

No. 672,819.

Patented Apr. 23, 1901.

A. BLACKIE.  
APPARATUS FOR DRYING HOPS.

(Application filed Nov. 24, 1899.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.

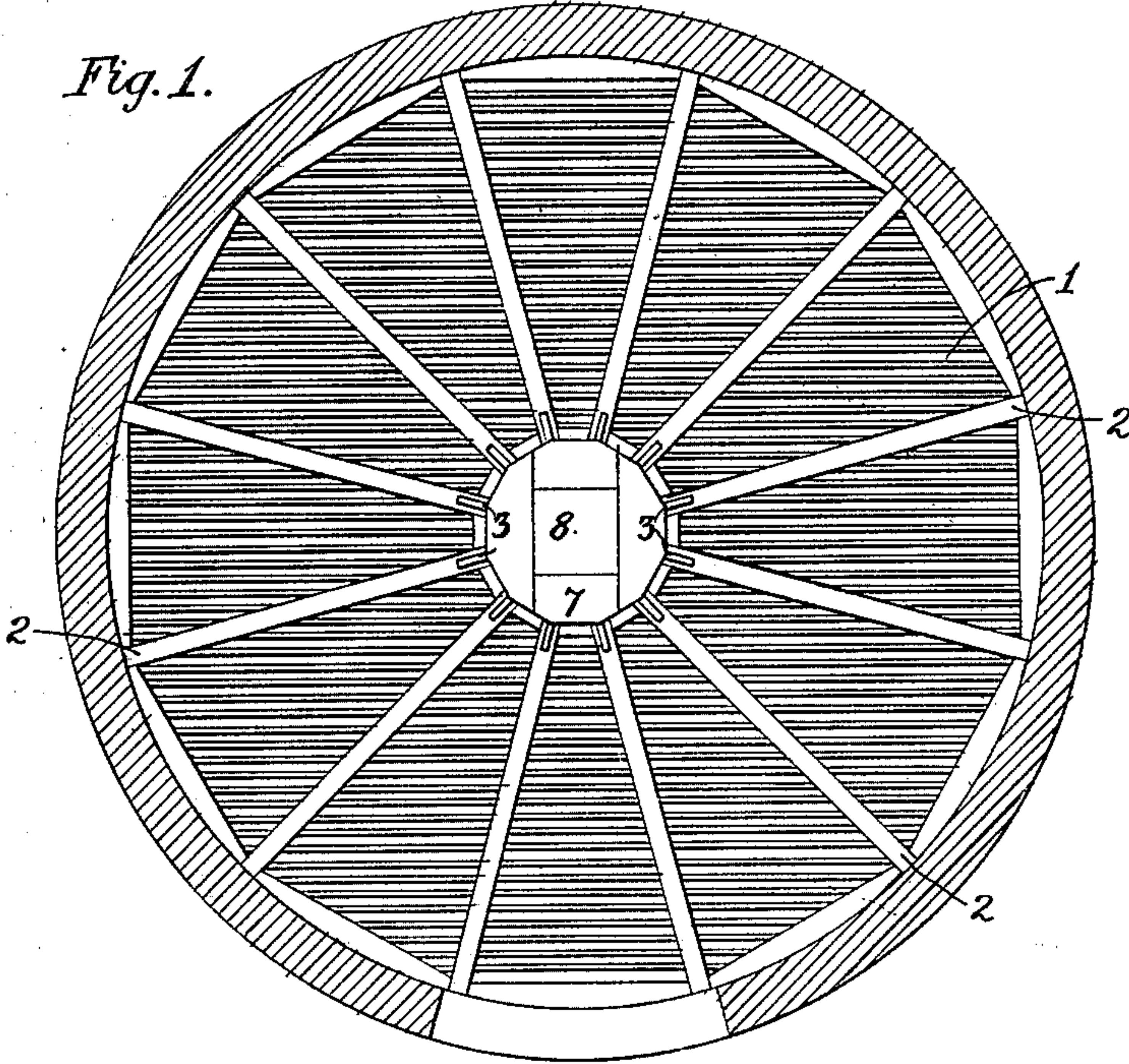


Fig. 4

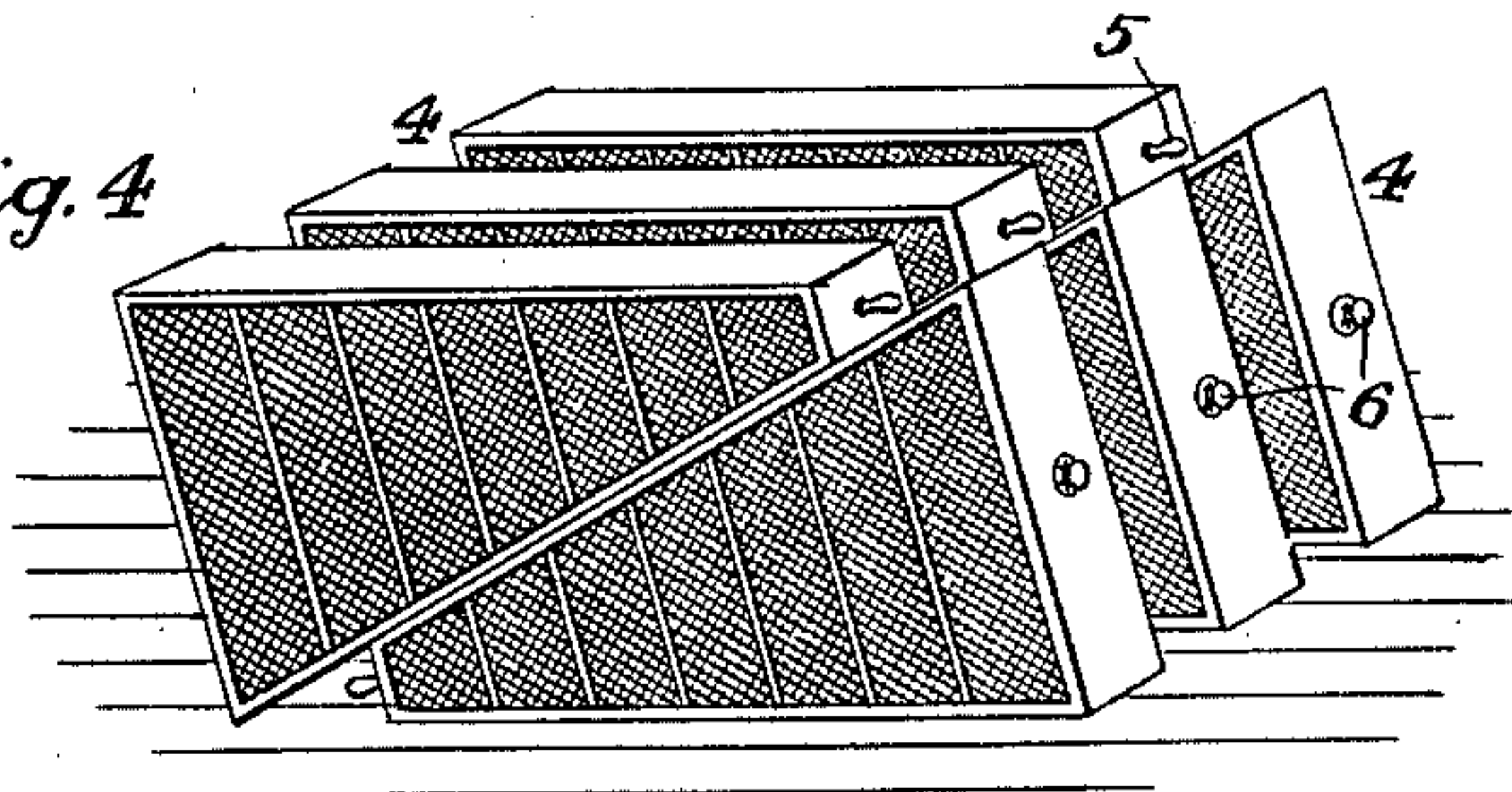
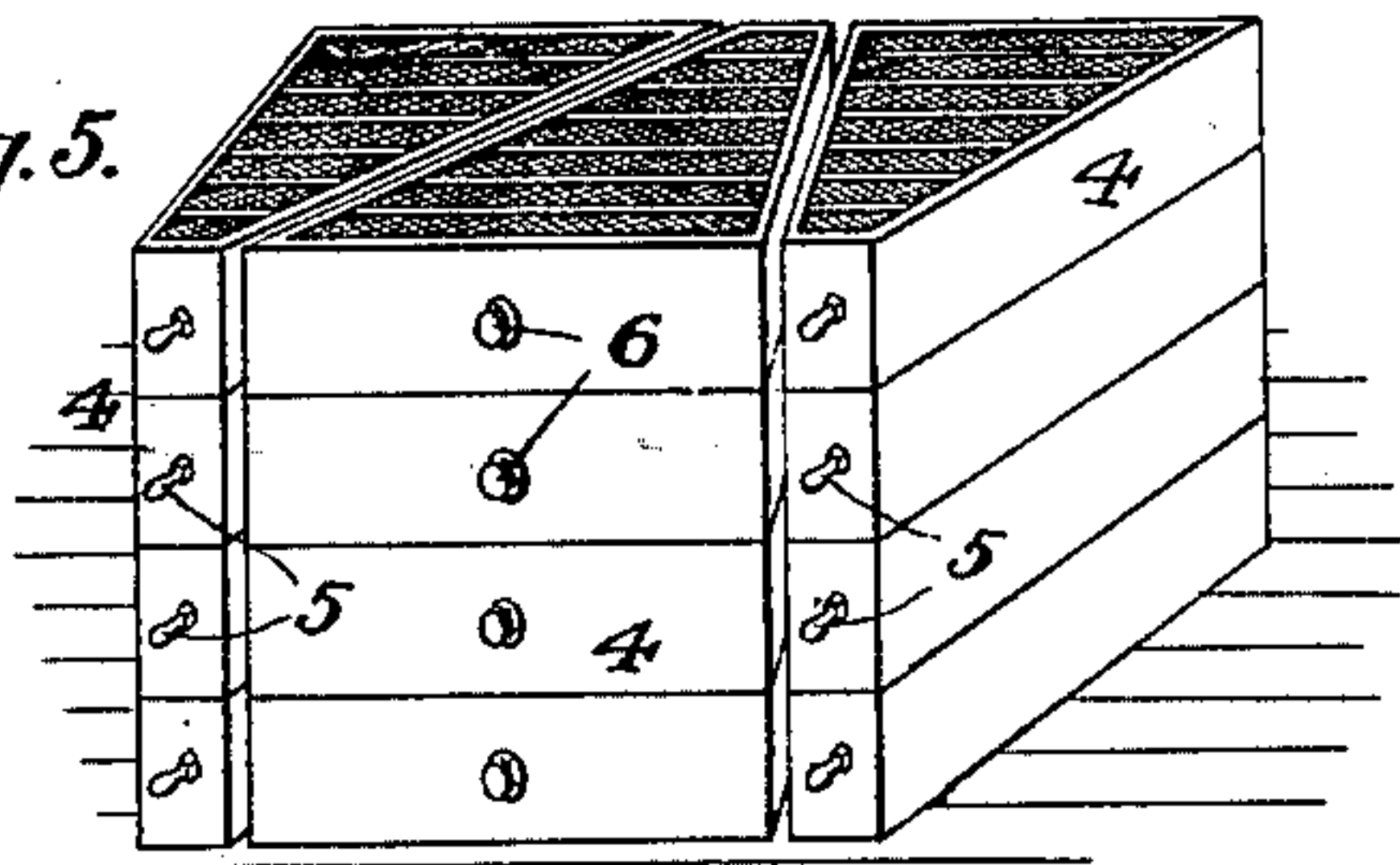


Fig. 5.



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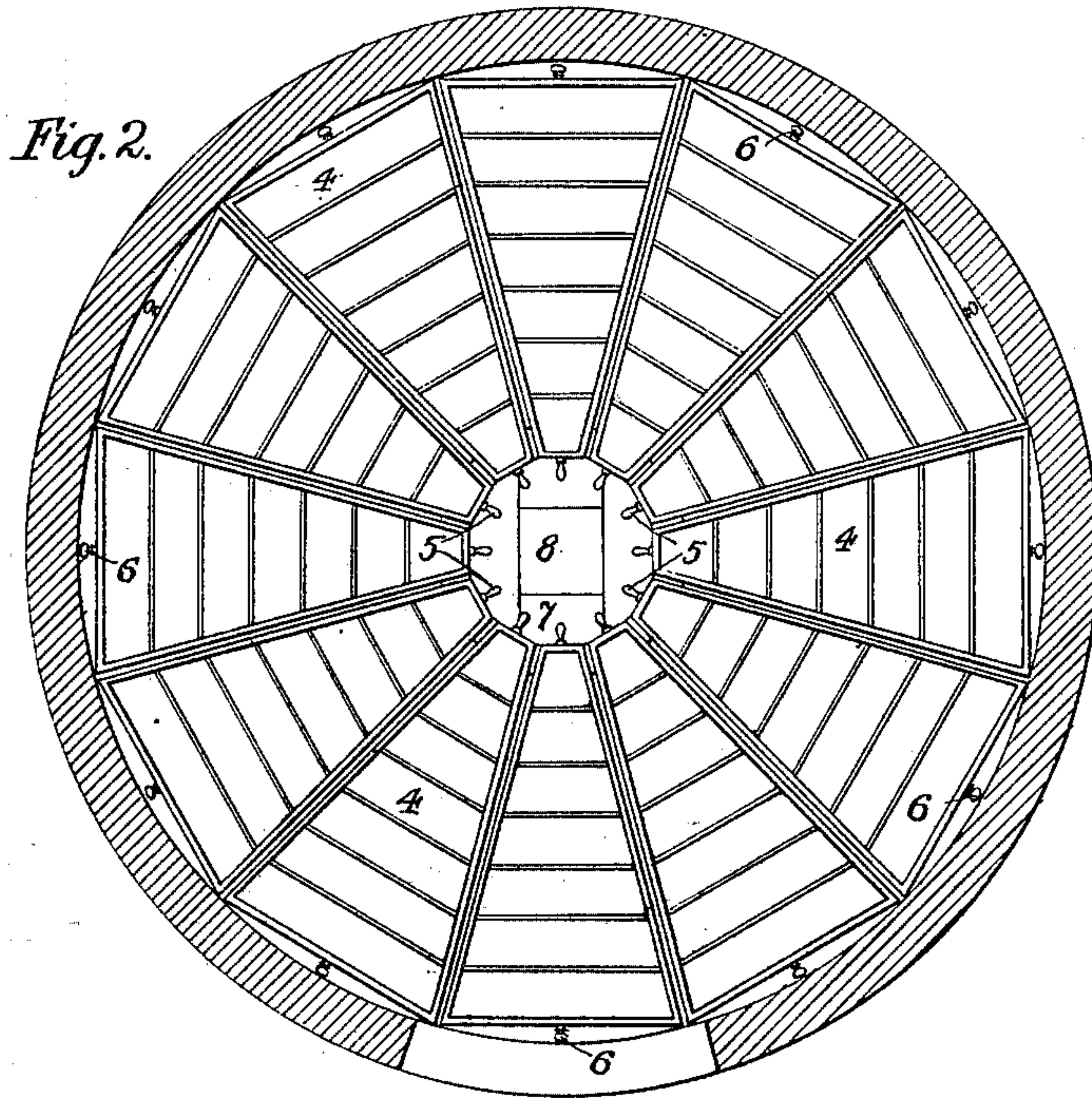
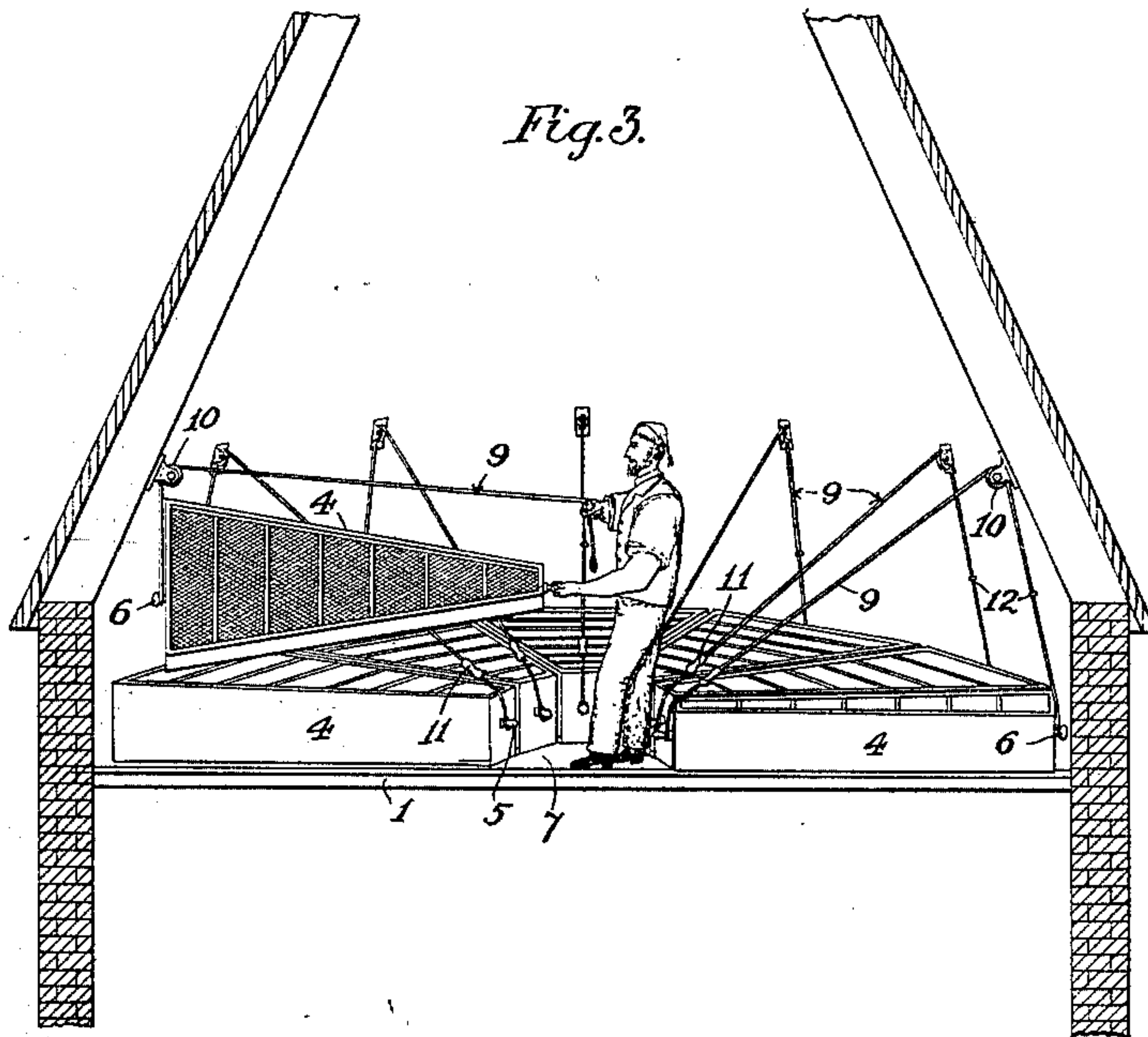
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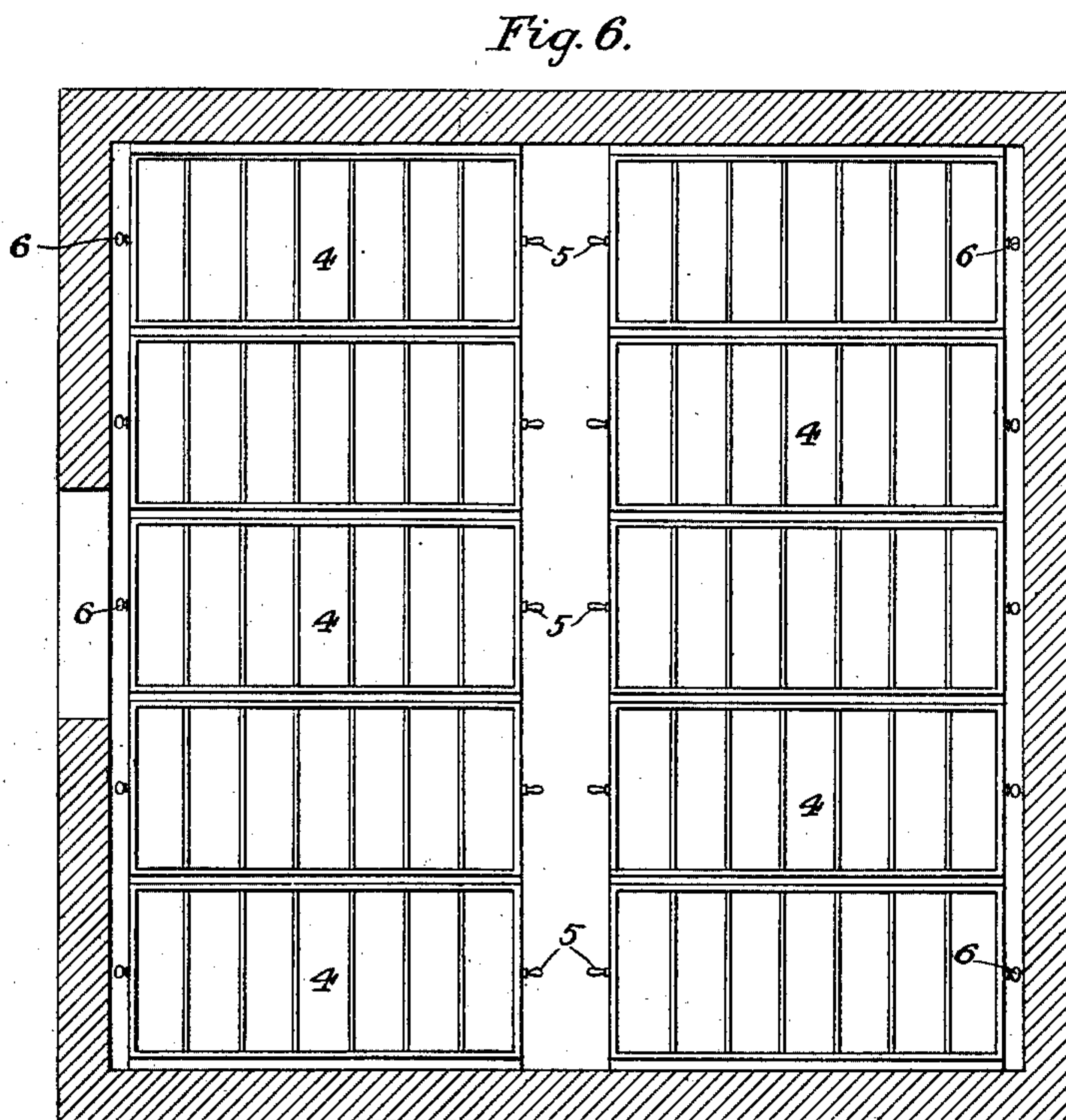
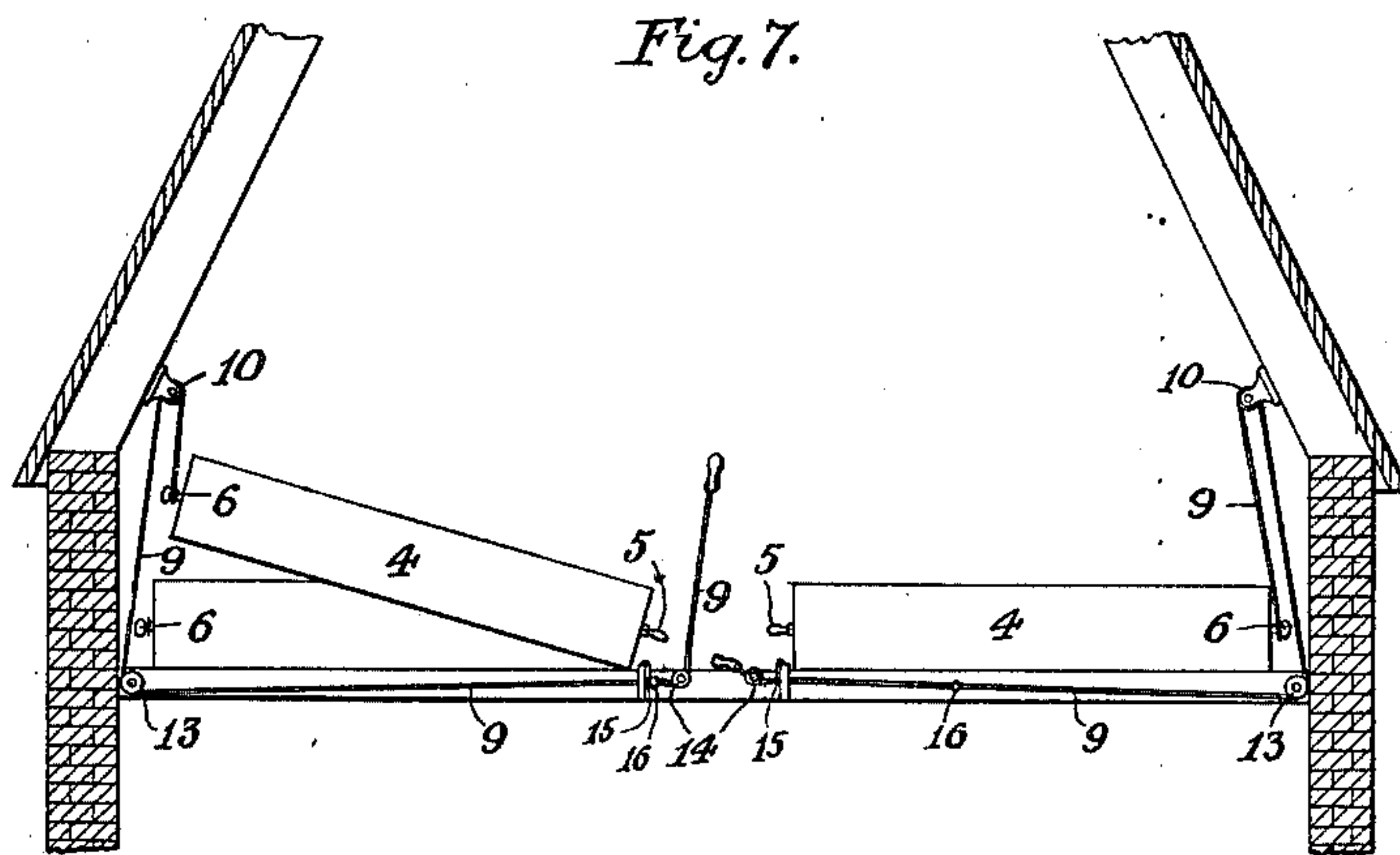
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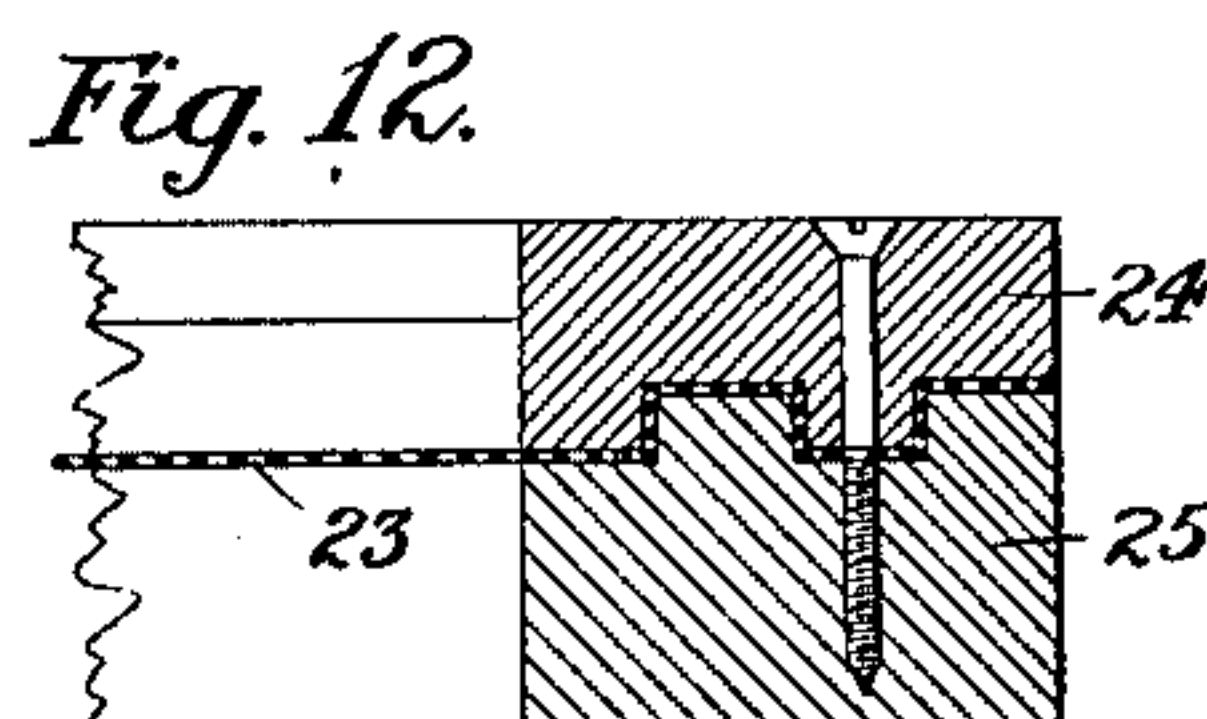
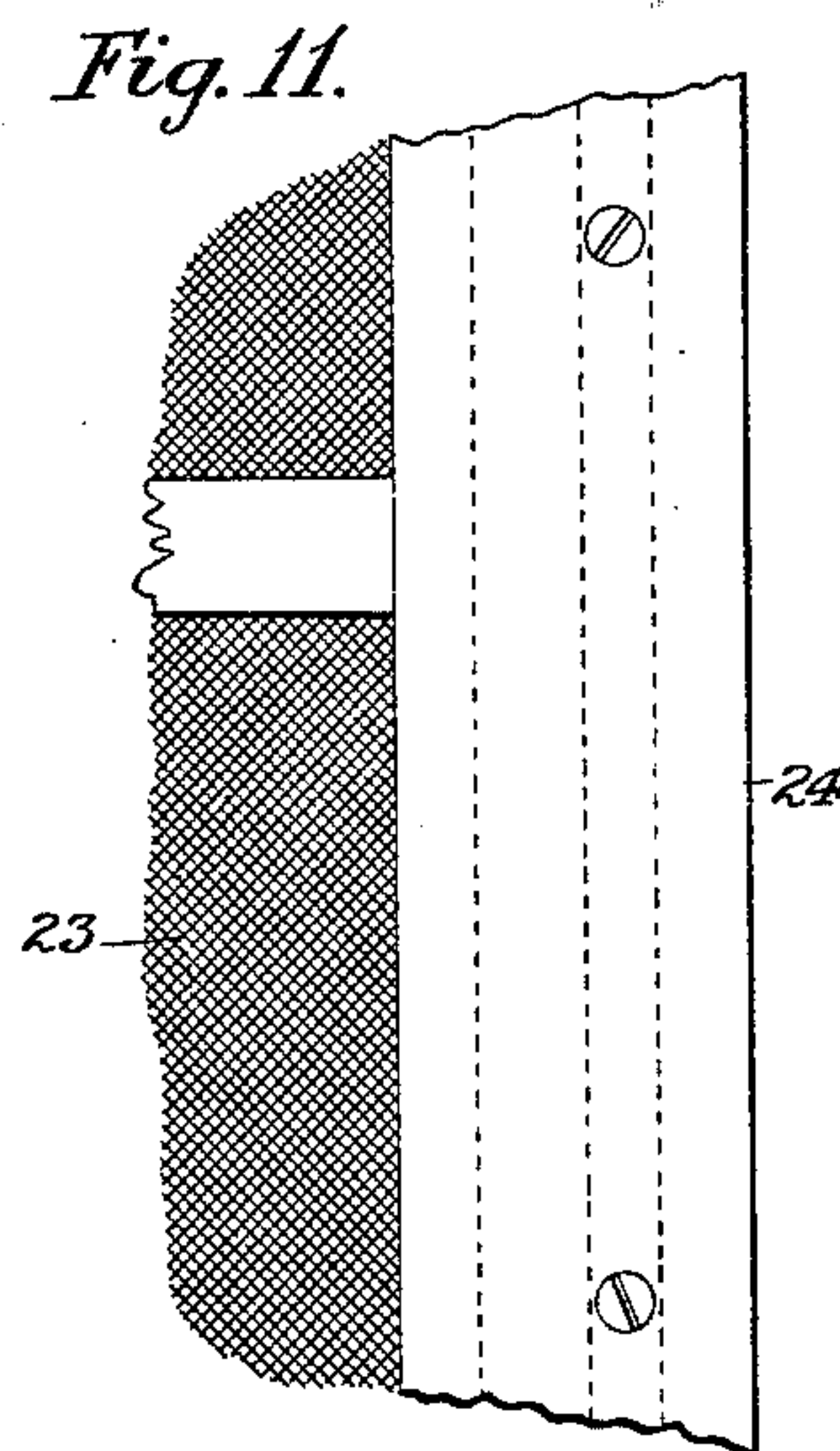
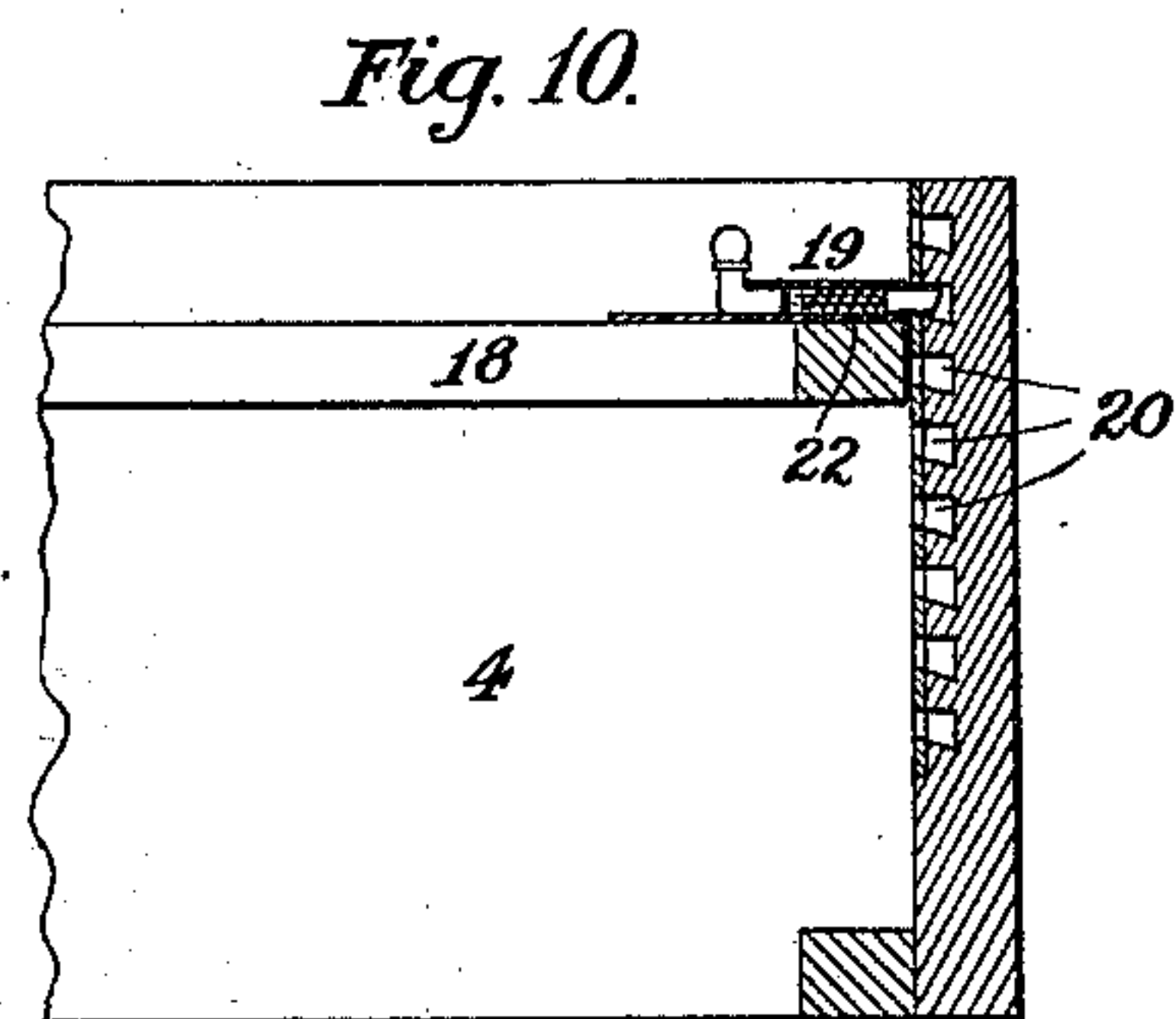
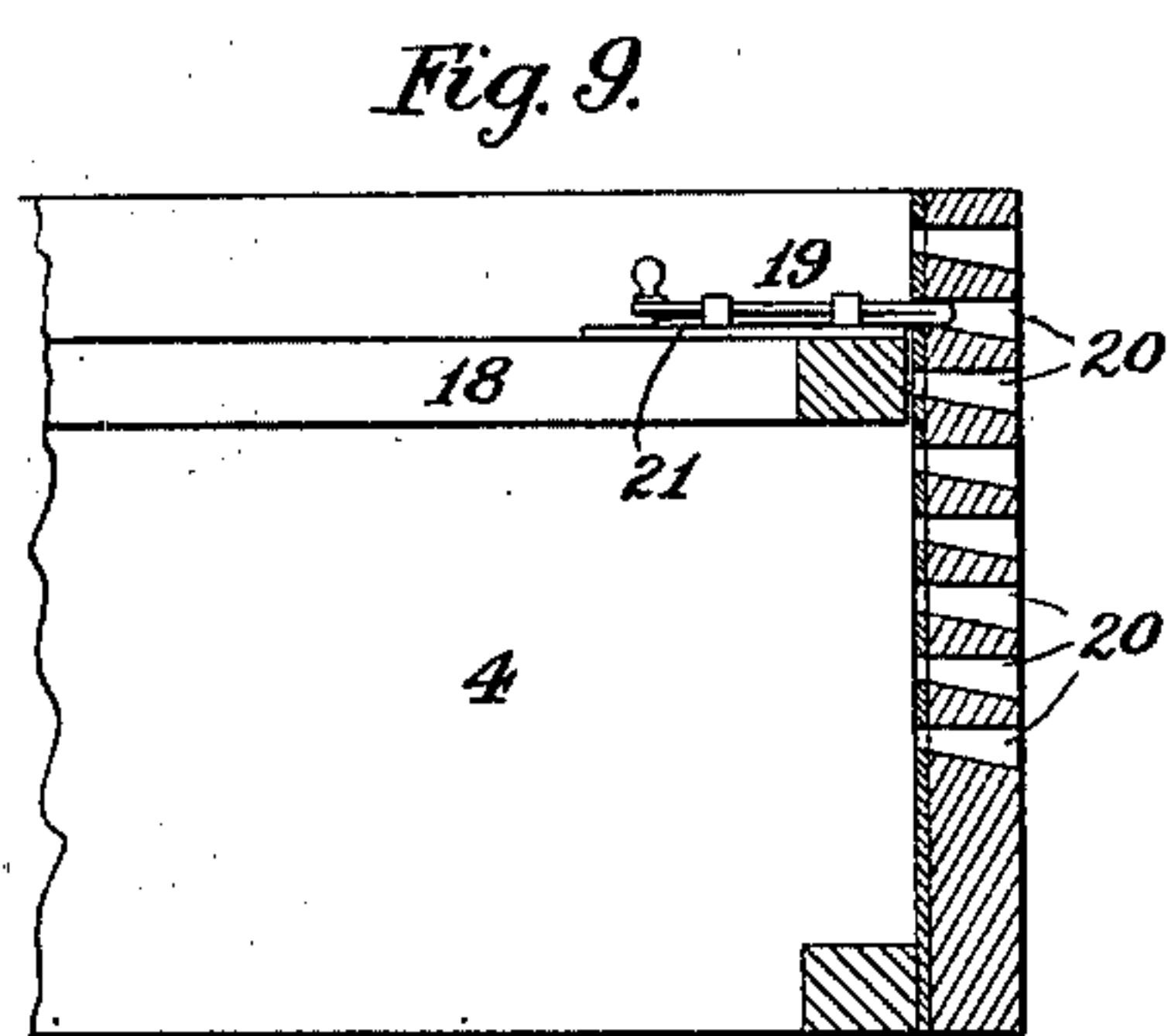
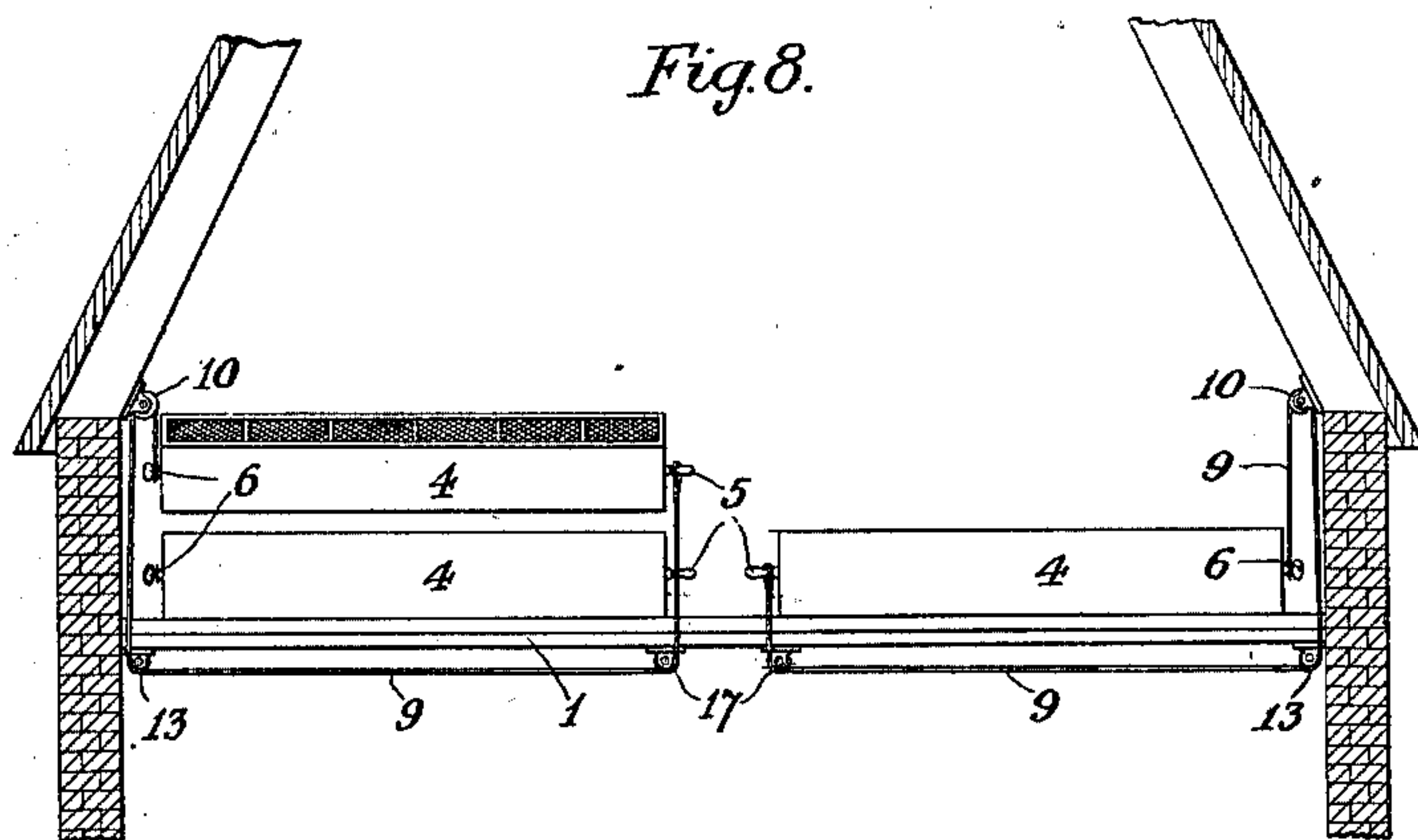
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(Application filed Nov. 24, 1899.)

(No Model.)

4 Sheets—Sheet 4.



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# UNITED STATES PATENT OFFICE.

ALFRED BLACKIE, OF TUNBRIDGE WELLS, ENGLAND.

## APPARATUS FOR DRYING HOPS.

SPECIFICATION forming part of Letters Patent No. 672,819, dated April 23, 1901.

Application filed November 24, 1899. Serial No. 738,158. (No model.)

*To all whom it may concern:*

Be it known that I, ALFRED BLACKIE, a subject of the Queen of Great Britain, residing at 50 Grove Hill road, Tunbridge Wells, in the county of Kent, England, have invented certain new and useful Improvements in Hop-Drying Apparatus, (for which I have made application for a patent in Great Britain, No. 16,486, dated August 14, 1899,) of which the following is a specification.

This invention relates to a hop-drying apparatus comprising an oast-house or drying-kiln having an open sparred floor and a number of portable hop-receptacles having porous bottoms and tops, whereby currents of heated air may be passed through said floor and through said receptacles containing the hops for drying them.

The present invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of the floor of a round kiln suitably prepared to receive the frames containing the hops to be dried, and Fig. 2 is a similar view showing such floor with the frames in position thereon. Fig. 3 is a perspective view showing one method of manipulating the frames. Fig. 4 shows a number of the frames as arranged on the cooling-floor after drying when it is desired to cool the hops quickly; and Fig. 5 shows the manner of arranging such frames when the cooling is to take place more gradually. Fig. 6 is a plan view of a square kiln with frames suitably arranged thereon, and Fig. 7 shows an arrangement which may be used in connection therewith for manipulating the frames. Fig. 8 shows a modification of such arrangement. Fig. 9 is a sectional view showing one method of attaching the lids or covers of the frames in position, and Fig. 10 illustrates a modified arrangement for the same purpose. Fig. 11 is a plan view, and Fig. 12 a transverse section illustrating the method I prefer to employ for attaching the porous cloth or other suitable material to the lids or covers and bottoms of the frames.

This apparatus comprises an oast-house or kiln of any suitable form provided with an ordinary sparred floor 1, composed of slats or spars disposed apart from each other, leaving open spaces between them for the passage of air, and hop receptacles or frames 4, having

porous tops and bottoms, disposed on said floor. When the hop-receptacles are placed directly on the floor, portions of the heated air for drying the hops rise through the floor between the receptacles and around the ends thereof and have no effect upon the hops and the heat is consequently wasted. To avoid this waste of heat, intermediate strips 2 of wood or other suitable material, together with similar end strips 2<sup>a</sup> and 2<sup>b</sup>, are disposed on the floor 1 in such manner as to form completely-walled inclosures or compartments approximating in shape the hop-receptacles. The intermediate strips 2 are arranged in such position that they come immediately below the joints in the hop-receptacles 4 when the latter are placed in position in the kiln, and the end strips 2<sup>a</sup> close the end spaces under the outer ends of said receptacles adjacent to the inside wall of the oast-house or kiln and the strips 2<sup>b</sup> close the spaces under the inner ends of the receptacles, so as to prevent the escape of air around the frames. By this means the heated air will pass upward through the hop-receptacles only, and consequently the whole thereof will be utilized in drying the hops, as the whole floor-space, except the parts beneath the porous hop-receptacles, is entirely closed or sealed. The strips referred to may be covered with felt, if desired.

The central part 7 of the drying-floor is preferably boarded over, as shown, to provide a space for the operator to stand when attending to the frames, as hereinafter described, and to prevent escape of heat. Part of the boarding 7 is preferably made removable, as shown at 8, so that it can be lifted to allow the heated air to rush up through the opening thus left, and so act as a reek-dissipator or as a means of quickly reducing the temperature below the drying-floor.

The frames 4 are provided with handles or trunnions 5 6, of any suitable form, placed centrally in the end pieces of same, so that they can be used either as handles for lifting the frames by hand, turning them when passing through doors or when shooting out the hops, or as trunnions whereby by the employment of cords or chains and pulleys, as hereinafter described, the frames 4 may be raised from the floor of the drying-chamber, turned for a half-revolution on the trunnions, and then



again lowered into the exact position which they previously occupied, but reversed. The arrangement shown in Fig. 3 for effecting this manipulation of the frames 4 by means of  
 5 cords and pulleys is as follows: It will be seen that one end of the cord or chain 9 is looped over the handle 6 next the wall of the oast-house and retained in position by a groove provided for the purpose or by means of a  
 10 hook and eye or other suitable means. It is then passed over a pulley 10, fixed at a suitable height on the wall or roof of the kiln directly above the handle 6, and carried to the center space, where it is retained in position  
 15 by looping over the other handle 5. The cord 9 is provided with a handle 11 to enable the operator to grasp it properly, and a small stop 12 is placed upon it between the handle 6 at the wall end of the frame 4 and the pulley 10  
 20 above to arrest the frame when it has been raised to a suitable height for turning. When it is desired to turn the frame, the operator releases the end of the cord 9 in the center space, and by pulling on it with one hand and  
 25 lifting the end of the frame nearest him with the other raises it till the stop 12 acts, when by a movement of the wrist he causes the frame to revolve on the handles or trunnions 5 and 6 till it is reversed and then lowers it  
 30 into its former position.

To enable the operator to freely manipulate the movable lids 18 of the frames 4 and to examine the hops nearest the wall, which he could not otherwise conveniently reach,  
 35 a plank may be placed on top of the adjoining frame, on which the operator may stand while manipulating the lids, or the frame 4 may be raised by the cord and pulley, as already described, and the operator then gently  
 40 swings it on top of the next frame, thus clearing the space previously occupied by the frame, so that he can pass in and easily reach any part of it.

When the hops in the frames 4 have been  
 45 sufficiently dried, such frames are taken from the drying-chamber and arranged on the cooling-floor, the hops still remaining in same. The removal of the frames is facilitated by the cords and pulleys, the operator slightly  
 50 raising the frame by means of the cord and pulling it toward him, so leaving a space between the frame and the wall for an assistant to enter, unfasten the cord, and lift his end of the frame by the handle. If it is desired  
 55 to cool the hops quickly, the frames are arranged on their edges on the cooling-floor, with a space between each pair, as shown in Fig. 4, the rapidity of the cooling being to a certain extent regulated by the space left be-  
 60 tween the frames. If, however, it is desired to retard the cooling, such frames may be arranged one upon another, as shown in Fig. 5, a cover being, if necessary, placed over the top.

65 In the case of square or oblong kilns I prefer to construct and arrange the frames 4 as shown in Fig. 6, a space 7 being left down

the center between the two sets, as shown, in which the operator can stand to manipulate the frames when required. Such frames are  
 70 provided with handles or trunnions 5 and 6, as described in connection with those for use in circular kilns, and the same arrangement of cords and pulleys for operating same may also be employed. 75

When the frames used are of large size, in the case of either square, oblong, or circular kilns, I prefer, however, to employ the arrangement shown in Fig. 7 for this purpose, such arrangement consisting in looping the  
 80 cord 9 over the handle 6 at the wall end of the frame 4, then passing it over pulley 10, down around a second pulley 13, and then below the frame to a third pulley or roller 14, mounted on the floor. A hinged catch 15  
 85 is arranged so that when the cord is pulled upward, as shown at the left-hand side of Fig. 7, a stop 16 on the cord will lift such catch 15 and pass same, the catch dropping behind it, while when the pull on the cord is  
 90 subsequently relaxed the stop will come in contact with the back of the catch and so prevent the further return movement of the cord. The action of pulling on the latter having  
 95 raised the back of the frame 4 to the position shown on the left-hand side of Fig. 7, such frame will therefore be retained in this position, and the operator, having thus both  
 100 hands free, can then by grasping the handle 5 with one hand lift the inner end of the frame and with the other hand turn it over on the trunnions formed by its handles. He then places the inner end of the frame down in position again, releases the catch 15, and  
 105 lowers the frame by means of the cord to its original position, but with its other side uppermost, so as to expose the undried hops to the action of the heat. A further modification of this arrangement is shown in Fig. 8,  
 110 in which it will be seen that the cord 9 after being looped over the handle 6 at the wall end of frame 4 passes over pulley 10, thence down around pulley 13, and then along below the frame to pulley 17, whence it passes to  
 115 and is looped over handle 5. With this arrangement it is only necessary for the operator to grasp handle 5 and raise the inner end of the frame 4, when this motion will also, through the cord and pulleys, act on the handle 6, so that the force used will operate  
 120 equally on both ends of the frame, which will thus be raised and remain in a horizontal position, when it can be turned over so as to bring its lower side uppermost and then be replaced in its original position on the floor. 125

It will be readily understood that the arrangements of cords and pulleys described for manipulating the frames might be modified without departing from the spirit of my invention, any suitable arrangement being  
 130 employed which would enable such frames to be raised from the drying-floor at will, so as to permit same to be reversed when necessary, or when convenient instead of employ-



ing cords and pulleys a man at each end of the frames might by seizing the handles raise such frames directly for the purpose of reversing them on the drying-floor or transporting them from place to place, as desired.

The movable lids 18 of the frames 4 are fitted so that they can be easily raised or lowered for the purpose of examining the hops and either end lifted without unfastening the other end and so that the lids can be fixed in any position at will, either as shown in Fig. 9 or as shown in Fig. 10, so as to permit of the height of the lid being adjusted as the bulk of the hops diminishes in drying.

In Fig. 9 the lid 18 carries three or more bolts 19, adapted to enter a series of holes 20, formed in the ends or sides of frame 4, such bolts being made or provided with a spring 21, which will tend to keep them in the position in which they are placed, while in Fig. 10 the bolt 19 is acted on by a coiled or other spring 22, which keeps it normally in engagement with the hole in frame 4. When the latter arrangement is employed, it will therefore only be necessary to place the lid in the required position in the frame, when the springs of the bolts will at once lock it and prevent it from moving either up or down. The holes are formed, as shown, slightly beveled outward and downward to prevent the ends of the bolts at one extremity of the frame jamming when the other extremity is raised.

For the purpose of clamping the porous cloth 23 (which, if desired, may be rendered fireproof by chemical or other suitable means) to the bottom and movable lids of the frames I prefer to employ the means shown in Figs. 11 and 12, consisting in securing same between two strips 24 25 of wood or other material, provided with a corresponding groove or grooves and projection or projections, between which such cloth will be securely clamped, whereby the cloth can be stretched without fear of tearing same, and the two strips of wood are then suitably connected together by screws or other means.

It will be readily understood that instead of porous cloth I may employ other porous material—such as basket-work, cane, wire trellis, or perforated metal or other suitable material—for the lids and bottoms of the frames.

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

1. In a hop-drying apparatus, the combination of a ventilating-floor having a central closed space for the attendant, strips secured

on said floor and forming completely-walled inclosures extending from said central closed space, portable hop-receptacles disposed on said strips and provided with porous bottoms to permit the passage of drying currents of air, said inclosures corresponding in shape with said receptacles and serving to confine the air-currents to the interior of said receptacles, the intermediate strips closing the joints between adjacent receptacles, the entire floor being closed except those portions beneath the receptacles.

2. In a drying apparatus, the combination of an upright kiln, a reticulated floor therein provided with a central closed platform for an attendant, a series of strips disposed on said floor and radiating from said central platform, short end strips connecting the inner ends of said radial strips, longer end strips connecting the outer ends of said radial strips, and tapering receptacles adapted to rest on said strips and provided with porous bottoms.

3. In a hop-drying apparatus, the combination of a drying-kiln provided with an open floor having a central covered space for the attendant, pulleys disposed above said floor, portable porous receptacles for containing the hops disposed in said kiln and provided with trunnion-handles projected centrally from their opposite ends, and cords connected with said trunnion-handles and passing over said pulleys.

4. In a hop-drying apparatus, the combination of a ventilating-floor provided with a central closed platform for the attendant having a removable floor, strips secured on said ventilated floor and forming completely-walled inclosures, portable hop-receptacles disposed on said strips over said inclosures and provided with porous bottoms to permit the passage of drying currents of air, said strips serving to confine the air-currents to the interior of said receptacles.

5. A receptacle provided with bolt-holes at its opposite ends and with a lid having bolts engaging said bolt-holes for adjustably securing said lid in position, said bolt-holes being widened outward and downward to permit the lifting of the lid at either extremity to examine the hops without unfastening the other extremity.

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Witnesses:

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