P. D. BREWSTER.

ROTARY PRESSURE BLOWER.

APPLICATION FILED SEPT. 29, 1906.

971,660. Patented Oct. 4, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

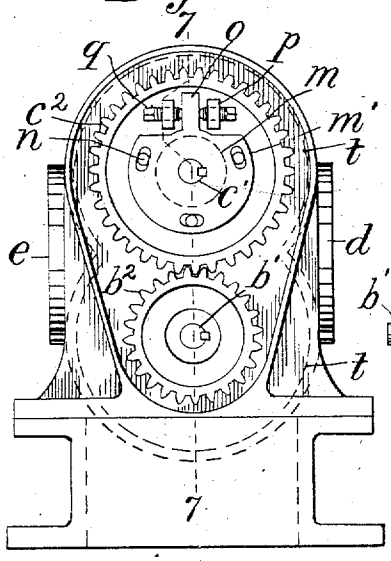


Fig. 2.

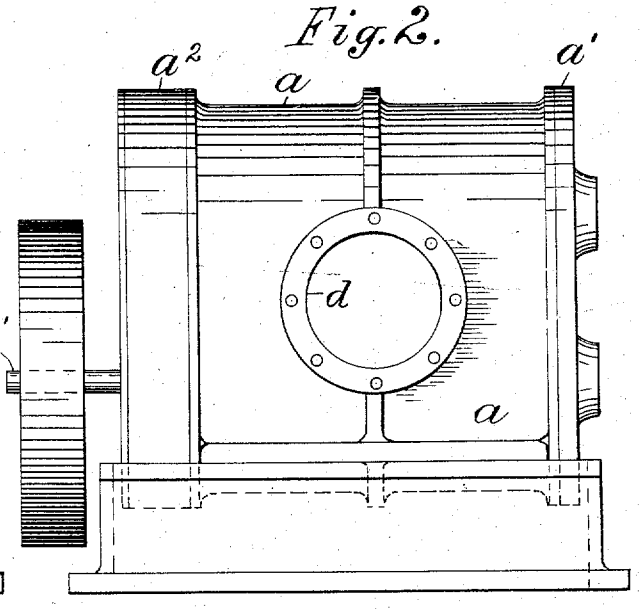
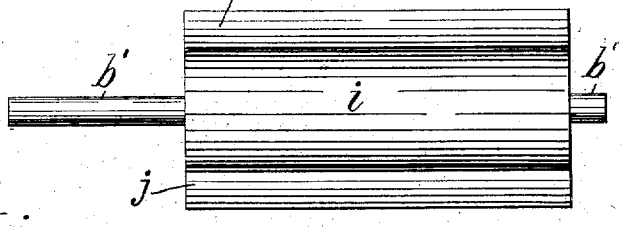


Fig. 4.

Fig. 5.



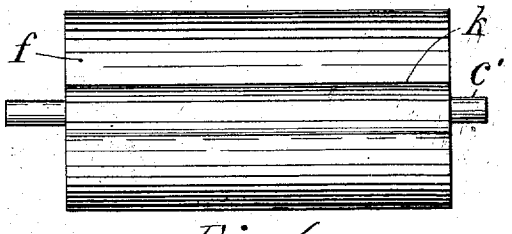


Fig. 6.

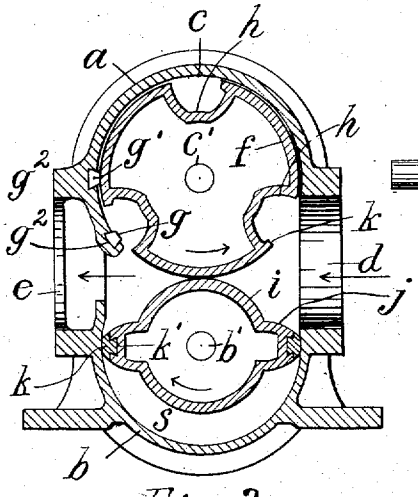


Fig. 3.

Witnesses:
M. C. Wall
E. M. Crane

Inventor.
Percy D. Brewster, per
Thomas S. Crane, Atty.

P. D. BREWSTER.

ROTARY PRESSURE BLOWER.

APPLICATION FILED SEPT. 29, 1906.

971,660. Patented Oct. 4, 1910.

2 SHEETS—SHEET 2.

Fig. 7.

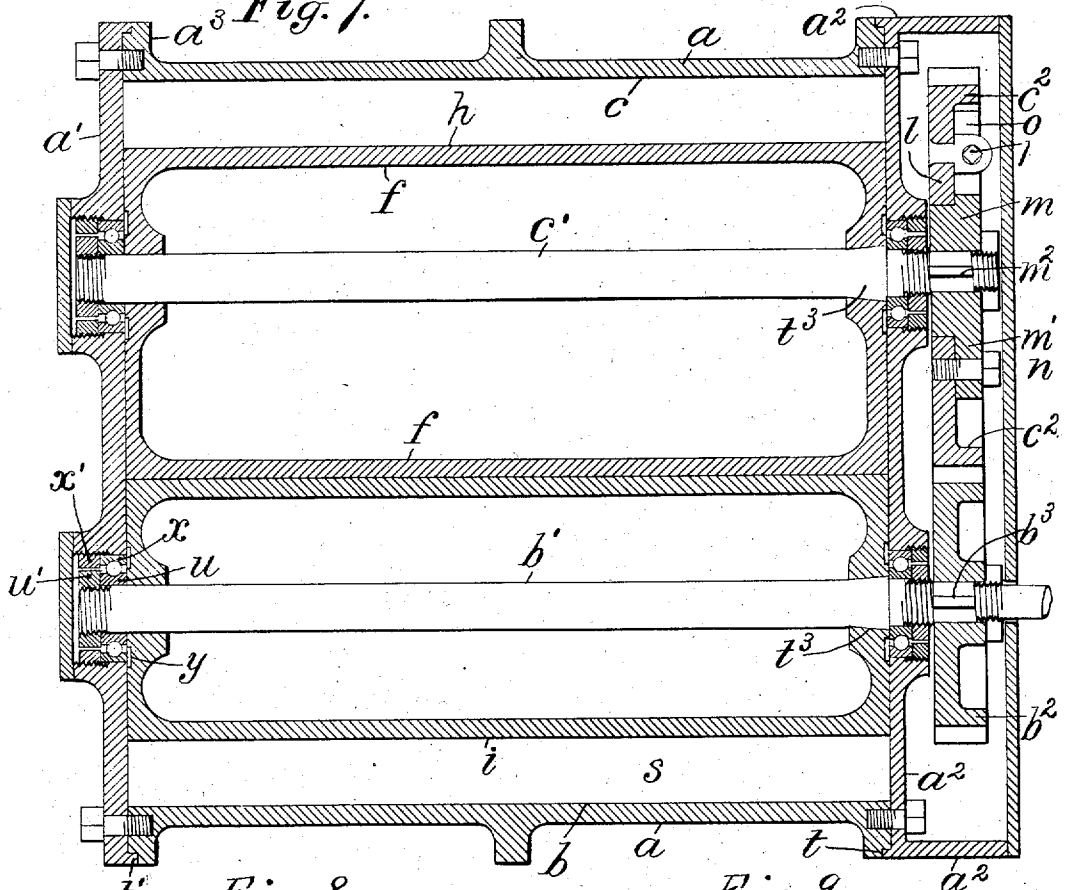


Fig. 8.

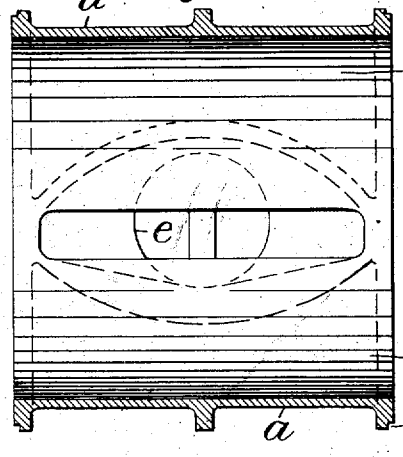
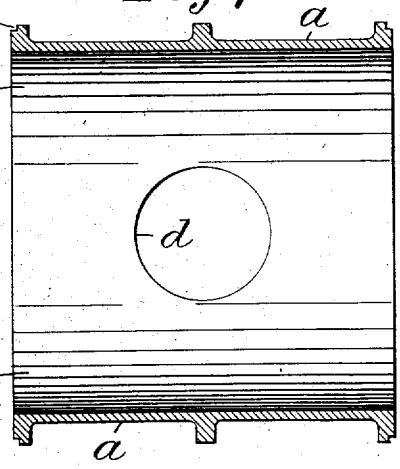


Fig. 9.



Witnesses:
M. C. Wall.
E. N. Crane

Inventor.
Percy D. Brewster, per
Thomas L. Crane. Atty

UNITED STATES PATENT OFFICE.

PERCY D. BREWSTER, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO BREWSTER ENGINEERING CO., OF HOBOKEN, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ROTARY PRESSURE-BLOWER.

971,660. Specification of Letters Patent. Patented Oct. 4, 1910.

Application filed September 29, 1906. Serial No. 336,769.

To all whom it may concern:

Be it known that I, PERCY D. BREWSTER, a citizen of the United States, of No. 301 William street, East Orange, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Rotary Pressure-Blowers, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of the present invention is to improve the efficiency of rotary blowers in which drums rotate in contiguity, and piston-heads or ridges upon one of the drums engage with grooves or sockets in the opposite drum. The contact of the drums forms a cut-off for the air and forces it from the piston cylinder. In such construction, the piston-heads revolve within a casing and drive the air before them, and the smaller the piston-drum in proportion to the size of the casing, the greater is the volume of air delivered for each rotation.

In my construction, the grooved drum, which is termed the "abutment-drum" herein, is made fifty per cent. larger than the piston-drum and furnished with three of the grooves or sockets to engage the piston-heads, and the drums are connected by gear-wheels of pitch diameter in proportion to their respective diameters; so that the abutment-drum revolves at only two-thirds the speed of the piston-drum. By making the abutment-drum larger, the grooves or sockets can be cut deeper in the drum without weakening its structure, and the piston-heads can be made longer, and the piston-cylinder (in the casing) larger in proportion to the diameter of its drum, than where a two-grooved abutment-drum is used which is necessarily of the same diameter as the piston-drum to produce the same surface speed where they rotate in contiguity. In my construction, the drums rotate at speeds inversely proportionate to their diameters, which correspond to the numbers of the piston-heads and abutment-sockets. To economize the construction, the chamber or cylinder (in the casing) for the abutment-drum is not bored, but the contact of such drum with the casing is effected by seats which are made by casting soft metal in grooves in the drum.

In the annexed drawing, Figure 1 is an end elevation of the blower with the cover to the gear-guard removed; Fig. 2 is a side elevation showing the blower inlet; Fig. 3 is a vertical section across the middle of such inlet on Fig. 2; Fig. 4 is a horizontal section across the edge of the casing at the center of the inlet; Fig. 5 is a side elevation of the piston-drum and driving-shaft; Fig. 6 is a side elevation of the abutment-drum and its shaft; Fig. 7 is a vertical section, where hatched, at the center line of Fig. 1, the bed being omitted; Fig. 8 is a similar section looking toward the outlet, with the heads and drums removed to show the outlet passage; and Fig. 9 is a similar section looking toward the inlet.

The casing a is provided at the ends with cylinder heads a' and a^2, and with twin parallel bores b and c. These bores embrace each only about one-half of a cylinder, and may advantageously be a little over 180 degrees, to maintain contact with the rotating parts. Shafts b' and c' are fitted to bearings in the heads at the centers of the bores. The casing has inlet d upon one side and outlet e upon the opposite side. The bore b is machine-finished on the lower half, that is, at one side of the inlet and outlet, and the bore c is made a little larger than the abutment-drum f and provided with one or more longitudinal packings g, g', covering a space equal to the width of the abutment-sockets h in the abutment-drum. The packing strips g, g' thus embrace each of the abutment-sockets in turn as they move past the packings, and prevent the passage of air past the packings as effectively as a single wide strip. A piston-drum i is shown with two piston-heads j, and the abutment-drum with three abutment-sockets h. No valves are employed, but the inlet and outlet of the blower open directly into the bore in which the piston-drum revolves. The inlet and outlet enter the bore b a little above or at one side of the center line so that both the piston-heads may be in contact with the bore at the same time, the space s containing the fluid which is impelled to the outlet e as the piston-drum and abutment-drum revolve in opposite directions, or in the direction of the arrows marked therein in Fig. 3. The sockets h are made so as to clear the piston-heads in order to avoid finishing their interior, and each socket is provided along one edge with a finished seat k in order to match the corresponding finished face of the piston-head.

The contiguity is maintained by the gears keeping the rear curve of the piston-head contiguous with the rear seat of the socket, and any wear in the gears only serves to increase the clearance and does not cause "knock". The shafts b' and c' are connected outside the head k by gears b^2, c^2, to revolve at different speeds, either the forward or backward face of each piston-head (as the part marked j in Fig. 3) being curved to maintain a contiguous relation with the seat k of the corresponding piston-socket.

In building the blowers, it is convenient to adjust the curved surface of the piston-head into close proximity to the seat k in the abutment-socket by making one of the connecting gears b^2 and c^2 adjustable on its shaft. This may be effected in any convenient manner, a means being shown in Figs. 1 and 7 which permits of very minute adjustment. The gear-wheel c^2 is shown with a flat annular flange l upon which the gear-teeth are cut, and a hub m is secured to the shaft c' and provided with a flange m' which overlaps the flange l. Cap-screws n connect the flanges l and m', being inserted through slots in the latter to permit of a rotary adjustment, and a lug o is formed on the flange m' and two plugs p, at a little distance therefrom upon the flange l, are provided with set-screws q extended through the lugs p to the opposite side of the lug o. The hub m is secured rigidly to the shaft c' by key m^2, and the gear b^2 is secured rigidly to the shaft b' by key b^3, and when the teeth of the gears are interlocked, with one of the piston-heads in one of the abutment-sockets, the set-screws q are turned to adjust the abutment-drum with the seat k close to the piston-head. Any means of giving one of the drums a slight peripheral adjustment in relation to the other suffices to carry out this part of the invention. This adjustment also serves to take up any wear of the gears, so as to always maintain a close clearance between the edge of the sockets and the heads. Annular grooves t are shown in dotted lines in Fig. 1 cut in flanges a^3 of the casing; and corresponding concentric ribs t' are formed on cylinder-heads a' and a^2 which are adapted to fit in the grooves in the casing; these insure the exact centering of the shafts and allow an extremely fine clearance all the way around the bore and permit a contiguous relation at all places.

In practice, the packing strips k, g and g', are formed by setting the drums in an operative relation, placing clay adjacent to the grooves in which the strips are to be formed and running melted Babbitt or other soft metal into such spaces. This secures the metal strips respectively to the casing and to the piston-heads, and the mere rotation of the drums then slightly scrapes off the soft metal where an actual contact exists, and produces the desired slight clearance. By making the packing-strips narrow, they are cast with great facility and employ much less of the soft metal, and form a fluid cut-off as the sockets pass the packings, as effectively as a single wide strip. To renew the bearings when worn, I provide ball-bearings formed of separate inner and outer collars, grooved to form ball-races and fitted to circular openings in the heads.

The drums are shown each fitted at one end to a taper-seat t^3 upon the shaft secured with the Woodruff key, and the inner ball-race u is pressed against the end of the drum by a nut u', which serves also to draw the drum firmly upon the taper-seat. The outer ball-race x is shown adjustable in the head by means of a screw-collar x' fitted within the head, and having in practice holes upon its outer side to insert a spanner for turning it when required, as in bicycle ball-bearings. A recess y is shown in the end of the drum adjacent to the collar x to permit the adjustment of the collar, and when such collar is pressed inwardly it leads the balls in a slightly different track, and moves the balls, the inner race u, and the drum, away from the head. The drums are made slightly shorter than the length of the bores in the casing, thus allowing a slight clearance at the ends, and the ball-bearings are adjusted to hold the drums in a central position so as to run close to the heads without touching the same. The gear-wheels b^2 and c^2 operate only to rotate the drums in unison, as the abutment-drum offers no resistance to rotation, and the gears may thus be driven at a higher speed than if working against a resistance.

At every revolution of the blower, all the fluid driven forward by the piston-heads is expelled, and a greater efficiency is thus secured than when any portion of the inclosed air remains in delivery ports, and expands into the succeeding piston-space.

Owing to the fact that the abutment-drum is materially larger than the piston-drum, the sockets in the abutment-drum may be made very deep and the piston-heads projected a correspondingly great distance from the piston-drum thus occupies a relatively small part of the piston-cylinder and discharges a greater volume of air at each rotation than if a larger drum were used in the same cylinder.

I hereby disclaim the mere use of a piston-drum having longitudinal piston-heads, and an abutment-drum having longitudinal sockets to coöperate with such piston-heads, as my invention consists in the particular constructions claimed herein.

Having thus set forth the nature of the invention what is claimed herein is:

1. A rotary pressure blower having a casing with twin bores and inlet and outlet

opening into the casing upon opposite sides at the junction of such bores, two drums arranged to rotate within the said bores, the drums having diameters in the proportion of two to three, gears in the proportion of two to three revolving the drums continuously at the same peripheral velocity, the smaller drum having two longitudinal oppositely disposed similar piston-heads with unbroken surface and finished upon one side only, and the larger drum having three longitudinal abutment-sockets materially wider than such piston heads and having one edge only finished and fitted to the side of the piston head, whereby the air in said sockets is freely discharged to the outlet opening of the casing.

2. A pressure blower having a casing with twin bores only one of which is machine-finished, and an inlet and outlet opening into the casing upon opposite sides at the junction of such bores, two drums arranged to rotate within the said bores, the drums having diameters in the proportion of two to three, contiguous peripheral surfaces of the casing embracing more than one-half the periphery of each drum, gears in the proportion of two to three revolving the drums at the same peripheral velocity, the smaller drum having two longitudinal oppositely disposed similar piston-heads with unbroken surface each having its apex fitted to such larger bore, the larger drum having three abutment-sockets fitted to the piston-heads, the shell of such abutment-drum being fitted loosely to the unfinished bore, the unfinished bore having two grooves g^2 adjacent to the outlet opening of the casing, and a longitudinal packing formed of two soft metal strips g, g', fitted to the grooves g^2 and separated by a distance at least equal to the width of the sockets, in the abutment-drum.

3. A rotary pressure blower having two contiguous drums provided, respectively, with piston-heads and abutment-sockets, gearing connecting the drums to rotate them at speeds proportional to the respective numbers of the heads and sockets, and means for giving one of the drums a slight peripheral adjustment in relation to the other, to adjust the piston-heads properly to the abutment-sockets.

4. A pressure blower having a casing with twin bores and opposite heads, an abutment-drum provided with abutment-sockets having a shaft mounted in the heads and fitted to one of the bores, a piston-drum having piston-heads and mounted on a shaft fitted concentrically in the other bore, a gear-wheel attached rigidly to one of the shafts, and a hub to the other shaft, a ring-gear having connection with such hub and meshing with the rigidly attached gear, and lugs and set-screws adapted to adjust the ring-gear upon the hub to set the piston-heads and sockets in contiguity with one another.

5. A rotary pressure blower having a casing with twin bores and inlet and outlet opening into the casing upon opposite sides at the junction of such bores, two drums arranged to rotate within the said bores, the drums having diameters in the proportion of 2 to 3, gears in the proportion of 2 to 3 revolving the drums continuously at the same peripheral velocity, the smaller drum having two longitudinal oppositely disposed similar piston-heads, and the larger drum having three longitudinal abutment sockets wider than such piston-heads to clear the same and having at least one edge finished and fitted to the side of the piston-head, as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

PERCY D. BREWSTER.

Witnesses:
L. LEE,
THOMAS S. CRANE.

Correction in Letters Patent No. 971,660.

It is hereby certified that in Letters Patent No. 971,660, granted October 4, 1910, upon the application of Percy D. Brewster, of East Orange, New Jersey, for an improvement in "Rotary Pressure-Blowers," an error appears in the printed specification requiring correction as follows: Page 2, line 116, after the compound word "piston-drum" a period and the words *The piston-drum* should be inserted, making a new sentence; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of October, A. D., 1910.

[SEAL.]

E. B. MOORE,
Commissioner of Patents.

opening into the casing upon opposite sides at the junction of such bores, two drums arranged to rotate within the said bores, the drums having diameters in the proportion of two to three, gears in the proportion of two to three revolving the drums continuously at the same peripheral velocity, the smaller drum having two longitudinal oppositely disposed similar piston-heads with unbroken surface and finished upon one side only, and the larger drum having three longitudinal abutment-sockets materially wider than such piston heads and having one edge only finished and fitted to the side of the piston head, whereby the air in said sockets is freely discharged to the outlet opening of the casing.

2. A pressure blower having a casing with twin bores only one of which is machine-finished, and an inlet and outlet opening into the casing upon opposite sides at the junction of such bores, two drums arranged to rotate within the said bores, the drums having diameters in the proportion of two to three, contiguous peripheral surfaces of the casing embracing more than one-half the periphery of each drum, gears in the proportion of two to three revolving the drums at the same peripheral velocity, the smaller drum having two longitudinal oppositely disposed similar piston-heads with unbroken surface each having its apex fitted to such larger bore, the larger drum having three abutment-sockets fitted to the piston-heads, the shell of such abutment-drum being fitted loosely to the unfinished bore, the unfinished bore having two grooves g^2 adjacent to the outlet opening of the casing, and a longitudinal packing formed of two soft metal strips g, g', fitted to the grooves g^2 and separated by a distance at least equal to the width of the sockets, in the abutment-drum.

3. A rotary pressure blower having two contiguous drums provided, respectively, with piston-heads and abutment-sockets, gearing connecting the drums to rotate them at speeds proportional to the respective numbers of the heads and sockets, and means for giving one of the drums a slight peripheral adjustment in relation to the other, to adjust the piston-heads properly to the abutment-sockets.

4. A pressure blower having a casing with twin bores and opposite heads, an abutment-drum provided with abutment-sockets having a shaft mounted in the heads and fitted to one of the bores, a piston-drum having piston-heads and mounted on a shaft fitted concentrically in the other bore, a gear-wheel attached rigidly to one of the shafts, and a hub to the other shaft, a ring-gear having connection with such hub and meshing with the rigidly attached gear, and lugs and set-screws adapted to adjust the ring-gear upon the hub to set the piston-heads and sockets in contiguity with one another.

5. A rotary pressure blower having a casing with twin bores and inlet and outlet opening into the casing upon opposite sides at the junction of such bores, two drums arranged to rotate within the said bores, the drums having diameters in the proportion of 2 to 3, gears in the proportion of 2 to 3 revolving the drums continuously at the same peripheral velocity, the smaller drum having two longitudinal oppositely disposed similar piston-heads, and the larger drum having three longitudinal abutment sockets wider than such piston-heads to clear the same and having at least one edge finished and fitted to the side of the piston-head, as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

PERCY D. BREWSTER.

Witnesses:
L. LEE,
THOMAS S. CRANE.

Correction in Letters Patent No. 971,660.

It is hereby certified that in Letters Patent No. 971,660, granted October 4, 1910, upon the application of Percy D. Brewster, of East Orange, New Jersey, for an improvement in "Rotary Pressure-Blowers," an error appears in the printed specification requiring correction as follows: Page 2, line 116, after the compound word "piston-drum" a period and the words *The piston-drum* should be inserted, making a new sentence; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of October, A. D., 1910.

[SEAL.]

E. B. MOORE,
Commissioner of Patents.

Correction in Letters Patent No. 971,660.

It is hereby certified that in Letters Patent No. 971,660, granted October 4, 1910, upon the application of Percy D. Brewster, of East Orange, New Jersey, for an improvement in "Rotary Pressure-Blowers," an error appears in the printed specification requiring correction as follows: Page 2, line 116, after the compound word "piston-drum" a period and the words *The piston-drum* should be inserted, making a new sentence; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 25th day of October, A. D., 1910.

[SEAL.]

E. B. MOORE,

Commissioner of Patents.