

(No Model.)

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W. A. MEEKER.

FRUIT DRIER.

No. 300,995.

Patented June 24, 1884.

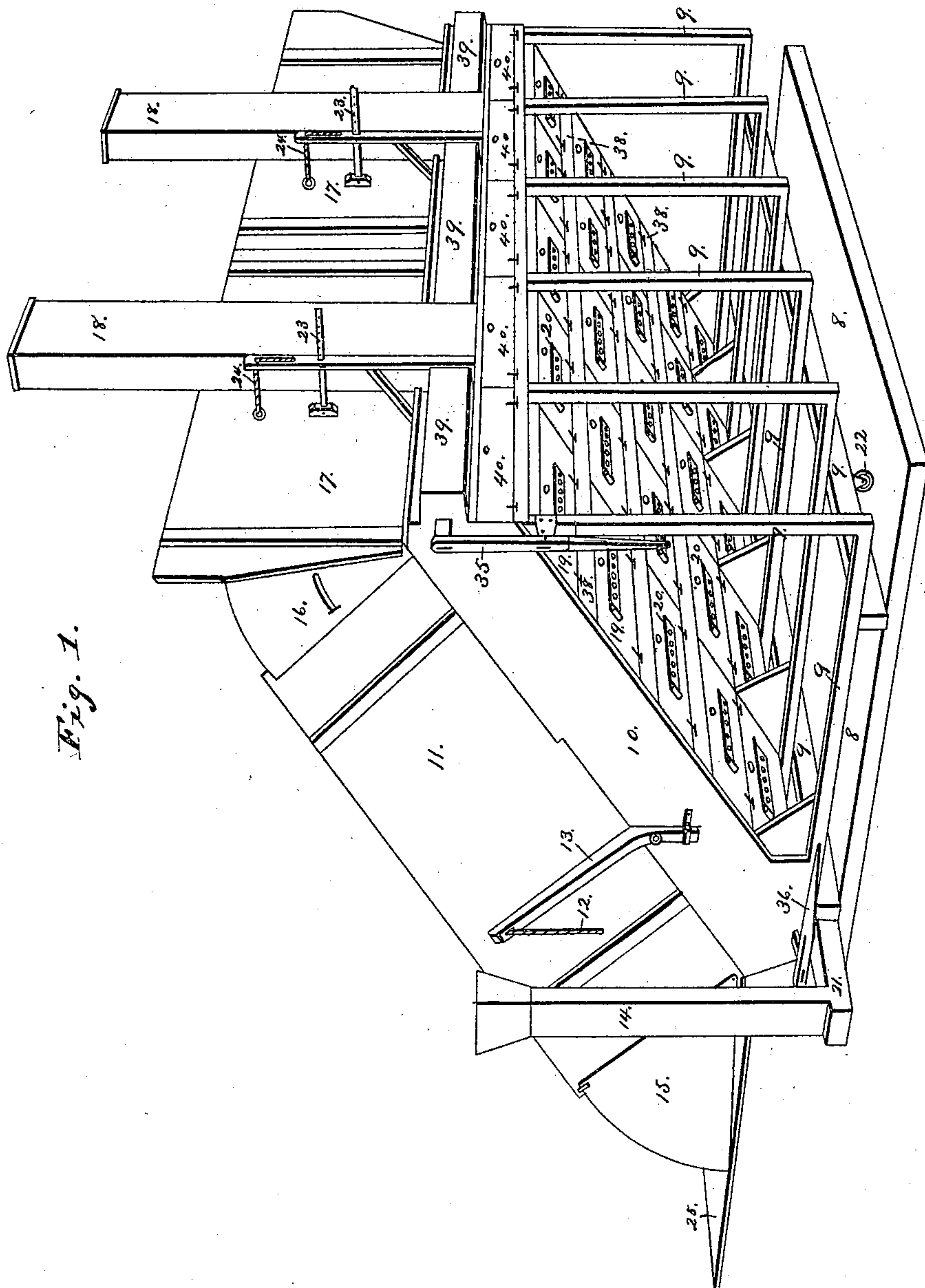


Fig. 1.

WITNESSES

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(No Model.)

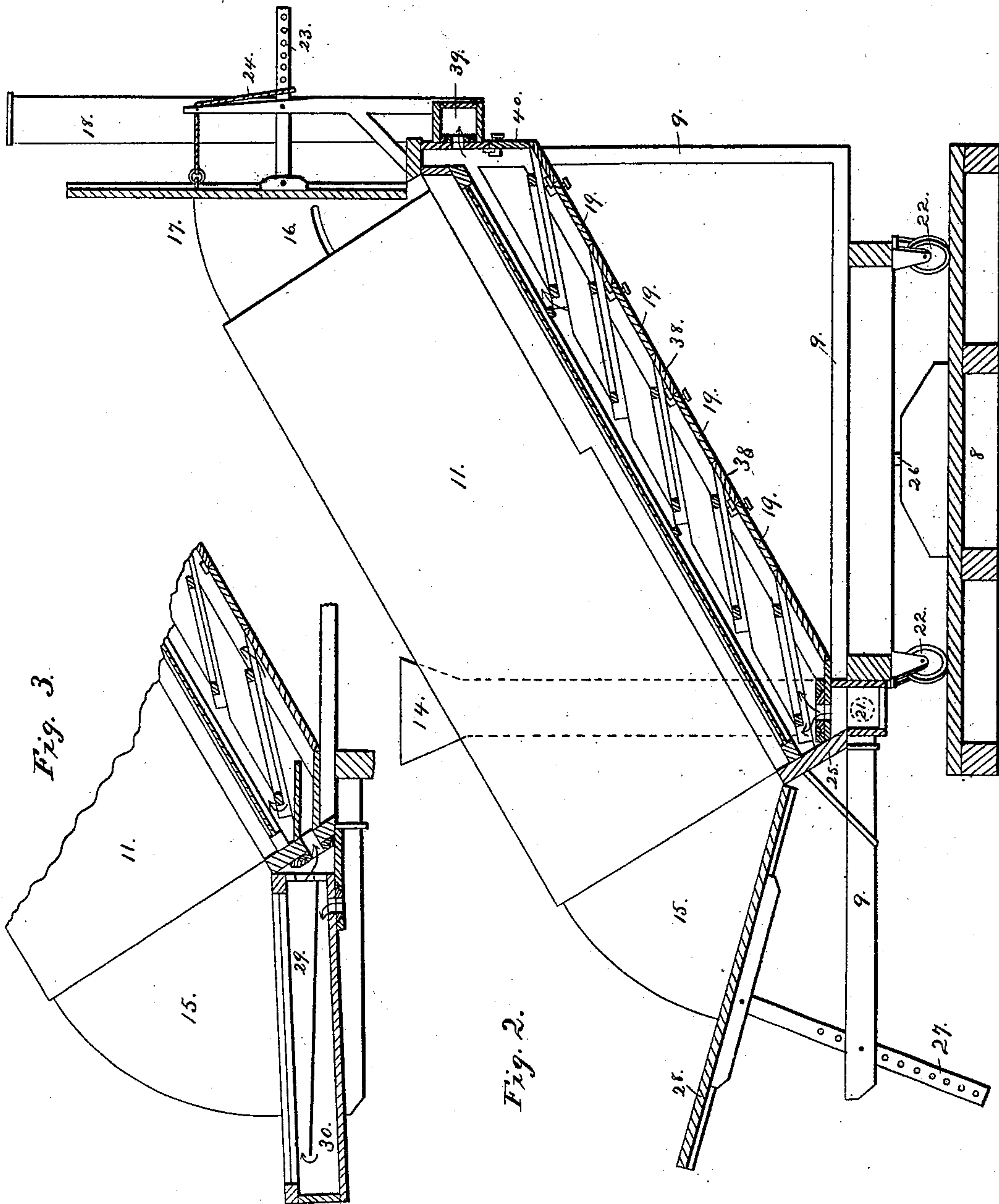
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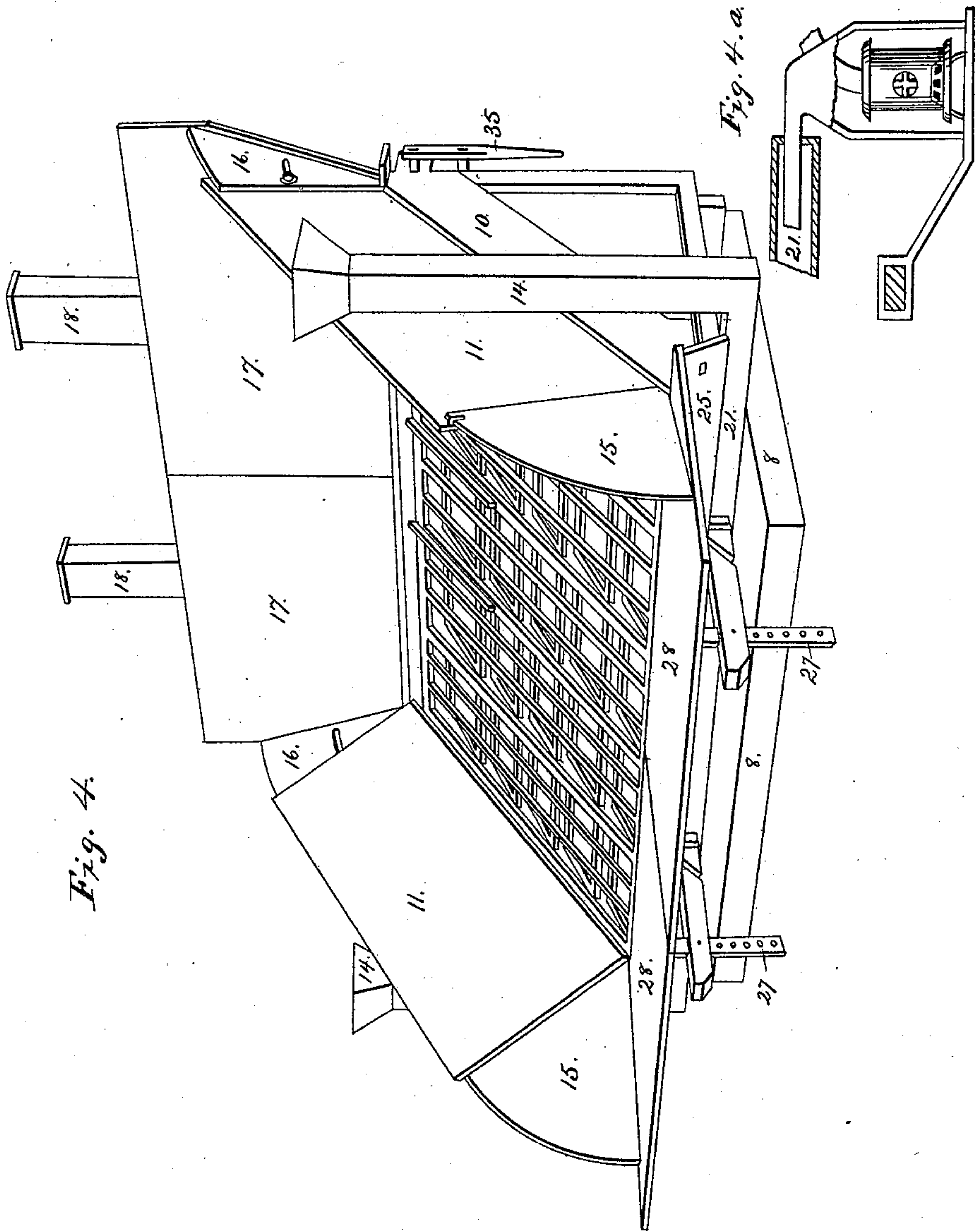
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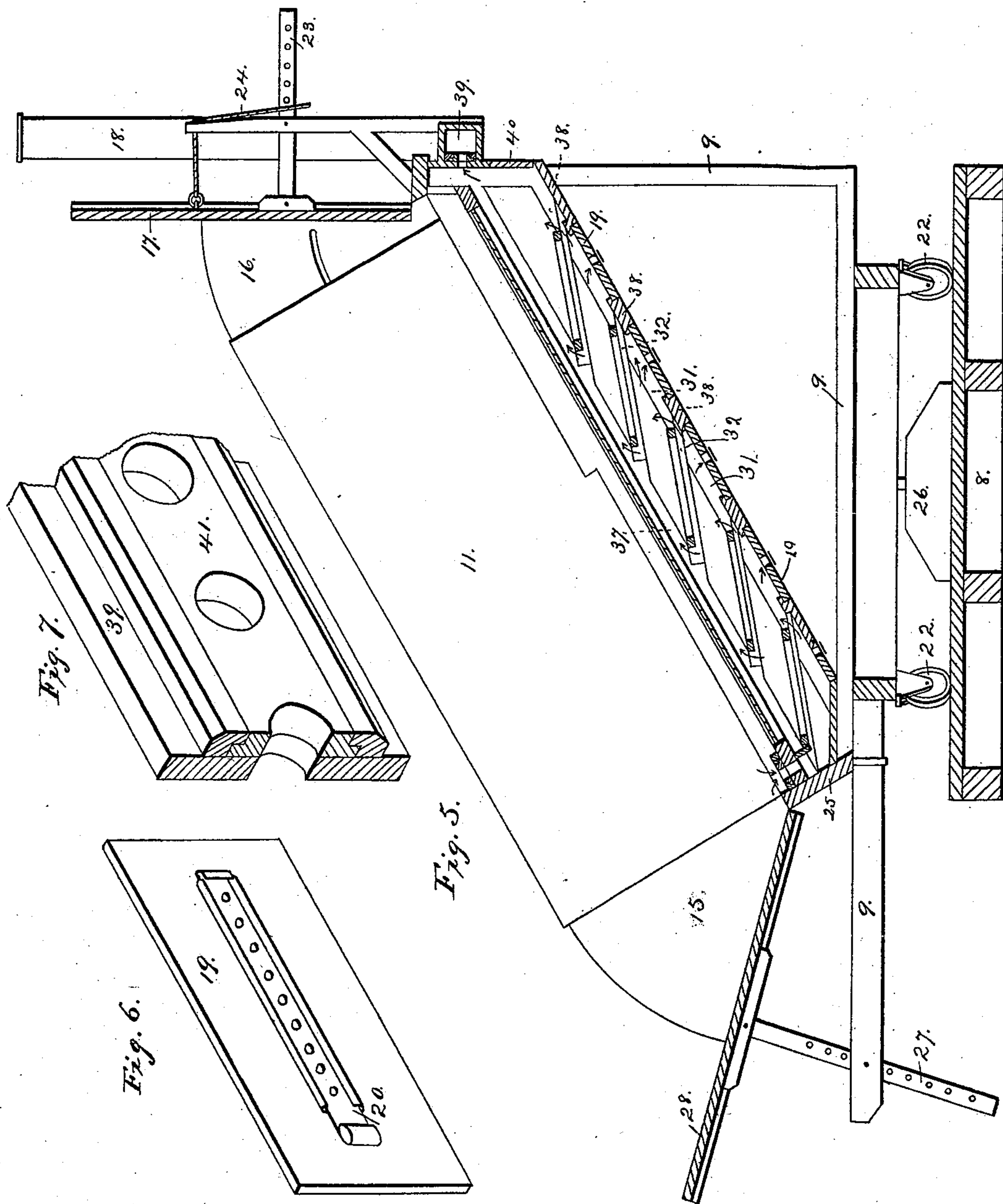
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# UNITED STATES PATENT OFFICE.

WILLIAM A. MEEKER, OF SAN FRANCISCO, CALIFORNIA.

## FRUIT-DRIER.

SPECIFICATION forming part of Letters Patent No. 300,995, dated June 24, 1884.

Application filed January 9, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM A. MEEKER, of the city and county of San Francisco, in the State of California, have invented certain new and useful Improvements in Fruit-Drying Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

My invention consists in building a drying-machine especially intended for drying fruit with heat derived from the rays of the sun; and it consists in the general plan of the machine as a whole, and also in inventing and applying many of the elementary devices used in the construction of the machine, and also in the arrangement and application in detail of the various devices used by which the machine as an entirety is made practically successful and of very superior excellence.

The machine consists of a large frame, which supports a number of trays for holding the fruit while being dried, so arranged that the rays of the sun strike all of the fruit being dried and a double current of warm air passes under and above the trays. At the front and rear of the machine, and also at its ends, are attached adjustable reflectors for throwing the rays of the sun upon the drying fruit on the trays. Above the trays is a cover of glass, put there either with or without sashes, so as to form an entire covering above the trays which is practically air-tight, while a series of doors and boards form a floor or wall below the trays. The fruit-trays at the front of the machine are placed in the lowest position, the set of trays next back of the front trays are set at a higher elevation than the front trays and so on, each set of trays running longitudinally with the machine, being successively placed at a higher elevation than the set next in front of them. This arrangement causes the body of the machine which holds the fruit to incline upward as it goes backward, as shown in the drawings, thus furnishing a form which exposes all of the fruit in the machine equally to the direct rays of the sun and at the same time facilitates the air-draft through its

drying-chambers. The machine is provided with flues and gates or dampers for regulating the inlet of air and the outlet of air and moisture, together with devices for raising and adjusting the various reflectors. A platform is provided on which the rest of the machine can be turned around horizontally, so as to keep the fruit in proper position before the sun during the entire day.

In the drawings hereto annexed, and made a part of the specification, Figure 1 is a perspective view showing the rear and one end of the machine in elevation. Fig. 2 is a sectional elevation showing one tier of trays from the front to the rear of the machine, in which the fruit is held while being dried, and also the reflectors at one end and at the front and rear; also two of the wheels which support the machine and the center pivot underneath it, around which it revolves; also one of the flues at the back end of the machine, through which the moist air escapes, and an adjustable link for adjusting the back reflector, the horizontal box or flue which connects with the vertical flue, and also a vertical flue or tube near the front, which connects with the horizontal box or flue, through which the air is admitted into the drying-chamber. Said last-named vertical box or flue is not commonly used, although it may be, if preferred. Fig. 3 is a sectional view showing a heating-chamber at the front part of the machine. This chamber may or may not be used, at the option of the user. Fig. 4 is a perspective elevation of the machine, showing the several reflectors and trays, the means for adjusting the front trays, two flues in the rear for carrying off the moist air, the front box or flue, and upright boxes connected therewith, for admitting air to the machine. Fig. 5 is a sectional side elevation, similar to Fig. 2, except that the means for admitting the air into the machine at the lower front part is not the same. Fig. 6 is an enlarged view of one of the perforated slides or gates for letting moisture out of the machine underneath the trays. Fig. 7 is an enlarged view of a section of one of the slides or dampers for regulating the admission of air into the machine at its lower front, and also for regulating the outlet of the



same through the horizontal box or flue at the back end of the machine.

In the drawings similar numbers refer to corresponding parts.

5 In the drawings, 8 is a platform upon which the machine rests.

9 are timbers constituting the frame-work of the machine.

10 26 is a pivot connected with the platform 8, and extending up into the frame-work of the machine, so as to form a pivot, around which the machine will turn horizontally.

22 are four wheels which support the weight of the machine upon the platform 8. These 15 wheels are placed at such an angle as to follow each other in a circle when the machine is revolved around the pivot 26. They should have an iron circular track to run upon.

31 in Fig. 5 is a frame-timber extending at 20 an incline from near the front of the machine backward and upward to its rear, and 37 is a similar strip or timber placed above timber 31. A similar set of timbers are at the other end of the machine, and these timbers are covered 25 on their outside by the inclined boards 10, which are on the ends of the machine. (Shown in Figs. 1 and 4.) Boards similar to 10, and inclined in the same corresponding way, are placed in the machine at regular intervals be- 30 tween such end boards, and form partitions across the drying-chamber between each tier of trays that run from the front to the rear of the machine.

In Figs. 2 and 5 are shown several horizontal 35 cleats or strips of wood extending forward from timber 31 to timber 37, and attached to them. One of these cleats is marked 32 in Fig. 5. Corresponding cleats are fastened upon each side of the said board partitions. There 40 is one of these cleats at each end of each tray, and the ends of the tray when in the machine rest upon these cleats or strips 32.

38 are strips or boards running from end to end of the machine, and fastened underneath to 45 the timbers 31 and to the lower edges of the said board partitions.

19 in Fig. 1 is one of several doors which are hinged to strips 38, and are fastened by a 50 suitable button or latch when they are closed, as shown in Fig. 1 of the drawings. There are as many of these doors as there are trays, and through them the trays are passed into and taken out of the machine. Resting upon the 55 upper edges of timbers 37 and the said partition-boards is a glass covering put on in sashes or in any other convenient way, so as to cover the entire surface of the fruit-drying chambers.

10 are end boards rigidly attached to the 60 machine and made a part of its frame-work.

11 are reflectors at each end of the machine, being hinged at their lower edges, so as to be adjustable and capable of being folded down over the face of the machine.

65 15 and 16 are movable reflectors pivoted at their bottom, so that when it is desired to close

or shut down the reflectors 11 the upper parts of the end reflectors, 15 and 16, may slide either in front or back of reflectors 11 by being partially revolved around the pivots at their lower 70 ends, so that they will not project far beyond the ends of reflectors 11. This permits them to be used in forming an inclosure of reflectors when the machine is in use, and also to be turned down over the glass face of the machine 75 when desired.

13 in Fig. 1 is a bracket fastened to the end board, 10, at each end of the machine, and 12 is a rope passing through a pulley or hole in the upper end of each bracket 13, one end of 80 the rope being attached to the reflector 11 and the other end extended so as to be hitched to any convenient fastening. By means of the bracket 13 and rope 12 the reflector 11 can be raised or lowered to any position, and can be 85 raised up from its position when lying down over the glass face of the machine.

17 are reflectors at the upper and back end of the machine. These reflectors are made adjustable by rope 24 and link 23. (Shown in 90 Figs. 1, 2, and 5 of the machine.)

28 are the front reflectors, made adjustable by similar links, 27. The lower front ends of the spaces which inclose the fruit-trays are covered and made tight by a front board, 25, 95 and bottom boards enough to cover any space not covered by the doors 19 and strips 38. The upper and back parts of the drying-spaces which inclose the trays are covered and made tight by the horizontal box or flue 39 and the 100 vertical doors 40. The ventilation of the drying-spaces and the creation and control of the drafts of warm air which pass through the drying-spaces in which the trays are placed is one of the principal features of my invention. 105 To accomplish these ends I construct at the upper and back end of the machine the horizontal box or flue 39, which runs the entire length of the machine, and is closed tight at each end, so that no air gets into it except 110 what comes into it from the drying-spaces.

To admit the air and drafts from the drying-spaces into the flue 39, I perforate the side of the flue next to the drying-spaces with a large number of holes, that extend at regular 115 distances apart from near one end of the flue to a point near to its other end. I also construct one or more vertical flues, 18, the lower ends of which open into the horizontal flue 39. Inside of the flue 39 I place a horizontal 120 slide, 41, which runs nearly the entire length of the flue, and is perforated with exactly the same number of holes and in the same relative positions as are the holes in the side of the flue next to the drying-spaces. The slide 41, 125 thus perforated, I place flat against the perforated side of the flue 39. An attachment from the perforated slide 41 extends out through the end of the flue 39, and to this attachment the lever 35 is pivoted, as shown in Fig. 1, so 130 that the perforated slide can be moved back and forth endwise. As the holes in the per-



forated slide 41 correspond exactly with the holes in the side of the flue 39, it follows that when the holes in the slide are in front of the holes in the side of the flue an opening is made from the drying-spaces to the interior of the flue 39 at every hole through both the slide and the side of the flue.

Fig. 7 shows a short section of the perforated side of the flue 39 and slide 41.

In Figs. 1, 2, and 4 are shown means for admitting air into the drying-spaces. A tube, 21, extends the whole length of the front of the machine, and is perforated in all respects like the flue 39. This tube 21 also has a perforated slide similar to 41, and is operated in a similar manner by the lever 36. (Shown in Fig. 1.) Vertical tubes 14 admit air into tube 21, from whence it passes through the perforations in the slide and side of the tube 21 into the drying-spaces, and from thence the air continues on through the perforations in the side of the flue 39 and slide 41 to the inside of the flue 39, and from thence out of the machine through the vertical flues 18. A draft can thus be maintained through the drying-spaces in which the trays and drying fruit are placed. By moving either of the slides endwise the openings leading into or out of the drying-spaces can be either partially or entirely closed and the draft can be thereby controlled and regulated or entirely stopped, as may be desired.

In practice I have found that the vertical tubes 14 can be dispensed with, and, instead of the horizontal tube 21, I prefer to use a narrow board to cover the extreme lower portion of the drying-spaces. This board I perforate, and with it I use a perforated slide, in the method already described and shown in Fig. 7. By this arrangement the air will pass down from over the machine, as shown by the arrows in Fig. 5. This air will be somewhat warmed in the space which is inclosed on four sides by the reflectors before it goes into the drying spaces or chambers. I cover the openings through which the air passes into and out of the machine with fine wire-cloth, and thereby keep flies and all kinds of insects away from the fruit.

I have found by actual tests that about five per cent. of additional heat is obtained in the drying-chambers of the machine from the sun's rays by coloring the inside of the bottoms, sides, and ends of the chambers black.

Fig. 3 of the drawings shows a heating-chamber, which may be used, if necessary, for warming a body of air to be used in the drying-spaces. The heating-chamber 30 in Fig. 3 is an inclosed space covered with glass, and extends nearly or quite the entire length of the machine, and may be of any width desired. The wider it is the more air will be heated by it.

29 is a diaphragm, which may be made of sheet-iron. It extends the whole length of the heating-chamber 30, but is not quite so wide as

the chamber, as a space must be left at the outer edge of the diaphragm for the air from underneath to pass upward. Perforations through the bottom, along its edge next to the machine, admit air into the chamber 30. The air thus admitted passes, as shown by the arrows in Fig. 3, along underneath the diaphragm around its outer edge, and from thence to the perforated entrance already described into the drying-spaces. The air in passing through the chamber 30 keeps constantly getting warmer. The heating-chamber 30 may be surrounded with more or less reflectors according to the amount of heat which must be produced. In some localities the natural heat is greater than in others, and therefore less artificial heat is required. In most places in California, where the machine has been operated, an ample degree of heat has been obtained without using the heating-chamber 30 at all.

In some localities it may be convenient, at some seasons of the year or on cloudy days, to assist the heat of the sun by artificial heat from fire. To accomplish this I take away the vertical tubes 14 and attach a small stove, by any suitable means, to one or both of the front corners of the machine, and let heating-pipes from the stoves run entirely through the horizontal tube 21—such, for example, as shown in Fig. 4<sup>a</sup>. The heat from these heating-pipes will pass with the draft through the drying spaces or chambers of the machine. The stoves will be carried around with the machine as it is revolved around the pivot 26. A convenient size for the trays is three feet long and two feet wide. My machine can be made of any size, so as to use any number of trays desired. By using the partition-boards, which extend from the lower front edge of the machine to the upper back edge, as already described, the entire drying-space in the body of the machine is divided into as many drying spaces or chambers as there are tiers of trays running from the front to the rear of the machine. Different kinds of fruit can be dried in the different chambers thus formed at the same time without any mingling of their different flavors.

My machine may be used for drying other substances besides fruit, including vegetables and even meats.

Fig. 6 of the drawings shows one of the doors 19 having a slide, 20, with perforations for opening and closing corresponding perforations through the doors, operating in all respects like the slide and perforations shown in Fig. 7. This slide, with the openings made by the perforations through it and the door, constitutes a dripping device. One of these dripping devices is placed in each one of the doors 19, and in practice they are valuable auxiliaries for getting rid of the moisture from the drying-chambers. In use they should only be open enough to let the condensed moisture pass out of the drying-chambers without permitting air enough to pass



in to interfere with the draft passing in at the front part of the machine.

I am well acquainted with the sun-drying machine patented to Edmund F. Ely, June 22, 1880, and I do not claim anything shown in that machine. Several defects existed in that machine of such a radical nature as to almost destroy its value for practical use. Among others, no adequate provision was made for carrying off the moisture which arose from the drying fruit, which moisture amounts to about three-fourths of the entire weight of the fruit when first put in the machine. The upper part of the machine, therefore, became for a time a sweat-room, soaking instead of drying the fruit there. Another defect was that the sun's rays struck the front edge of the lower trays, burning the fruit there, while the fruit farther back on the same trays was not reached by the sun, and not only would not dry as soon as the fruit on the front edges of the tray, but would even mold and spoil. In my machine a perfect system of ventilation and draft is provided, which, together with the drips underneath the trays, forms a thoroughly practical system of getting rid of the moisture.

In actual use one of my machines, containing but twenty-five trays, has thoroughly dried six hundred and fifty pounds of fruit, evaporating therefrom over four hundred and eighty pounds of moisture in the short space of twelve hours.

My fruit-drier produces a better article of dried fruit than any other. Flies and vermin being kept from the fruit, it is kept clean, and does not require washing or dipping in potash or other chemical solution. The essential oils, which contain the flavors of the fruit, are preserved, and the sugar of the fruit is crystallized instead of being evaporated and carried off, as is done to a great extent when fruit is dried in machines heated by fire.

Fruit dried in my machine also escapes the deterioration which results to fruit dried by the sun in the open air from flies, vermin, dust, night dews, and several days' exposure to atmospheric evil influences.

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

1. In a sun-drying apparatus, an inclined drying-chamber having a glass front, a reflector or system of reflectors arranged around it, and a series of trays inclosed within it, and drip-openings in the bottom of said drying-chamber, with regulating slides or gates for controlling them, substantially as described.

2. In a sun-drying apparatus, an inclined drying-chamber having a glass front, a reflector or system of reflectors arranged around it, and a series of trays inclosed within it, arranged so that each succeeding tier is higher and farther back than its predecessor, inlet and outlet flues and valves for regulating the circulation of air in said chamber, and drip-

openings and slides or gates for controlling them, substantially as described.

3. A sun-drying apparatus having combined in it a glass-covered chamber, a system of reflectors for concentrating the heat of the sun in the drying-chamber, an arrangement of shelves or trays which exposes all of the fruit to the rays of the sun, and a system of devices for creating and regulating a draft through the drying-chamber, all combined and operating substantially as described.

4. In a sun-drying apparatus, the combination of an inclosed glass-covered drying-chamber, the system of reflectors, and the flues provided with perforated slides for regulating the inlet and outlet of air, substantially as described.

5. In a sun-drying apparatus, the combination of an inclosed glass covered drying-chamber, a system of reflectors, a system of devices for controlling and regulating a draft through the drying-chamber, and the arrangement of trays by which each succeeding tier of trays is placed farther back than its predecessor, whereby the material supported by all the trays is subjected to uniform heat, substantially as described.

6. The combination, in a sun-drying apparatus, of a system of reflectors, a system of devices for creating and regulating a draft through the drying-chamber, and an inclosed glass-covered drying-chamber colored black on the bottom and sides, all constructed, combined, and operating substantially as described.

7. In a sun-drying apparatus, the combination of an inclosed glass-covered drying-chamber with a system of reflectors, a system of devices for creating and regulating a draft through the drying-chamber, and adjustable drip-openings in the lower part of the chamber, all combined and operating together, substantially as herein described and set forth.

8. In a sun-drying apparatus, the combination of an inclosed glass-covered drying-chamber with a system of reflectors, a system of devices for creating and regulating a draft through the drying-chamber, adjustable drip-openings in the lower part of the drying-chamber, and the auxiliary heating-chamber 30, all combined and operating substantially as herein described.

9. In a sun-drying apparatus, the combination of a glass-covered drying-chamber with a system of reflectors, a system of devices for creating and regulating a draft through the drying-chamber, adjustable drip-openings in the lower part of the drying-chamber, and a stove and heating pipe, all combined and operating substantially as herein described.

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