
KENNETH M. WADDELL.