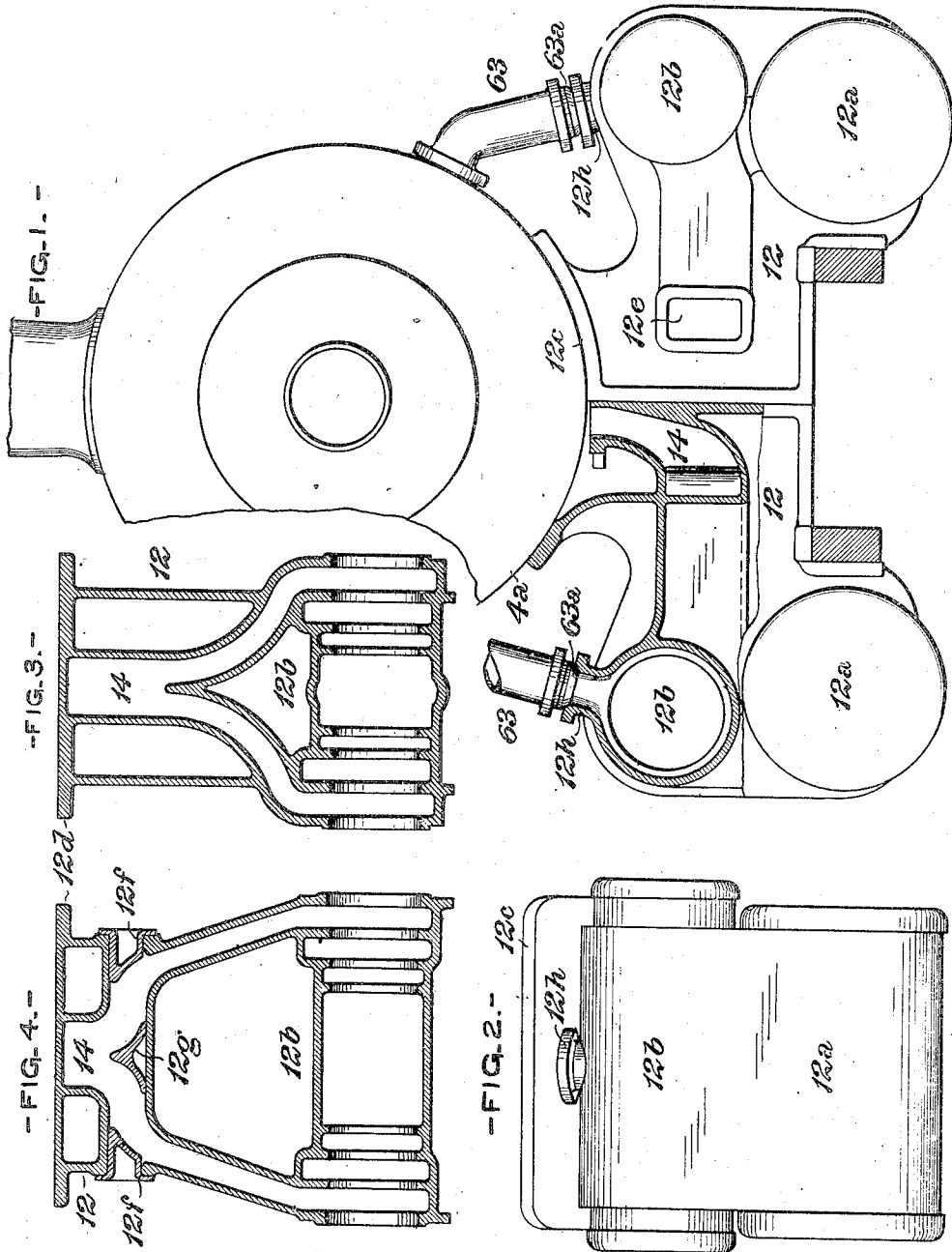


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APPLICATION FILED JAN. 23, 1911.

990,840.

Patented May 2, 1911.

3 SHEETS—SHEET 1.



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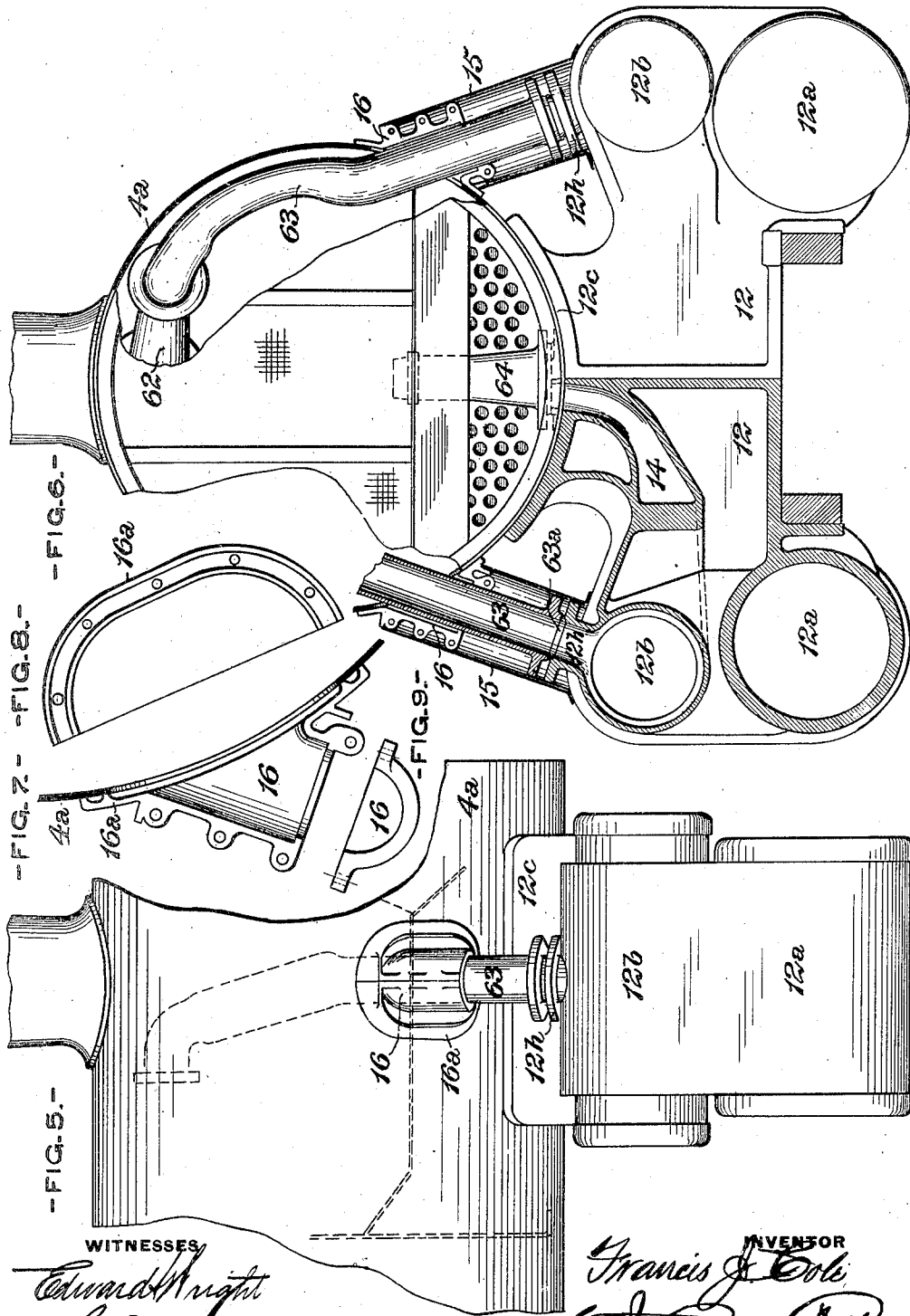
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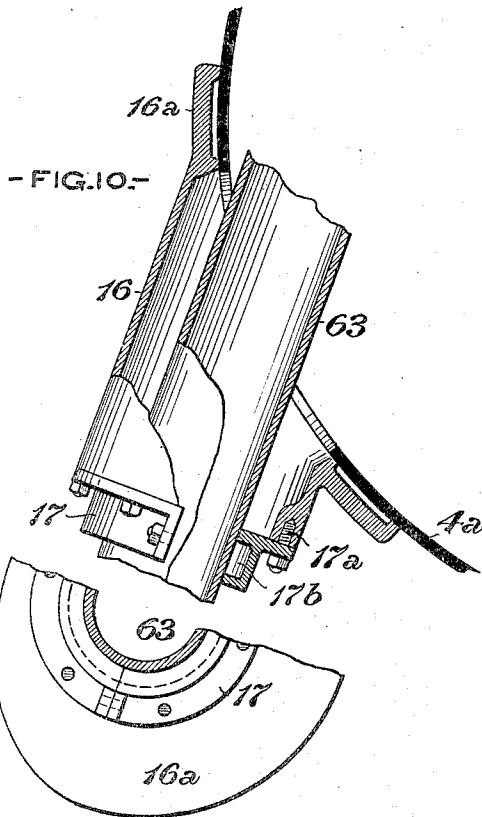
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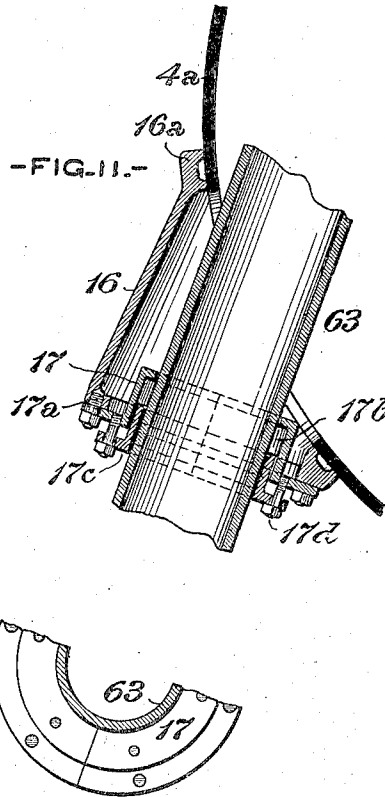
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-FIG. 12-



-FIG. 13-

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UNITED STATES PATENT OFFICE.

FRANCIS J. COLE, OF SCHENECTADY, NEW YORK.

CYLINDER-SADDLE FOR LOCOMOTIVE-ENGINES.

990,840.

Specification of Letters Patent.

Patented May 2, 1911.

Application filed January 23, 1911. Serial No. 604,140.

To all whom it may concern:

Be it known that I, FRANCIS J. COLE, of Schenectady, in the county of Schenectady and State of New York, have invented a certain new and useful Improvement in Cylinder-Saddles for Locomotive-Engines, of which improvement the following is a specification.

The object of my invention is to provide an improved construction of locomotive cylinder saddles and means for the connection of the main steam supply pipe or dry pipe of a locomotive engine, with the valve chests thereof, which shall be of simple and inexpensive construction and readily applicable in locomotives of the various present standard types, and by the application of which the construction of the cylinder saddles may be simplified and economized and their durability enhanced, and, further, the steaming capacity of the boiler may be promoted by a substantial reduction of the obstruction to draft through the smoke box which is presented with steam pipes of the ordinary construction.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a front view, partly in section, of a locomotive boiler and cylinder saddles, illustrating an embodiment of my invention; Fig. 2; a side view, in elevation, of one of the half saddle cylinders; Figs. 3 and 4, transverse sections through one of the cylinder saddles, illustrating different forms of exhaust steam passages therein; Fig. 5, a side view, in elevation, of the forward portion of a locomotive and of the right hand cylinder saddle thereof, showing a structural modification; Fig. 6, a view, partly in front elevation and partly in section, of the same; Fig. 7, a side view, in elevation, of one of the sections of an air joint casing; Fig. 8, a face view of the same; Fig. 9, a bottom view of the same; Figs. 10 and 11, longitudinal sections through portions of steam pipes and their casings, showing different forms of air joint appliances; and, Figs. 12 and 13, half bottom views of the steam pipe casings of Figs. 10 and 11.

In present standard practice, the smoke box, which constitutes the forward end portion of a locomotive boiler, is ordinarily of cylindrical form, and is secured to and supported upon a pair of half saddle cylinders, which are bolted together on the longitudi-

nal central plane of the locomotive and are segmentally recessed at top to the radius of the outside diameter of the smoke box, to form a saddle or bed plate on which the latter is seated. The half saddle cylinders are large, heavy, and complicated castings, each having live steam and exhaust steam passages, a cylinder barrel, and generally also a valve chest barrel, cored within it, and communication between the valve chests, whether cast integral with the saddle castings or separate therefrom, and the main steam supply pipe or dry pipe of the boiler, is established through branch steam pipes located inside the smoke box. By reason of the complication of the steam passages and the intricacy of the coring, it is, in the first place, difficult to make these half saddle cylinders of any other metal than cast iron, and further the construction above described is subject particularly when used with superheated steam, to practical objections, among which are that the live steam passages in the half saddles are a source of weakness, rendering them extremely liable to breakage by the effects of expansion and contraction due to the great range of difference of temperature between the steam in the live steam passages, which may be as high as 650 degrees Fahrenheit, and the external air, which may be, in the northwest-ern territory, as low as 40 or 50 degrees below zero. Again, the steam pipes which lead through the inside of the smoke box to the live steam passages of the half saddles, occupy a considerable percentage of the cross sectional area of the smoke box below the spark arresting appliances, and correspondingly obstruct the free passage of the products of combustion to the stack, and require an increase of exhaust blast and resultant back pressure, to afford the requisite draft.

My invention is designed to substantially overcome the objections above stated, as well as to enable cast steel to be desirably utilized as a material for the manufacture of half saddle cylinders.

In the practice of my invention, I provide a pair of what are known, as entireties, as "half saddle cylinders," these being two members, which are ordinarily counterparts, each comprising a saddle portion, 12^a, having a curved bed or seat. 12^b, on its top, at one side, and a steam cylinder, 12^a, and superposed distribution valve chest, 12^b, on the opposite side. The two members are fin-

ished on their meeting faces, and are secured together by bolts passing through flanges, 12^d, adjoining said faces. When so connected, the beds, 12^c, form a segmental seat, upon which the smoke box, 4^a, of the locomotive boiler, rests, and to which it is bolted. An exhaust steam passage, 14, (one or more) extends from each valve chest, 12^b, to the top of the saddle portion, and an exhaust pipe, 64, is bolted to the saddle portions, above the upper openings.

The live steam passages which are ordinarily cored in half saddle cylinder castings, are wholly dispensed with, and in lieu thereof, the valve chests communicate with the main steam supply pipe or dry pipe, through branch steam pipes, 63, which are connected, at their lower ends, to necks or short live steam passages, 12^h, projecting from the tops of the valve chests, 12^d, and then extend upwardly into the smoke box, 4^a, within which their upper ends are connected to the T head, 62, which is secured to, and communicates with, the forward end of the ordinary main steam supply pipe in the waist of the boiler. Where, as is now very generally the case, the boiler is fitted with a super-heating appliance, the upper ends of the branch steam pipes are connected to the superheated steam compartments of the headers or steam casings of said superheating appliance, which are, in present practice, located either adjoining the sides, or in the upper portion of the smoke box.

The material simplification of the half saddle cylinder castings, by the elimination of the live steam passages, enables them, under my invention, to be readily made of cast steel, and great reduction of their weight to be effected, as the necessary strength can be afforded without the use of the extremely heavy walls and sections required in iron castings. Inasmuch as steel is capable of much greater endurance of extremes of temperature than iron, cylinder saddles formed of cast steel are practically indestructible. The wearing surfaces of the cylinders and valve chests of steel castings should be protected by bushings of cast iron, cast steel not being as well adapted for frictional surfaces, and when these bushings become worn, they can be readily and inexpensively renewed, and the life of the half saddle cylinder be thus indefinitely prolonged. In order to facilitate the molding of half saddle cylinders of cast steel, and the removal of the cores after they are cast, openings, 12^e, are formed in them by suitable cores, said openings being closed, after the castings are made, by removable cover plates.

The distribution valve chests, 12^b, are, in the instance exemplified, adapted for the use of piston valves of the inside admission

type, and the exhaust steam passages of the half saddle cylinders are consequently bifurcated, leading out of the valve chests adjacent to their opposite ends, and uniting to a connection with the exhaust pipe in or near the central transverse plane of the saddle portion, as shown in Figs. 3 and 4. Fig. 3 shows a bifurcated exhaust passage of substantially the ordinary form, in which the branches of the exhaust steam passages are inwardly curved from their junction with the valve chest to a straight central terminal portion extending for somewhat less than half the distance from the inner face of the half saddle cylinder to the valve chest. It will be seen that while this form of exhaust steam passage is practicable, the removal of the cores cannot be very readily effected. In order to facilitate casting and admit of cleaning out the hard baked cores which are necessary for making steel castings, the branches of the exhaust steam passage are preferably, as shown in Fig. 4, inwardly inclined for a substantial distance from the valve chest, and passages are formed on the ends of the saddle portion, near the ends of the inclined branches, which passages are, after the casting is made, closed by plugs, 12^f, the inner ends of which are inclined in conformity with the exhaust passages. In order to properly direct the flow of the exhaust steam and prevent cross currents, a separable V shaped dividing piece, 12^g, is fitted in the central portion of the exhaust steam passage, between the end openings, and between the terminals of the inclined branches of the exhaust steam passage.

The lower ends of the branch steam pipes, 63, are bolted to flanges on the necks, 12^h, of the distribution valve chests, ball joint rings, 63^a, being interposed, to form tight joints, with the capacity of a limited degree of relative movement of the steam pipes and valve chests, and the upwardly extending steam pipes pass freely through openings in the sides of the smoke box, leakage of air thereinto being prevented by suitable packing or joint appliances, as hereinafter described. In the case of locomotives using saturated steam, the branch steam pipes extend to the T head, 62, as shown in Fig. 6, their upper ends being bolted to the latter and ball joint rings being interposed in the ordinary manner. In order to protect the exterior portions of the steam pipes from the cooling action of the atmosphere, they are inclosed in sheet metal casings, 15, which extend from the half saddle castings to the outside of the smoke box, and may be provided with lagging of any suitable and preferred material which is a non-conductor of heat. The steam pipes are of substantially similar form in locomotives fitted with superheating appliances of the type having

headers located near the top of the smoke box, and in locomotives having the side header types of superheaters, are made of shorter length and are connected, at their upper ends to the superheated steam compartments of the side headers. As shown in the drawings, the branch steam pipes, 63 are formed of cast metal throughout, but it will be obvious that, if preferred, their bodies may be of wrought iron or steel pipe, and provided with cast end sections for connections to the T head and valve chests.

As shown in Figs. 5 to 9 inclusive, the branch steam pipes, 63, are inclosed, at and adjoining the outside of the smoke box, 4^a, in air joint casings, 16, which are formed in two halves, secured together by bolts, so as to be readily fitted around and removed from the steam pipes. Said pipes fit truly in openings in the bottoms of the casings, and any suitable packing or gasket may be fitted therein around the pipes.

Figs. 10 to 12 illustrate details of the special means provided for effecting the important function of insuring air tight joints between the branch steam pipes and the smoke box, without interfering with the capability of ready removal and replacement of the steam pipes whenever required. The joint casings, 16, are, in these instances, shown as formed in a single piece, having a flange, 16^a, at its top, curved in correspondence with the outside of the smoke box, to which it is secured by bolts passing through said flange. As shown in Figs. 10 and 12, the bottom of the joint casing is closed by a packing box, 17, formed in two separable sections, and secured to the casing by bolts, 17^a, said box providing an annular chamber, 17^b, around the steam pipe, for the reception of any suitable and preferred packing. In the structural modification shown in Figs. 11 and 13, the packing chamber is open at its outer end, and forms a stuffing box, within which packing is placed and is compressed as required, by a two part gland or follower, 17^c, and bolts, 17^d.

I claim as my invention and desire to secure by Letters Patent:

1. A half saddle cylinder for locomotive engines, comprising, in an integral casting, a saddle or supporting portion, a cylinder barrel, a distribution valve chest communicating with the cylinder barrel, an exhaust steam passage leading from said valve chest to an exhaust pipe seat on the saddle portion, and a live steam supply passage in said steam chest for the connection of a steam supply pipe independently of and exterior to the half saddle cylinder, said casting having end openings for the removal of cores.

2. A half saddle cylinder for locomotive engines, comprising a saddle or supporting portion, a cylinder barrel, a distribution valve chest communicating with the cylinder

barrel, an exhaust steam passage leading from said valve chest to an exhaust pipe seat on the saddle portion, a live steam supply passage in said valve chest for the connection of a steam supply pipe independently of and exterior to the half saddle cylinder, and a separable V shaped dividing piece fitted in the exhaust passage to properly direct the flow of exhaust steam to the exhaust pipe and prevent cross currents.

3. A half saddle cylinder for locomotive engines, comprising a saddle or supporting portion, a cylinder barrel, a distribution valve chest communicating with the cylinder barrel, a bifurcated exhaust steam passage leading from said valve chest to an exhaust valve seat on the saddle portion, passages leading from the branches of the exhaust passage through the end walls of the saddle portion, plugs closing said passages and having their inner ends inclined in conformity with said branches, and a live steam supply passage in the valve chest for the connection of a steam supply pipe independently of and exterior to the half saddle cylinder.

4. The combination, with a locomotive boiler, of a half saddle cylinder having a saddle or supporting portion, a cylinder barrel and an integral distribution valve chest communicating with said barrel, and an exhaust steam passage leading from the valve chest to an exhaust pipe seat on the saddle portion, and a steam supply pipe connected to the valve chest and leading therefrom, exterior to the half saddle cylinder and through the smoke box of the boiler, to a communication with the main steam supply pipe thereof.

5. The combination, with a locomotive boiler, of a half saddle cylinder having a saddle or supporting portion, a cylinder barrel and an integral distribution valve chest communicating with said barrel, and an exhaust steam passage leading from the valve chest to an exhaust pipe seat on the saddle portion, a steam supply pipe connected to the valve chest and leading therefrom, exterior to the half saddle cylinder and through the smoke box of the boiler, to a communication with the main steam supply pipe thereof, an air joint casing inclosing the steam supply pipe at and adjoining the outside of a smoke-box, and a separable packing box surrounding the steam supply pipe and closing the lower end of the air joint casing.

6. The combination, with a locomotive boiler, of a half saddle cylinder having a saddle or supporting portion, a cylinder barrel and an integral distribution valve chest communicating with said barrel, and an exhaust steam passage leading from the valve chest to an exhaust pipe seat on the saddle portion, a steam supply pipe connected to the valve chest and leading there-

from, exterior to the half saddle cylinder
and through the smoke box of the boiler, to
a communication with the main steam sup-
ply pipe thereof, an air joint casing sur-
rounding the steam supply pipe and having
5 a flange on its upper end secured to the
smoke box, and a separable packing box

fitting around the steam supply pipe and
closing the lower end of the air joint casing.

FRANCIS J. COLE.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."