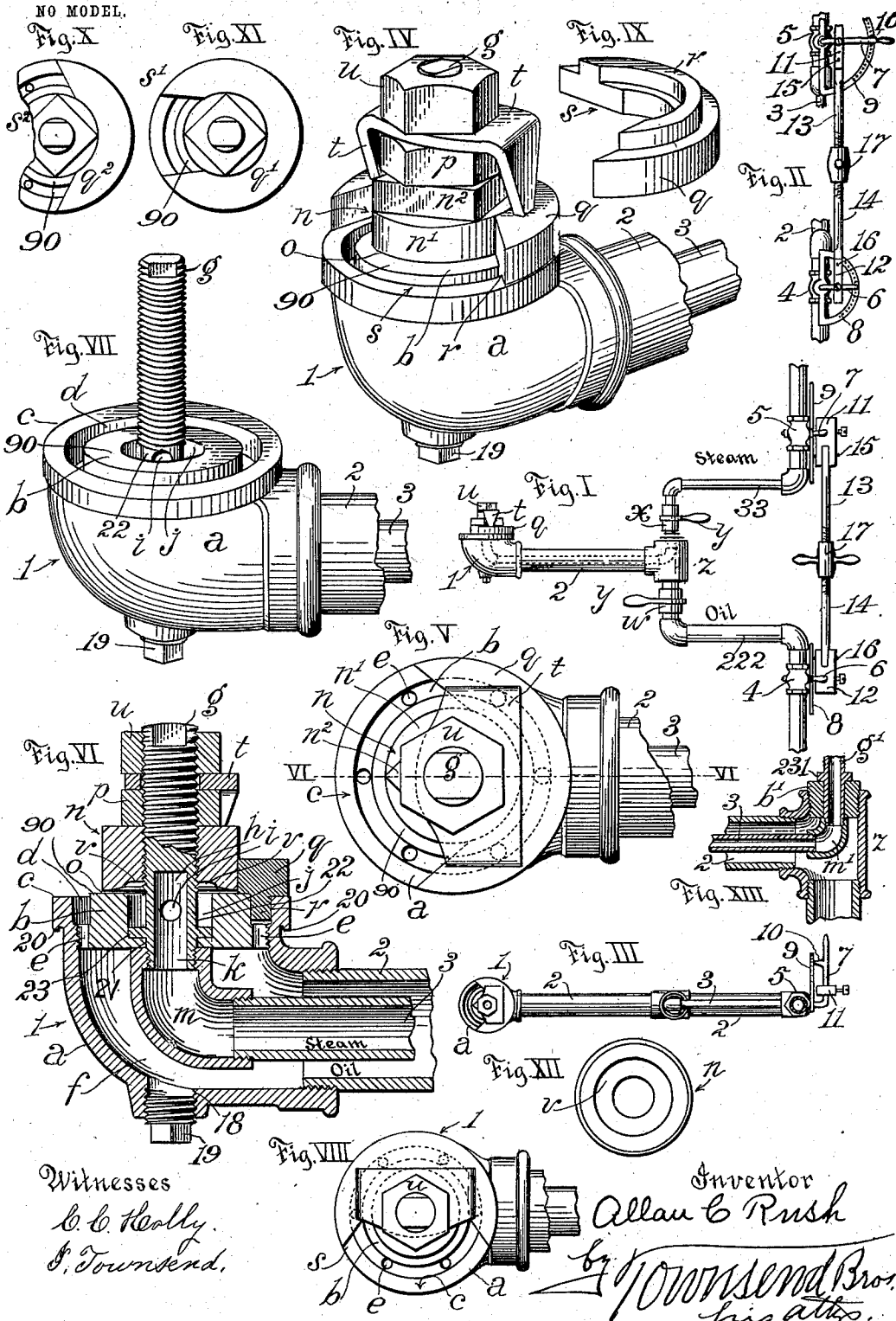


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A. C. RUSH.
CRUDE HYDROCARBON BURNER.
APPLICATION FILED JUNE 3, 1902.



Witnesses
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UNITED STATES PATENT OFFICE.

ALLAN C. RUSH, OF LOS ANGELES, CALIFORNIA.

CRUDE-HYDROCARBON BURNER.

SPECIFICATION forming part of Letters Patent No. 752,593, dated February 16, 1904.

Application filed June 3, 1902. Serial No. 110,102. (No model.)

To all whom it may concern:

Be it known that I, ALLAN C. RUSH, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Crude-Hydrocarbon Burner, of which the following is a specification.

An object of this invention is to provide a hydrocarbon-burner which is readily adapted for producing a flat flame of greater or less width and power, as may be desired, and which is capable of great variation from very large to very small power. In this connection several forms of one of the parts of the burner may be supplied from which the installer or operator may select the part adapted to produce the width and power of flame which the burner will be required to supply.

This invention is adapted to use an expansive fluid, as compressed air or steam, for the purpose of atomizing the liquid fuel, as oil, with which the burner is supplied.

An object of the invention is to provide means whereby the amount of steam or compressed air emitted may be regulated by increasing the thickness of the steam-jet as well as by increasing the width thereof.

A further object is to provide a burner which is adapted to furnish a circular sheet of flame and is also adapted to be readily arranged to project the flame from one side only in a sheet of determined width, which may be of greater or less extent, according to the requirement of the burner, so that one burner-body may with little expense of time, attention, labor, and material be adapted for various uses from that in which a circular flame is desired to that in which the flame is a narrow sheet. This I accomplish by providing a body having an annular channel the outer wall of which terminates in a plane and providing means for supplying liquid fuel to said channel and means for directing an expansive fluid from the interior outward radially across said channel in a plane parallel to said terminal plane, so that when the channel is unobstructed a circular flame may be produced, and by temporarily closing a portion of the channel a fan-shaped blaze may be produced for the time being.

A further object of the invention is to provide a hydrocarbon-burner of very simple construction and which can be made of great or small size with but little expense and which will economically and effectively burn crude hydrocarbon and also refined hydrocarbon.

The accompanying drawings illustrate the invention.

Figure I is a side elevation of a burner embodying the invention set up ready for operation. Fig. II is an elevation from the right of Fig. I, omitting the atomizer. Fig. III is a plan of Fig. I. Fig. IV is a perspective view of the atomizer. Fig. V is a plan view of the same. Fig. VI is a section on line VI VI of Fig. V. Fig. VII is a perspective view of the body of the atomizer, omitting the removable parts. Fig. VIII is a plan view showing the parts arranged to direct a flame at right angles to the direction which will be given to the flame by the appliance when the parts are arranged as shown in Figs. I to VI. Fig. IX is an inverted perspective view of the flame-director or segmental piece shown in the preceding views. Figs. X and XI are plan views showing flame-director pieces of different constructions on the body of the atomizer, the means for holding said pieces being omitted from these views for clearness of illustration. Fig. XII is an inverted plan of the steam or air deflector. Fig. XIII is a detail of a joint in the atomizer-pipes.

1 designates the atomizer-body, supplied with oil through a pipe 2 and with steam or compressed air through a pipe 3.

4 designates a valve controlling the oil-pipe 2, and 5 a valve controlling the steam-pipe 3.

6 and 7 are levers operating the oil-valve 4 and the steam-valve 5, respectively.

8 and 9 are indicators over which the levers 6 and 7 play, respectively, to indicate the degree to which the valve is open.

10 is a ratchet or clamp for holding one of the levers in a determined position.

11 and 12 are blocks adjustably mounted on the valve-levers 7 and 6, respectively, and 13 and 14 are right and left threaded rods pivoted by pivots 15 and 16 to the blocks 11 and 12, respectively.

17 is an adjusting-nut screwed on the right and left threads of the rods 13 and 14 to form an adjustable adjusting connection between the levers 6 and 7, by means of which when one of the levers is moved the other lever may be correspondingly moved. The blocks 11 and 12 may be variously adjusted upon their levers 7 and 6, so that when one lever is adjusted the other lever will be adjusted in a determined ratio. By this means the relative amounts of steam and oil supplied to the atomizer may be accurately determined and maintained through various adjustments of the valves 4 and 5, or by adjusting the block 11 near to the fulcrum of valve-lever 7 and the block 12 farther from the fulcrum of valve-lever 6 the oil may be increased and decreased in flow less rapidly than the steam, and a reverse adjustment may be made if it is desirable to increase or decrease the flow of steam less rapidly than the flow of oil.

The body 1 of the atomizer may be constructed of a member *a*, which may be an elbow or a T pipe-fitting, into one end of which the pipe 2 is screwed, and an end piece or plug *b* screwed into another end of the elbow or T member *a* and projecting a slight distance beyond the open end *c* of the member *a*, an annular channel *d* being provided between the plug and the rim or open end *c* of the member *a* and openings *e* being provided between the chamber *f* of said member and the channel *d* around the plug *b*. The plug *b* may be annular and screw-threaded internally and externally.

g is a screw-threaded hollow stem, closed at the top and having a chamber *h* at its lower end, the walls of which are perforated by perforations *i*, which open into an annular channel *j* within the plug *b* and around the stem *g*. Said stem *g* may extend down to form below the plug *b* a screw-threaded nipple *k*, upon which an internal elbow *m* is screwed. The pipe 3 may extend through the pipe 2 and be screwed into the internal elbow *m*, thus making provision for supplying an expansive fluid, such as steam or air, to the annular channel *j* through the pipe 3, elbow *m*, stem *g*, and perforations *i*, which are desirably below the top of the plug *b*.

n designates a deflector above the channel *j* to deflect the fluid and direct it laterally over the mouth of the channel *d*, which serves as a cup to contain the liquid fuel, thereby causing the blast of steam, air, or other expansive fluid to pick up the oil from the surface of the contents of the cup or channel *d* and blow it out and atomize the same and to thoroughly mix it with the external air before igniting. The deflector *n* may be a nut screwed on the screw-stem *g*. The lower portion of the nut *n* may be cylindrical, as shown at *n'*, while the upper portion may be angular, as shown at *n''*, the angular portion being designed to afford purchase for a wrench for

turning the nut *n* on the stem *g* to adjust the width of the slot *o*, through which the expansive fluid is to be emitted.

p is the set-nut, screwed on the stem *g* against the deflector *n* to hold it in any determined position.

q is a detached flame restrictor and director and power-equalizer, the same being a segmental piece adapted to fit upon the body *a* and furnished with a bead *r* to fit in the channel *d* to close a part of the upper portion thereof against the escape of oil and also to close the slot *o* to prevent the escape of the expansive fluid except at a determined place. The piece *q* may be in the form of the segment of a ring, and the opening *s* thereof may be of any desired size, depending upon the width of the blaze and the power which is to be produced.

t is a retainer for the detached piece *q*, the same consisting in an inverted-U-shaped perforated clip, the ends of which rest upon the piece *q* when the same is in place on the body 1.

u is a nut screwed on the stem *g* to clamp the retainer *t* firmly in place.

q, *q'*, and *q''* show, respectively, three different forms of the flame restrictor and director and power-controller, the difference consisting in the width and character of the openings *s*, *s'*, and *s''*.

The under face of the deflector *n* is desirably dished, as shown at *v*, Fig. VI, the portion above the inner channel *j* being provided with an annular chamber or channel and the outer portion of said under face being nearly flat, but slightly inclined outwardly, so that the steam or air will be forced out of the slot *o* under considerable pressure, as desired.

The rim *c* of the body *a* is desirably slightly lower than the face at *o* of the portion over which the expansive fluid passes between the two channels, so that the fluid passes over the rim *c* without being deflected upward thereby.

w and *x* designate unions or couplings in the pipes 2 and 3 for readily disconnecting the pipes in order to remove the atomizer of the apparatus. *y* designates handles for operating said unions or couplings.

18 is an opening closed by a plug 19, the removal of which gives access to the chamber *f* inside of the member *a* for the purpose of removing sediment which may accumulate from the oil.

I do not limit myself to the form of the body member *a*, which may be a T or an elbow, and it is to be understood that the plugged opening 18 may be of any desired size relative to the other parts of the member *a* and may be located at any point desired or deemed most convenient or efficient for cleaning the oil-passage. It may in some cases be advisable to make the opening 18 opposite the end in which the pipe 2 is screwed and to make

the plug as large in diameter as the pipe 2—that is to say, the size and location of the opening 18 may be determined as desired without departing from this invention.

It is to be understood that in practical operation the segmental piece q may be wholly omitted and the jet of steam and vaporized oil may be made to entirely surround the atomizer in a flat sheet. In such instances the portion of the pipes 2 and 3 leading to the atomizer will be of considerable length to allow the atomizer to be located at the center of the fire-box. (Not shown.)

The amount of steam emitted through the orifice o will depend upon the lateral and vertical extent of said orifice. By the use of the segmental pieces this may be cut down from a circular orifice to any-sized orifice desired. By the segmental piece q^2 (shown in Fig. X) a wide fan-shaped blaze will be produced. The segmental piece q (shown in Figs. IV and V) will give a narrower blaze, and the segmental piece q' (shown in Fig. XI) will give a still narrower blaze. By screwing the cap or deflector n down the thickness of the jet may be brought to a minimum, and by screwing it up it may be increased to any desired extent. The arms t' of the retainer t may be rearwardly deflected, as indicated in Fig. IV, so as to rest upon the flame director and restrictor q , q' , or q^2 , as the case may be.

20 designates a bead which hangs down around the body of the atomizer just below the rim, so that any oil which may flow from the channel d may drip from the bead and pass through the air and become mingled therewith for ready igniting in starting the burner into operation.

A convenient way of making the atomizer is to use an ordinary pipe-fitting, such as an elbow or T, and to screw the plug b into one end of it and then turn out the channel d , cutting away the screw-threads of the member a and a part of the plug. Then the holes e may be bored. The cavity and screw-threaded perforation j may be formed at this time or before the plug is inserted. Then the elbow m may be inserted and the screw-stem g be inserted through the hole 21 and screwed into the elbow m and the pipes 2 and 3 screwed into place. The stem g may be turned smooth at the part 22, which is in the channel j when the parts of the atomizer are assembled. Said stem is desirably furnished with a shoulder 23, which seats in the channel or cavity j of the plug b , and only that portion of the nipple k which projects below the bottom of the plug b is screw-threaded. The outer end of the stem g may be flattened, as shown in the several views, to allow the same to be readily turned by means of a wrench, so that when the inner elbow m is brought into position below the plug b and the nipple k is passed through said plug and screwed into the elbow it will draw the elbow tightly against the bot-

tom of the plug b , thus to form a steam-tight joint. The abutting portions of the inner fitting m and the plug b may be finished smoothly, so as to make a tight joint when the stem is screwed home.

The construction of the joint z where the pipes 2 and 3 branch apart is substantially the same as the joint just described. m' designates the inner fitting, and g' the screw-threaded stem having a shoulder 231, which fits upon the top of the plug b' , while the lower portion of the stem passes through said plug and screws into the inner fitting m' . The T-fitting z is large enough to allow it to turn freely around the fitting m' , so that when the atomizer is assembled with its pipes 2 and 3 and the fitting m' is in place the T z may be screwed onto the pipe 2 until the axis of its upper arm is in line with the axis of the upper arm of the fitting m' . Then the plug b' will be screwed into place and the stem g' inserted there-through and screwed into the fitting m' , thus drawing the shoulders 231 and the fitting m' firmly against the plug b' on the opposite sides thereof.

33 and 222 designate horizontal extensions of the pipes 3 and 2, respectively.

The outer wall of the channel d may slope inward, as shown, so that the channel tapers downwardly in cross-section, and the bead will be made to fit the same in order that when the segmental piece is in place it may tightly close the portion of said channel in which it is adjusted.

In practical operation the steam or compressed air will be supplied from any suitable source (not shown) and will be discharged across the liquid-supplying channel d by means of the plug, stem, and deflector, and the volume of flame and the direction thereof may be regulated to any required extent by appropriately adjusting the parts.

By arranging a plain flat face 90 of considerable width between the annular channels j and d and providing a dished deflector above the same terminating in a sharp edge above said face between said channels, the edge of which terminates in a plane close to said plain face 90, a narrow slot is provided and the expansive fluid is directed across the outer channel d in a plane parallel with the plane of the outer rim c of the outer channel. Said deflector n , being vertically adjustable on the screw-threaded stem g , enables the width of the slot to be adjusted and the jet to be directed in the required plane at all required adjustments.

By terminating the deflector between the expansive-fluid supply and the oil-channel the expansive fluid is allowed to begin to expand away from the face 90 before reaching the oil and avoids excessive expansion of said fluid against the body of oil in the channel L, so that the effect is more to suck off the surface of the oil as it rises in said channel, thereby

in a measure vaporizing the oil from the out-
set. The hollow stem *g* is radially perforated
to communicate with the channel, as shown,
so that the expansive fluid is directed against
5 the walls of the channel and expands in the
channel, thus to be distributed to the under
dished faces of the deflector and thence to the
outlet *o*.

Having described my invention, what I
10 claim, and desire to secure by Letters Patent
of the United States, is—

1. A body having in its top face two annu-
lar channels, means for supplying liquid fuel
to the outer channel, means for supplying an
15 expansive fluid to the inner channel, and a
deflector above said inner channel to direct
the expansive fluid across said outer channel;
the under face of the deflector being dished
above the inner channel and the edge of the
20 deflector being arranged close above the top
face of the body outside the inner channel and
forming therewith a narrow slot.

2. A body having two annular channels,
means for supplying liquid fuel to the outer
25 channel, means for supplying an expansive
fluid to the inner channel, a deflector above
said inner channel to direct the expansive fluid
across the outer channel, and a director ar-
ranged to close a portion of the outer channel
30 to limit the space across which the expansive
fluid will pass.

3. A body having two annular channels,
means for supplying liquid fuel to the outer
channel, means for supplying an expansive
35 fluid to the inner channel, an adjustable di-
rector arranged to close a portion of the outer
channel and to limit the space across which
the expansive fluid will pass; and means for
holding the director in place.

4. A body having two annular channels and
40 between said channels a flat face of consid-
erable width, means for supplying liquid fuel to
the outer channel, means for supplying an ex-
pansive fluid to the inner channel, and means
45 above said inner channel extending across a
portion of said flat face and terminating in a
sharp edge close to said face to form there-
with a narrow slot to direct the expansive fluid
across said outer channel.

5. A burner comprising a body having an
50 annular cup-forming channel the outer wall
of which terminates in a plane surface, means
for supplying liquid fuel to said channel and
means for directing an expansive fluid out-
ward, radially across said channel in a plane
55 parallel to said terminal plane.

6. A burner comprising a body having an
annular channel, means for supplying liquid
fuel to said channel, means for directing an
60 annular jet of expansive fluid outward, radially
across said channel and a member arranged to
close a portion of said channel to regulate the
space across which the expansive fluid may
pass.

7. A body having an annular channel, means

for supplying liquid fuel to said channel, means
for directing an expansive fluid across said
channel, a segmental member having a bead
to fit a portion of said channel and to limit
70 the space across which the expansive fluid
may pass.

8. A body having an annular channel, means
for supplying liquid fuel to said channel, means
for directing an expansive fluid across said
channel, a segmental member having a bead
75 to fit a portion of said channel and to limit
the space across which the expansive fluid
may pass, and means for fastening said seg-
mental piece in place.

9. A body having two annular channels, a
80 hollow stem projecting upward therefrom and
closed at the top and provided with openings
leading into the inner channel, means for sup-
plying liquid fuel to the outer channel, means
for supplying an expansive fluid to the hollow
85 stem, a deflector adjustably mounted on the
hollow stem, a segmental member closing a
portion of the outer channel, a retainer on
said stem engaging said segmental member
and a nut screwed on the stem and holding
90 the retainer in place.

10. A body having an annular channel and
a plane face outside said channel, and a hol-
low screw-threaded stem closed at the top and
provided with openings leading into the chan-
95 nel, a dished deflector screwed on said stem
above said channel and terminating above and
close to said face, and a set-nut screwed on
said stem, and engaging said deflector.

11. An atomizer comprising a hollow outer
100 member, a plug in one end of the member ar-
ranged with a channel between the rim of
said member and the plug, and a passage from
the hollow member into said channel, a chan-
nel being provided in the plug; a hollow stem
105 in the plug having an opening leading into
said channel; a pipe connected with said hol-
low stem, and a dished deflector above the
plug.

12. An atomizer provided with a channel,
110 means for supplying liquid fuel to the chan-
nel, an upright screw-threaded stem, a dished
deflector screwed onto said stem, and means
for supplying an expansive fluid between the
dished face of the deflector and the body of
115 the atomizer, said deflector terminating be-
tween the expansive-fluid supply and said
channel.

13. An atomizer-body having a channel in
its top the outer wall of which is lower than
120 the inner wall, means for supplying liquid to
the channel, a screw-stem, a deflector screwed
on the stem and arranged to form a narrow
slot between itself and the body, and means
for supplying an expansive fluid between the
125 deflector and the body.

14. An atomizer comprising a body having
an upwardly-opening annular channel, means
for supplying liquid to the channel, means
for directing an expansive fluid from the in- 130

terior outward radially across the channel above the same, and detachable means for closing a portion of the channel.

15 15. An atomizer comprising a pipe-fitting, a plug in one end of said fitting having a perforation and a channel around said perforation, a channel being provided between the plug and the rim of the fitting, and holes communicating between the chamber of the fitting and the last-named channel; a pipe-fitting in said first-named fitting; an externally-screw-threaded stem, closed at the top and hollow at its lower end fastened in the perforation of the plug and in said inner pipe-fitting and having a hole opening into said channel in the plug, a pipe fastened in said inner pipe-fitting, another pipe fastened in said outer pipe-fitting, and a deflector screwed on said stem.

20 16. An atomizer comprising an outer and an inner pipe-fitting; a plug in the outer pipe-fitting; a hollow stem extending through the plug and fastened to the inner pipe-fitting and having an outward opening from its hollow interior; and a deflector on said stem above said opening, forming with the plug, a narrow slot.

30 17. An atomizer provided with an annular channel and an upright stem, means for discharging a fluid across said channel; detachable means for closing a part of said channel; and a retainer fastened on said stem to hold said detachable means in place.

35 18. The combination of a body having a downwardly-tapering channel; means for supplying liquid to said channel; means for discharging a fluid across said channel; and a member provided with a tapering bead to close a part of said channel.

40 19. An atomizer comprising a body having an annular cup-forming channel in one end and a flat face adjacent the channel; a hollow

stem having an opening to supply fluid, and a deflector to direct said fluid across said flat face toward and across said channel in a plane parallel with the rim thereof. 45

20. A channeled atomizer having a screw-threaded stem which is hollow and radially perforated, and a deflector a portion of which is circular in cross-section and which is screwed on said stem above the perforated portion and has its under face dished. 50

21. An outer and an inner fitting, a plug in the outer fitting, and a stem inserted through the plug and screwed into the inner fitting and having a collar abutting against the plug. 55

22. A body having in its top face two annular channels, the outer rim of the outer channel being slightly lower than the face between the channels; an adjustable deflector arranged to form, with said face, a narrow slot; means for supplying liquid fuel to the outer channel, and means for supplying expansive fluid to the inner channel. 60

23. A burner comprising a body having an annular cup-forming channel, the outer wall of which terminates in a plane surface, an annularly-arranged series of openings into said channel, means for supplying a liquid through said openings into said channel, means for directing an expansive fluid outward radially across said channel in a plane parallel to said terminal plane, and means for closing a portion of said channel and adjustably controlling the direction of the outflowing product. 75

In witness whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, California, this 27th day of May, 1902.

ALLAN C. RUSH.

Witnesses:

JAMES R. TOWNSEND,
JULIA TOWNSEND.