

No. 842,845.

PATENTED JAN. 29, 1907.

W. D. DOUGLAS.
AIR FEEDING DEVICE.
APPLICATION FILED AUG. 13, 1903.

2 SHEETS—SHEET 1.

Fig. 1.

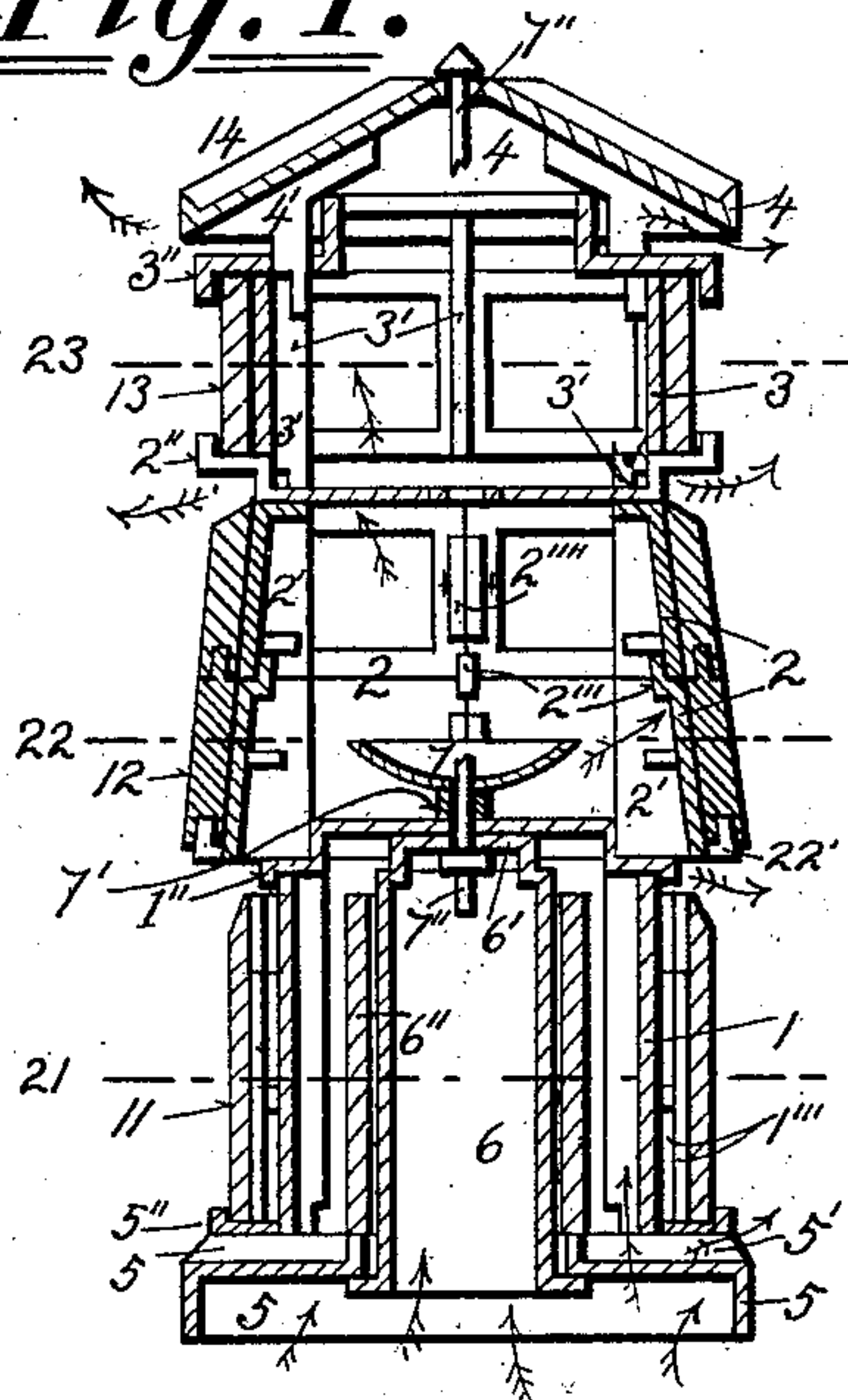


Fig. 2.

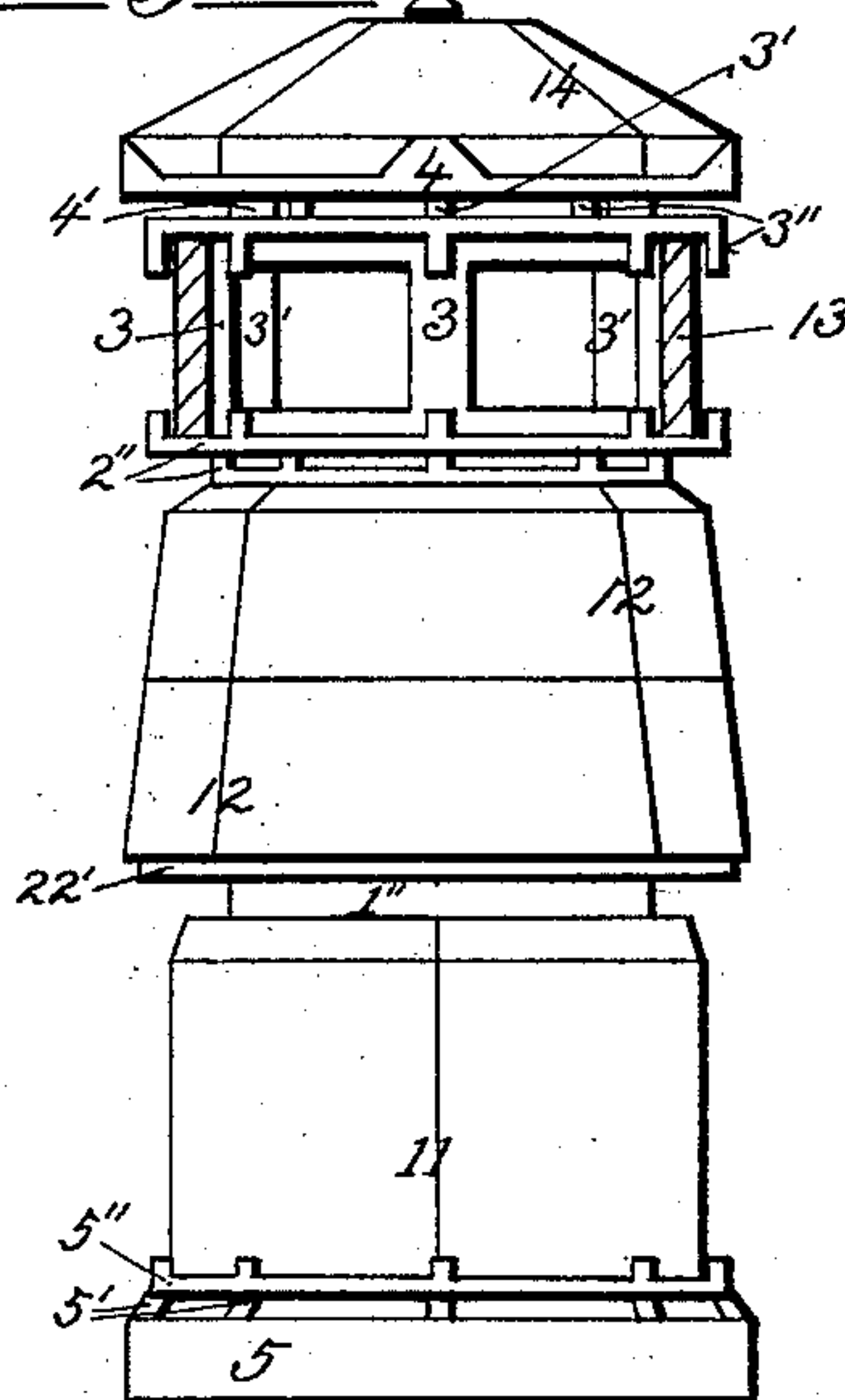


Fig. 4.

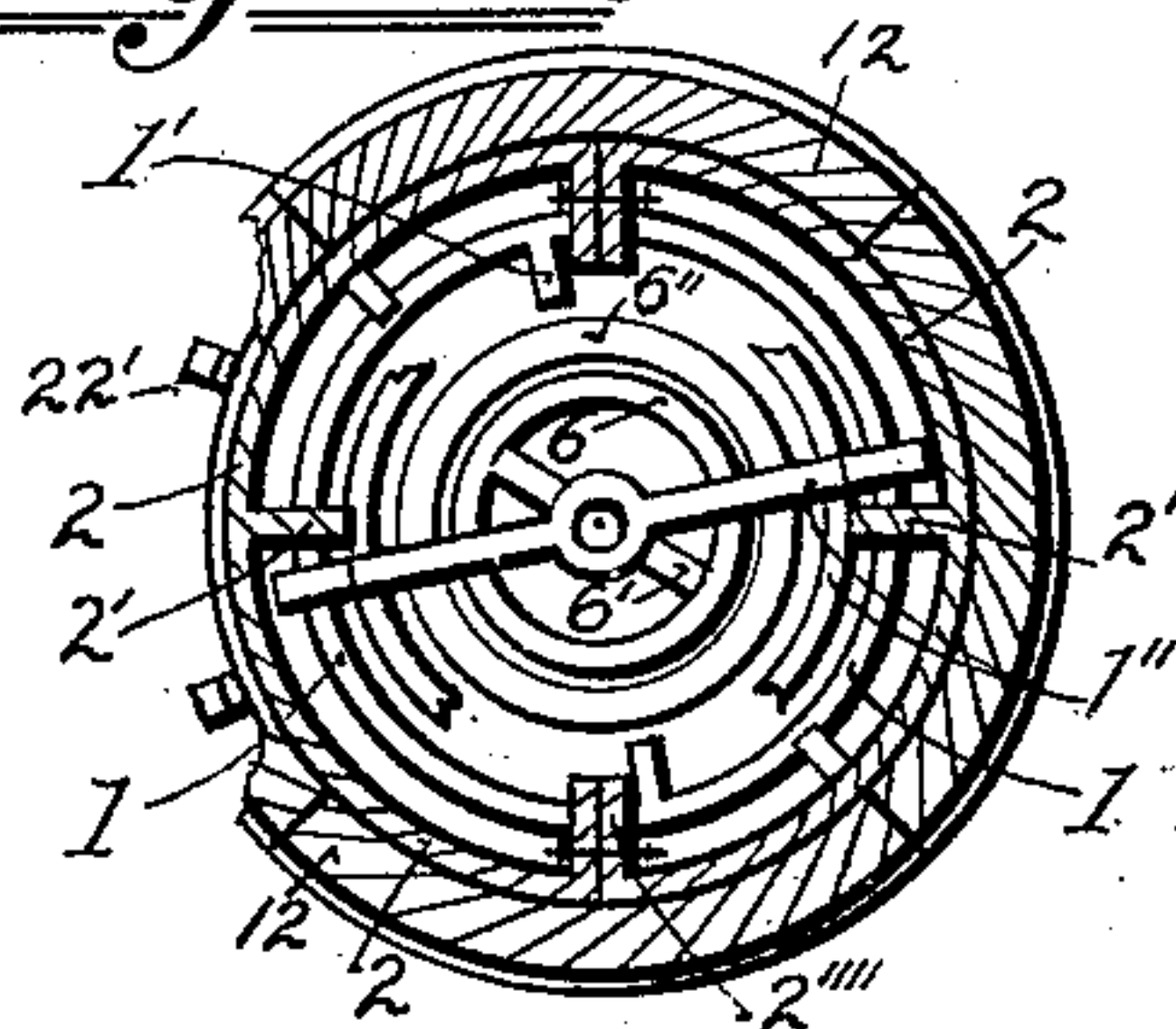


Fig. 3.

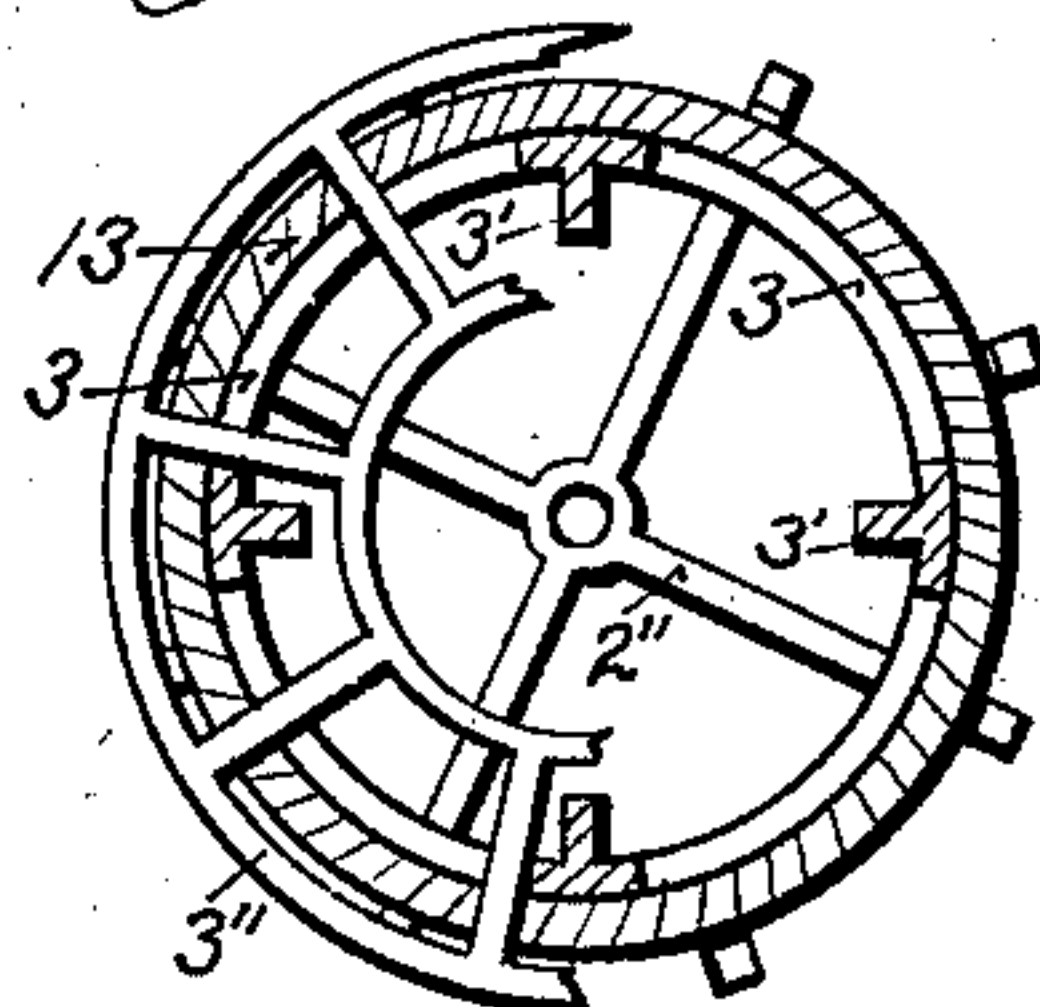


Fig. 5.

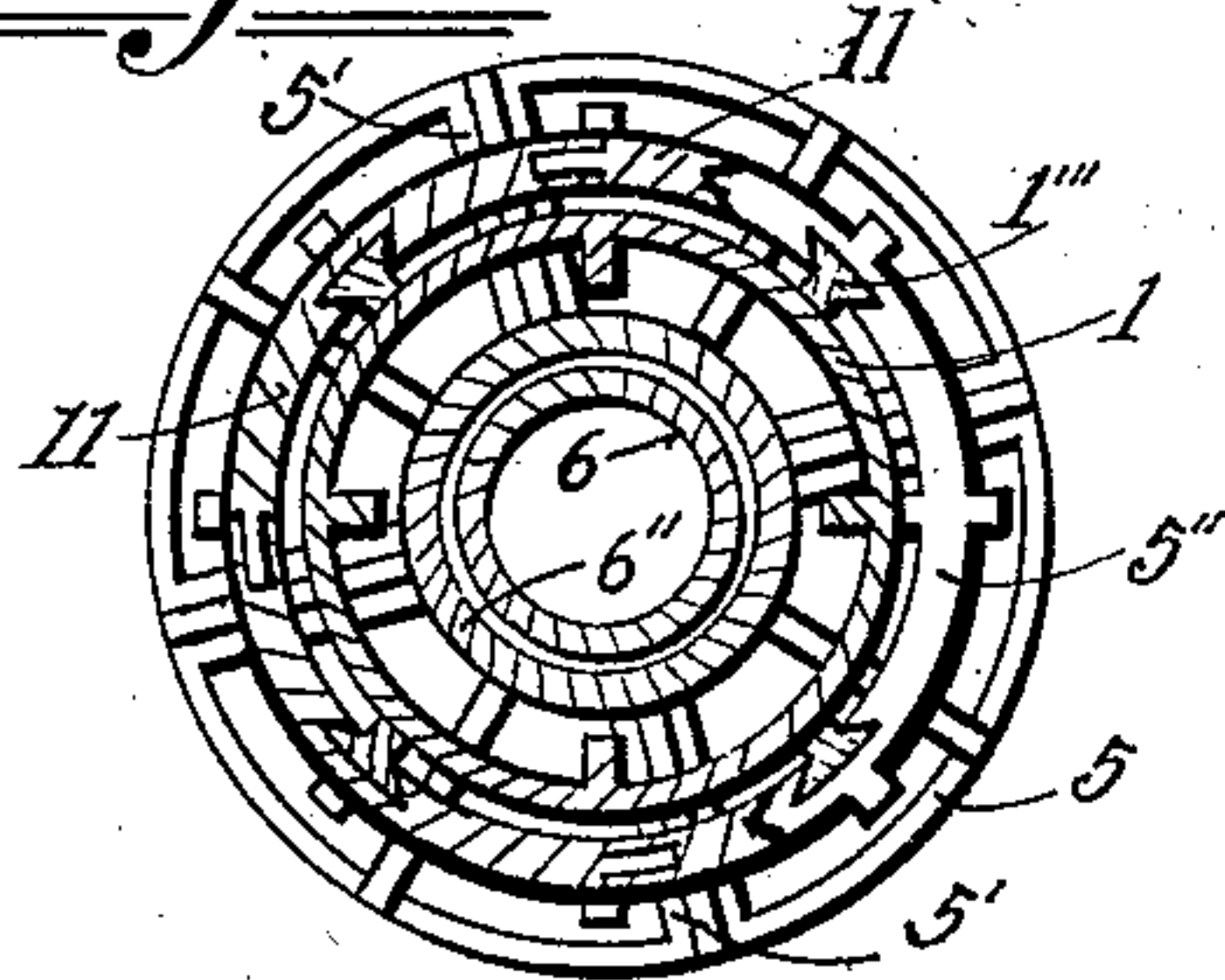
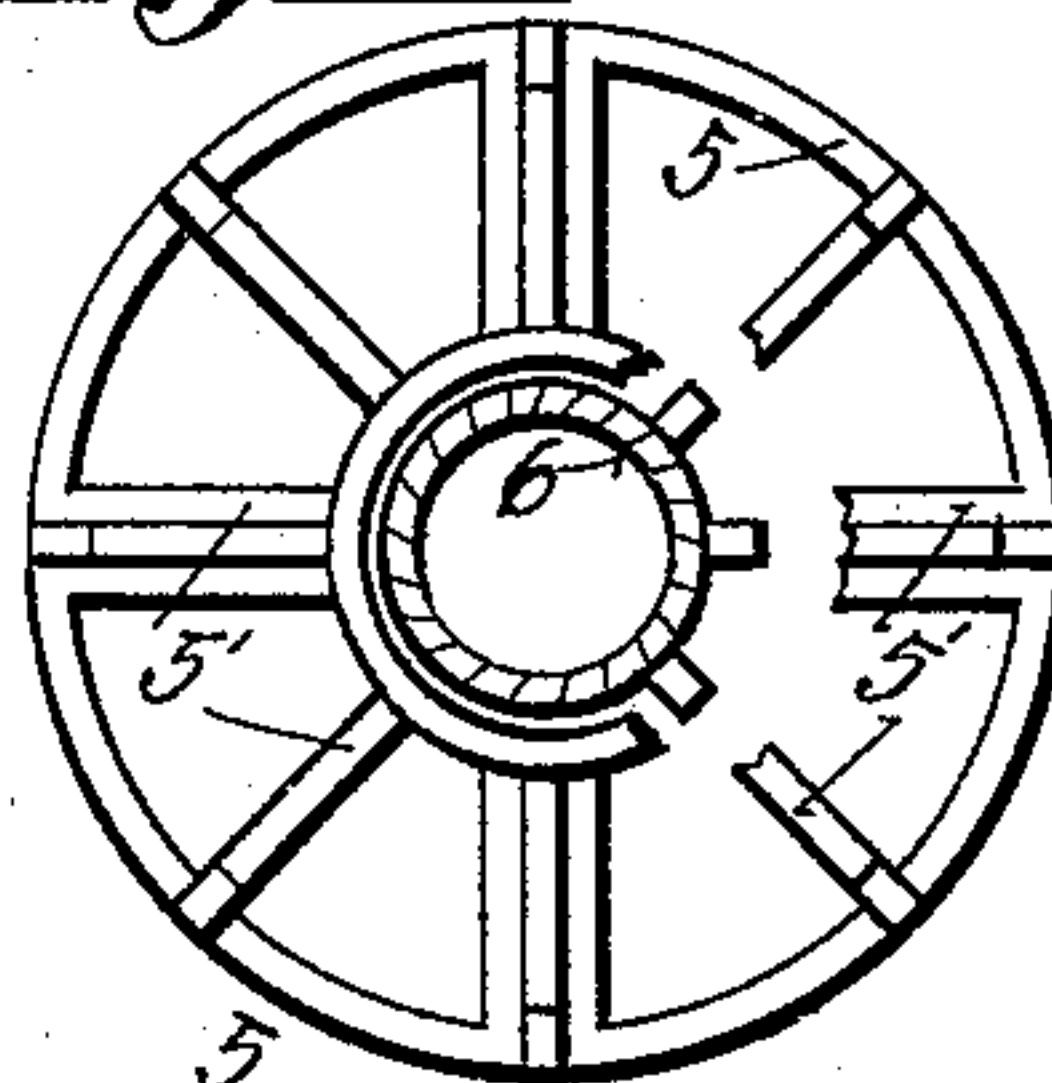


Fig. 6.



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2 SHEETS--SHEET 2.

Fig. 7.

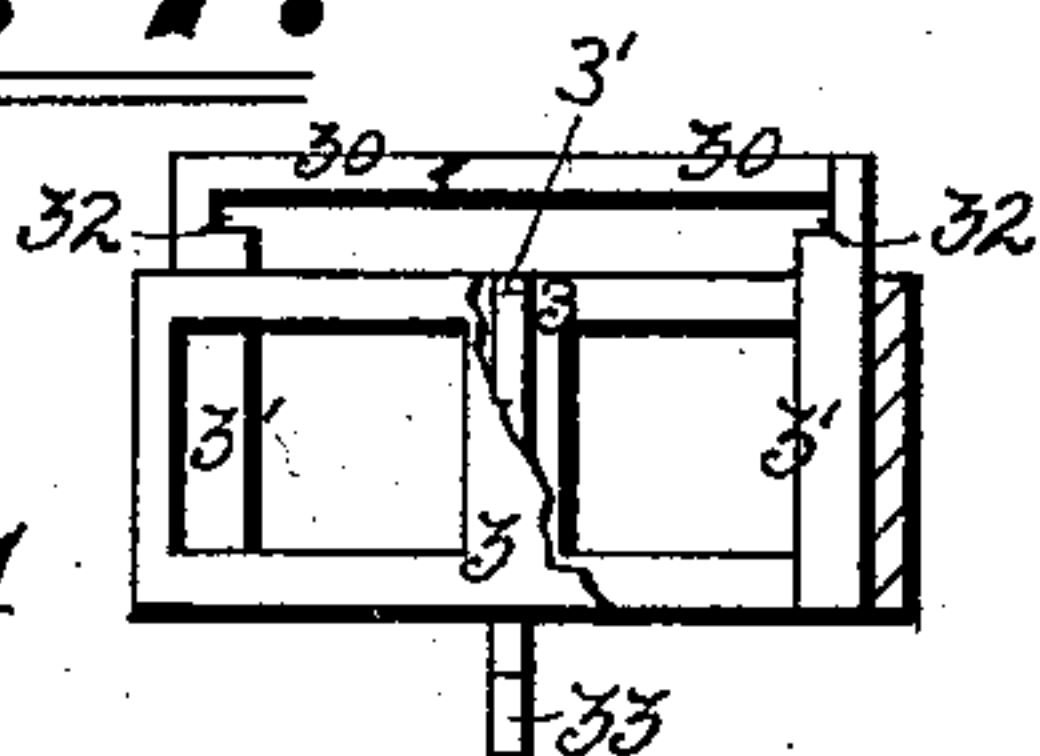


Fig. 9.

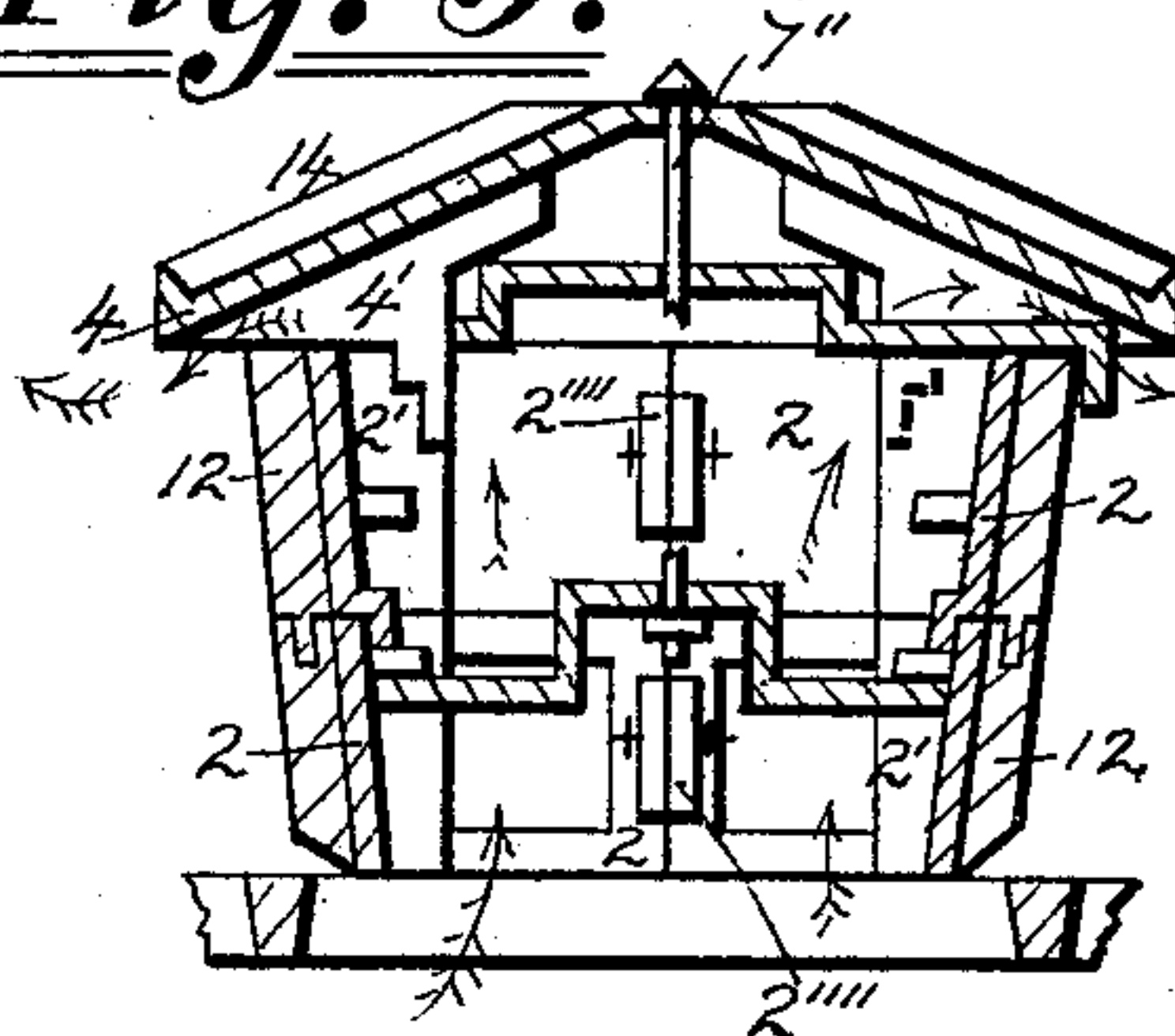


Fig. 9.¹

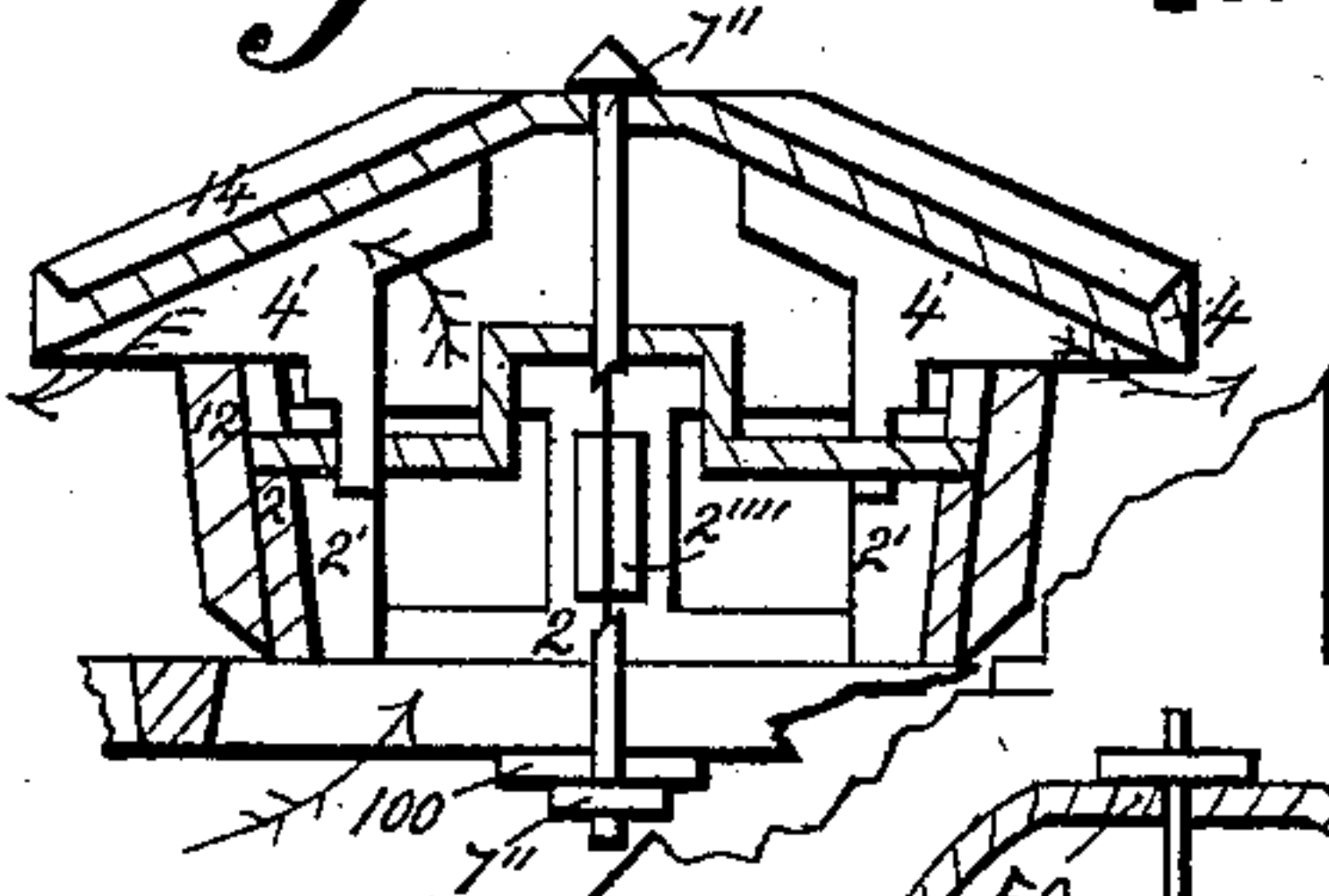


Fig. 10.

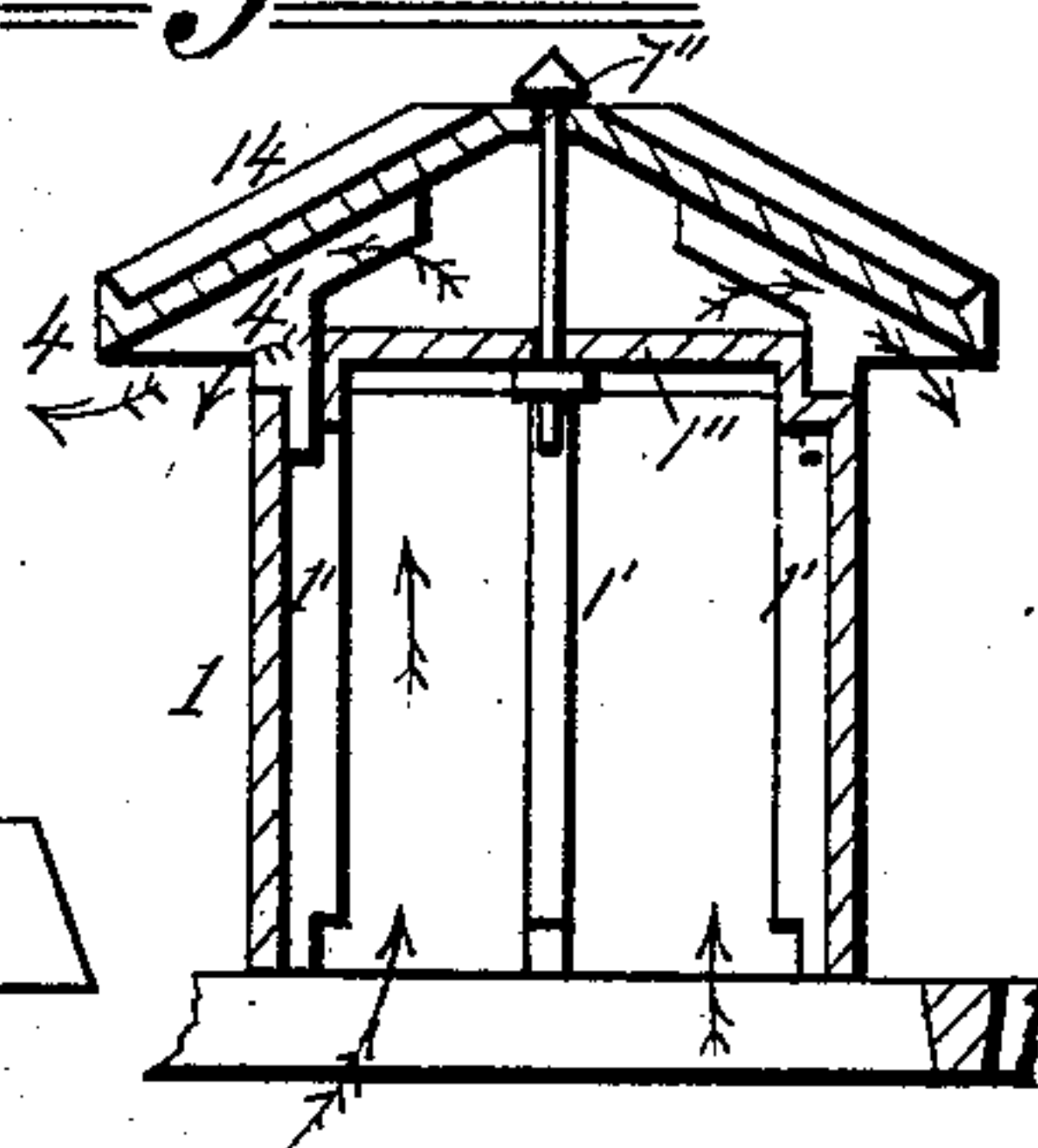


Fig. 8.

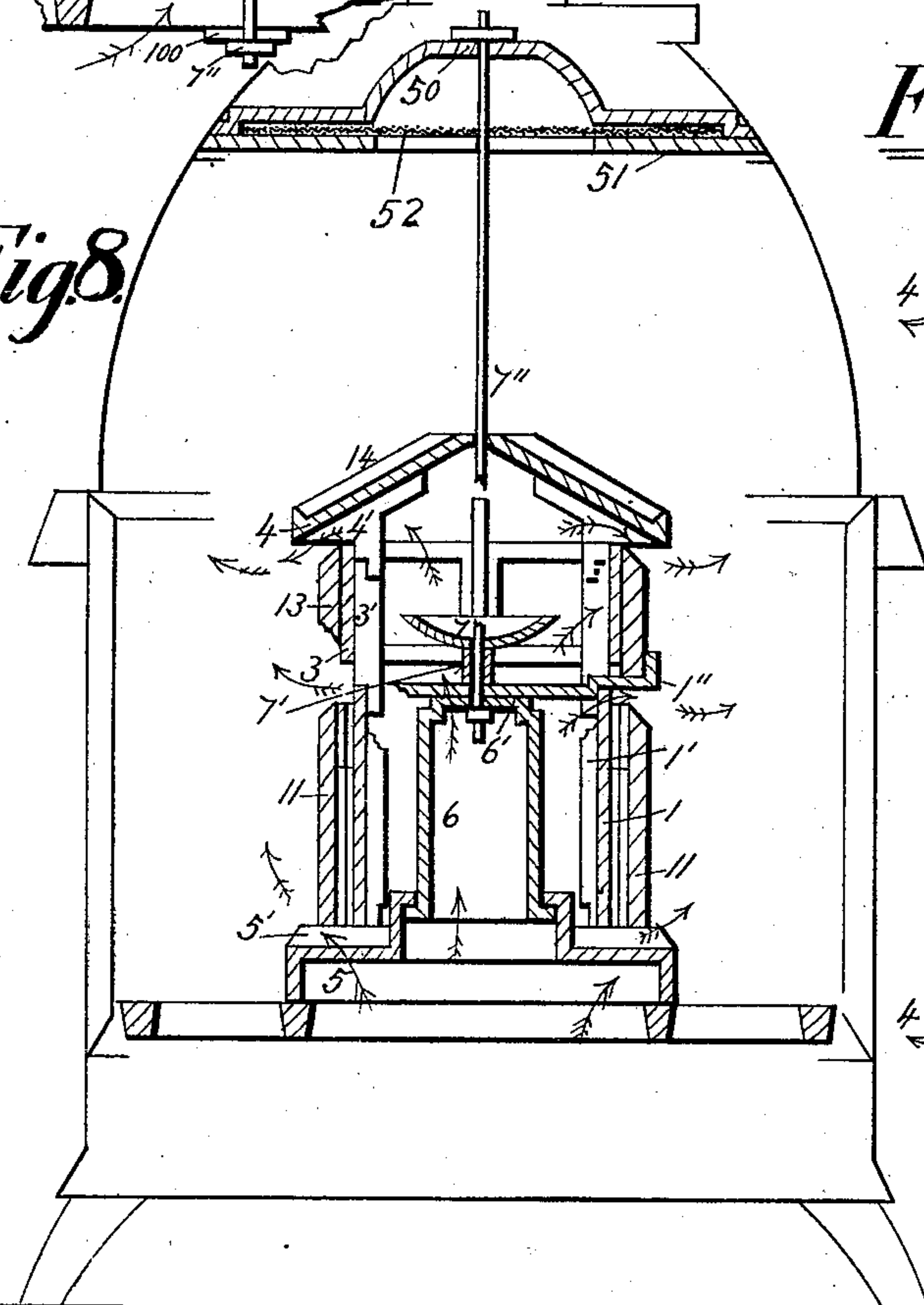
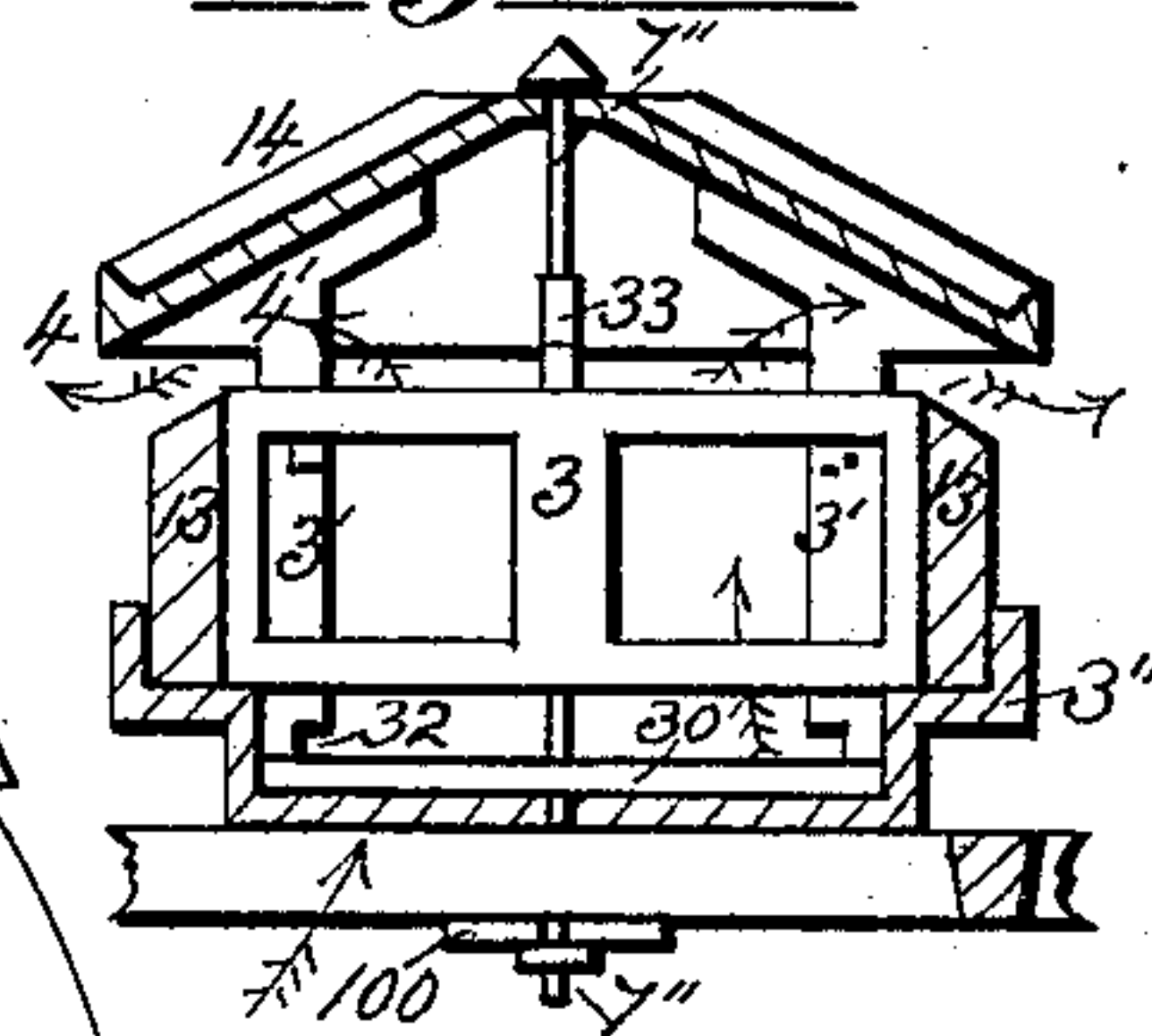


Fig. 11.



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UNITED STATES PATENT OFFICE.

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AIR-FEEDING DEVICE.

No. 842,845.

Specification of Letters Patent.

Patented Jan. 29, 1907.

Application filed August 13, 1903. Serial No. 169,360.

To all whom it may concern:

Be it known that I, WILLIAM DAVIS DOUGLAS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a new and useful Air-Feeding Device, of which the following is a specification.

This invention relates to improvements in air-feeding devices to be employed to distribute heated air and promote combustion in the fire-pots of stoves, furnaces, and the like, or in open fireplaces; and it consists in certain peculiarities of the construction, novel arrangements, operation, and combination of its various parts, as will be hereinafter more fully set forth and specifically claimed.

The objects of my improvement are, first, to preserve the body of the device from the fire by providing it with an effective covering or shield; second, to provide means for furnishing the most intensely heated parts of the body interiorly with a continuous, plentiful, and separate supply of comparatively cool air to decrease any tendency of said parts to melt; third, to facilitate the adjusting or withdrawing of removable parts without the inconvenience of removing the entire device from the furnace during the operation, and, fourth, to produce a more perfect combustion by reducing the generation of smoke to a minimum, and consequently effecting a greater economy in coal, the same being attained by spacing certain parts of the device from each other, so that air may stream therethrough into the fire in approximately horizontal planes and practically uninterrupted.

Other objects and advantages of the invention will be disclosed in the subjoined description and explanation.

In order to enable others skilled in the art to which my invention pertains to make and use the same, I will now proceed to describe it, referring to the accompanying drawings, in which—

Figure 1 is a vertical and nearly central sectional view of an air-feeding device embodying one form of my invention, its top being slightly elevated and the center bolt and an upper rib being partly broken away. Fig. 2 is a view in elevation of Fig. 1, part of the outer casing being cut away. Fig. 3 is a horizontal sectional view of the top division

of the double casing, taken on line 23 of Fig. 1, viewed from above. Fig. 4 is a horizontal sectional view of the middle division of the double casing, taken on line 22 of Fig. 1, viewed from above. Fig. 5 is a horizontal sectional view of the bottom division of the double casing, taken on line 21 of Fig. 1, viewed from above. Fig. 6 is a top plan view of the stand and a horizontal section of the interior tube combined. Fig. 7 is a fragmental view, partly in section and partly in elevation, of the upper section of the inner casing or body of the device. Fig. 8 is a vertical section of a modified form of the device, showing it located in a furnace with an auxiliary screen-frame located above it, a portion of its outer casing and the frame supporting same being broken away. Fig. 9 is another modification consisting of the inverted middle division and top of the device. Fig. 9' is a modification of Fig. 9. Fig. 10 is still another modification consisting of the bottom inner casing part and the top of the device; and Fig. 11 is a view, partly in section and partly in elevation, of another modified form illustrating one method of securing the device to the grate.

Similar numerals refer to like parts throughout the different views of the drawings.

The air-feeding device consists primarily of two tubes or casings, one of the same being located within the other and constituting the body of the device, the inclosing outer casing being spaced from the body when so required to form a vertical air-passage between the casings and each casing being open at its upper and lower end, the covering or top being common to both casings and spaced therefrom vertically by suitable means.

The parts enumerated are shown in the drawings as being spaced vertically from each other in order to enable air to pass between said parts from the interior of the device direct to the fire. The parts mentioned may be so spaced from each other by any convenient method—as, for instance, the formation of vertically-extended reinforcing interior ribs 1', 2', 3', 4', and 5', as shown on the inner faces of the stand, the inner casing or body above it, and the top of the device, by modifications of said ribs in the form of shallow teeth or projections suitably located on said parts; or by interposing auxiliary

frames, as 1'', 2'', or 3'', consisting, respectively, of one or more plain or angular rings and one or more plain or angular bars united therewith. Furthermore, for the admission
 5 of air between the inner and outer walls of the double tubular casing the walls of the lower part of the device are shown spaced from each other laterally by means of flanged vertical ribs 1''', which may be either formed
 10 on the exterior face of the body or, the body being eliminated, they may be constructed in the form of a single skeleton frame or piece consisting of a series of laterally-converging upright girders united by one or more
 15 rings and converging bars.

In Figs. 1 and 5 a ring 5'' is shown in the form of an annular ledge, which is usually united to the lower ends of the ribs 1''' at a little distance apart from the body and on
 20 which the sectional outer casing-wall rests. The edges of the several sections 11 of said outer wall may be tongued and grooved, and in the inner faces of the same approximately wedge-shaped vertical grooves are formed
 25 adapted to engage the vertical outer edges of the aforesaid ribs 1'', the latter being flanged or enlarged in any suitable form, as a T or the wedge shape shown, so that the several outer-wall sections 11 may be placed thereon
 30 vertically.

The middle division of the device is a modification of the main or lower division already described, and comprises a sectional outer wall 12 together with a sectional framework
 35 consisting of frames 2, which are securable to each other by bolts or the like at their flanged edges 2'''. The lower series of these sectional frames is provided interiorly with angles 2''' for the upper series to rest in and
 40 exteriorly with ledges 22' for the support of the outer wall, as in Figs. 1, 4, and 9.

The upper division of the device is another modification comprising an inner framework 3 and an outer wall 13, located between two
 45 auxiliary frames. The pertaining inner ribs 3', which extend alternately above and below the framework and have angular recesses 32 and 33, formed, respectively, in opposite edges of their opposite ends, illustrate one of
 50 the previously-explained methods of vertically spacing one division from any other part, as may be readily seen in Figs. 1, 2, 7, 8, and 11.

The top of the air-feeding device constitutes the main deflector of same, usually consists of a top-plate 4, combined with a protective sectional covering 14, and may be of any form. The conical top shown in the
 55 drawings may be used in any fireplace vertically deep, (see Fig. 8;) but for use in a shallow furnace a flattened top or plate should be employed, its middle being depressed in any suitable form, as that of the auxiliary deflector 7 thereunder, which may
 60 either be secured to the top plate or be dis-

pensed with entirely when said top is combined directly with the main casing-section 1 and which is hereinafter referred to. The top plate may be reinforced by any suitable depending projections, as a ring or ribs 4' 70 and the like, adapted to aid in spacing the same from any casing-section. For use in a narrow fireplace the top may be combined with and secured to the cross-bar 6' of the interior tube 6, resembling the modifications 75 shown in Fig. 10, in which the top is secured to the frame of section 1. The drawings amply illustrate how the top of the device may be combined with any one or more of the casing-sections. 80

The auxiliary frame 1'' may be removable, as in Figs. 1 and 8, or form part of the section, as in Fig. 10, and has a triple use—that is, its ring (shown broken in Fig. 4) is capable of maintaining the superimposed ribs 2' and 85 their pertaining section in position laterally, while its cross-bar forms a median support from which the interior tube 6 is suspended and on which the deflector 7 rests, separated therefrom by a short pipe 7'. 90

To steady the middle division of the body of the device and prevent the same from rotating, suitable recesses may be formed in the top edge of section 1 for the bottom ends of ribs 2' to rest in. 95

As shown in Fig. 1, the interior tube by means of its outwardly-flanged lower edge may support the stand on which section 1 rests while it is itself suspended from said section, the several parts of the body of the device being secured and drawn together by means of bolts or the like. 100

A special feature of my invention is that the body of the device is doubly protected from the effects of intense heat, first, by the 105 outer casing intervening between it and the fire, and, second, by the continuously-flowing relatively cool isolated air-current conducted through the interior tube directly to the parts usually most affected. 110

In Fig. 8, located in a furnace over an air-feeding device and secured thereto by a central rod, I have shown auxiliary frames 50 and 51, which used singly or together may support any open-work screen, as 52, of 115 fabric sufficiently fine to prevent the escape of cinders therethrough. In Fig. 9 a frame is shown located under inner ledges of the body in illustration of a means by which the combined body, top, and frame may be secured and drawn together, and in Fig. 9' an auxiliary frame resting in slits in an inverted wall-section illustrates the same object attained by another method. Any convenient mode of securing the device to the grate may 120 be adopted, one example being afforded by a spider-like frame 100, (see Figs. 9 and 11,) located under the grate, a central bolt or the like being extended downwardly there-through from the device above the grate. 125 130

Usually the several parts of the inner casing or body of my device are made of iron; but, like those of its outer casing, they may be constructed of any suitable metal or fire-resisting material, as fire-brick and the like, in any size and form, a horizontal cross-section of the entire device according usually with that of the furnace containing it.

From the foregoing and by reference to the drawings it will be clearly seen and readily understood that the air, separated into currents as indicated by the arrows, will enter the chamber formed by the combined inner casing parts through the lower end thereof. Part of the air will escape directly to the fire through the stand, part will ascend on either side of section 1, and still another, the coolest part, will ascend through the interior tube and by the deflector thereabove be so directed that it will impinge onto section 2. Both of the last-mentioned currents will then pass out into the coal and fuel through the annular air-spaces between sections 1 and 2, 2 and 3, and 3 and 4, affording all together a continuous and plentiful supply of oxygen to the fuel.

Having now fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an air-feeding device, the combination with a casing open at its upper and lower ends and having at its upper end a frame comprising one or more bars and rings united therewith, of a removable top for the casing, and means for securing together the top and the casing, substantially as described.

2. In an air-feeding device, the combination with a casing open at its upper and lower ends provided with interior ledges, a frame located within the casing and supported by said ledges, said frame comprising one or more rings united by radiating bars, of a removable top provided with a series of downwardly-extending angular ribs, and means for securing the top to the casing, substantially as described.

3. In an air-feeding device, the combination with a tube or casing having at one of its open ends upwardly-extending ribs or projections and a frame comprising one or more ribs or bars and rings uniting the same, of a removable sectional top provided at its under side with downwardly-extending projections, a stand or support for the casing comprising one or more rings and bars uniting the same, and means for securing together the stand, casing and top, substantially as described.

4. In an air-feeding device, the combination with a casing open at its upper and lower ends, of a removable top therefor, a frame comprising one or more rings united by radiating bars separating the top from the walls of the casing, a stand or support for the casing comprising one or more rings united

by radiating bars or ribs, and means for securing together the stand, casing, frame and top, substantially as described.

5. In an air-feeding device, the combination with a tube or casing open at its upper and lower ends provided with projections or teeth at its upper end and having inner ledges and vertical ribs, of a removable top for the casing, a frame located within the casing under inner ledges thereof, said frame comprising one or more rings and bars uniting the same, and means for securing and drawing together the top, casing and frame, substantially as described.

6. In an air-feeding device, the combination of a casing open at its upper and lower ends, a removable sectional top therefor, a frame comprising one or more rings united by radiating bars separating the top from the walls of the casing, a tube provided with a cross-bar at its upper end secured centrally to the frame, and means for securing the parts together, substantially as described.

7. In an air-feeding device, the combination of a casing open at its upper and lower ends, a removable top therefor, a frame comprising one or more rings united by radiating bars separating the top from the walls of the casing, a tube provided with an outwardly-flanged lower end and a cross-bar at its upper end secured centrally to the frame, a stand or support for the casing comprising one or more rings united by radiating bars or ribs, and means for securing together the stand, casing and top, substantially as described.

8. In an air-feeding device, the combination with a casing or body open at its upper and lower end and provided exteriorly with flanged vertical ribs, of a removable sectional outer wall or casing inclosing the body and having inwardly-facing vertical grooves adapted to engage the flanges of the ribs of said body, and a removable top for the casings having one or more downwardly-extending projections, the body being spaced by its exterior ribs from the outer wall inclosing the same, substantially as described.

9. In an air-feeding device, the combination with the body or inner casing-wall having flanged vertical outer ribs connected at their lower ends by a ledge separated from the body, of a removable sectional outer casing-wall inclosing said body, resting on said ledge and having inwardly-facing vertical grooves adapted to engage the flanges of said ribs, a removable sectional top for the casing-walls, a frame separating the sectional top from the casing-walls, a stand or support for the body comprising one or more rings united by bars or ribs, and means for securing together the several parts, substantially as described.

10. In an air-feeding device, the combination with a double-walled casing comprising

the body or inner wall and a separated removable sectional outer wall having approximately wedge-shaped vertical grooves in their respective adjacent faces, of a skeleton frame inclosed between said walls comprising a series of convergent upright girders united by a ring or ledge at about their lower ends, a removable top for the casing, a frame separating the top from the walls of the casing, a stand or support for the skeleton frame and body comprising one or more rings united by radiating bars or ribs, and means for securing together the several parts, substantially as described.

11. In an air-feeding device, the combination of a skeleton frame comprising a series of convergent upright girders united near their lower ends by a ledge and thereabove by one or more rings and bars, with a removable sectional casing or wall inclosing the girders resting on the ledge thereof and having inwardly-facing vertical grooves adapted to engage the outer flanges of said girders, a removable sectional top for the casing, a frame separating the top from the casing-walls, a stand or support for the skeleton frame comprising one or more rings united by radiating bars or ribs, and means for securing together the several parts, substantially as described.

12. In an air-feeding device, the combination with a grate, of a skeleton frame located thereabove comprising a series of convergent upright girders united at their lower ends by a ledge and at their upper parts by one or more rings and bars, a removable sectional casing or wall inclosing the girders resting on the ledge thereof and having inwardly-facing vertical grooves adapted to engage the outer flanges of said girders, a removable sectional top having a depressed well-shaped middle, a frame separating the top from the casing-walls, and means for securing together the several parts, substantially as described.

13. In an air-feeding device, the combination of a double-walled casing formed in horizontal divisions each consisting of an inner wall-section having flanged vertical outer ribs united at their lower ends by a ledge supporting thereon a removable sectional outer wall-section having vertical grooves in its inner face adapted to engage the flanges of said ribs, with a removable top for the casing, a plurality of frames respectively separating the top from the casing and the horizontal sections of said casing from each other, a stand or support for the inner wall-sections or body, said stand and frames respectively comprising one or more rings united by bars or ribs, and means for securing together the several parts, substantially as described.

14. The combination with a grate, of an air-feeding device located thereabove comprising a casing open at its upper and lower

ends, a removable sectional top therefor, a frame separating the top from the walls of the casing, and means for securing together the casing, frame, top and grate, substantially as described.

15. In an air-feeding device, the combination with a grate, of a stand located thereabove comprising one or more rings united by bars or ribs, a skeleton frame supported on the stand comprising a series of upright girders united near their lower ends by a ledge and thereabove by one or more rings and bars, a removable sectional casing or wall inclosing the girders, resting on the ledge thereof and having inwardly-facing vertical grooves adapted to engage the outer flanges of said girders, a removable top for the casing, a frame separating the top from the casing-walls, and means for securing together the parts and grate, substantially as described.

16. In an air-feeding device, the combination with a grate, of a stand located thereabove comprising one or more rings united by bars or ribs, a skeleton frame supported on the stand comprising convergent upright girders united at their lower ends by a ledge, a double-walled casing inclosing said girders between its walls and having in adjacent opposite faces thereof vertical grooves adapted to engage the flanges of said girders, a removable top, a frame separating the top from the casing-walls, and means for securing together the parts and grate, substantially as described.

17. In an air-feeding device, the combination with a casing or body open at its upper and lower end and provided exteriorly with flanged vertical ribs projecting alternately a little above and below the top and bottom rim of the body and connected near their lower ends by a ledge separated from said body, a removable sectional outer wall or casing inclosing the body and having inwardly-facing vertical grooves adapted to engage the flanges of the ribs of said body, of a stand or support for the body comprising one or more rings and bars united therewith, and a removable double top for the casings having one or more downwardly-extending projections, suitable means being provided for securing the stand, casing and top together, substantially as described.

18. In an air-feeding device, the combination with a grate, of a casing located thereabove, and its upper and lower end being open, a removable top for the casing, said top having one or more downwardly-extending projections on its under face to space it from the casing, and means for securing together the grate, casing and top substantially as described.

19. In an air-feeding device, the combination of a double-walled casing, a top provided with depending projections to space it

from said casing, and a deflector centrally located and supported in the casing, substantially as described.

20. In an air-feeding device, the combination with a grate, of a stand located thereabove comprising one or more rings united by bars or ribs, a casing supported on said stand open at its upper and lower ends, a removable sectional top, a frame separating the top from the casing, and means for securing together the grate, stand, casing, frame and top, substantially as described.

21. In an air-feeding device, the combination with a grate, of a stand located thereabove comprising one or more rings united by bars or ribs, a double-walled casing open at its upper and lower ends supported by said stand, a removable top for the casing, a frame separating the top from the walls of said casing, a spider-frame located under the grate consisting of one or more rings and bars united therewith, and means for securing and drawing together the spider below and the parts above the grate, substantially as described.

22. The combination with a furnace provided with a grate, of an air-feeding device comprising a stand located centrally on the grate consisting of one or more rings united by bars or ribs, a double-walled casing supported by said stand, a removable top for the casing, a frame separating the top from the casing-walls, means for securing together the central parts and grate, one or more auxiliary frames located at a distance from the device but connected therewith by means of a rod and supporting a screen adapted to prevent the escape of sparks to the flue, said

auxiliary frames comprising respectively rings united by bars or ribs, and means for supporting the frames within the furnace, substantially as described.

23. In an air-feeding device, the combination of a casing or body open at its upper and lower ends having vertical slits in its walls and angular ribs projecting above its upper end, a tongued-and-grooved removable sectional outer wall inclosing the body, a removable sectional double top, a frame located within the body comprising rings united by bars having their outer ends inserted in said slits, and means for securing together the parts, substantially as described.

24. In an air-feeding device, the combination of a stand or support comprising one or more rings united by ribs or bars, a casing or body provided exteriorly thereof with vertical ribs resting on the stand, a removable outer wall for the casing comprising vertical sections connected together by tongue-and-groove connections, said sections being provided with vertical grooves on their inner faces adapted to engage the ribs of the casing, a removable sectional top for the casing provided with downwardly-extending projections, and means for securing the stand, casing and top together, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM DAVIS DOUGLAS.

Witnesses:

JAMES McHUGH,

WILLIAM S. COVINGTON.