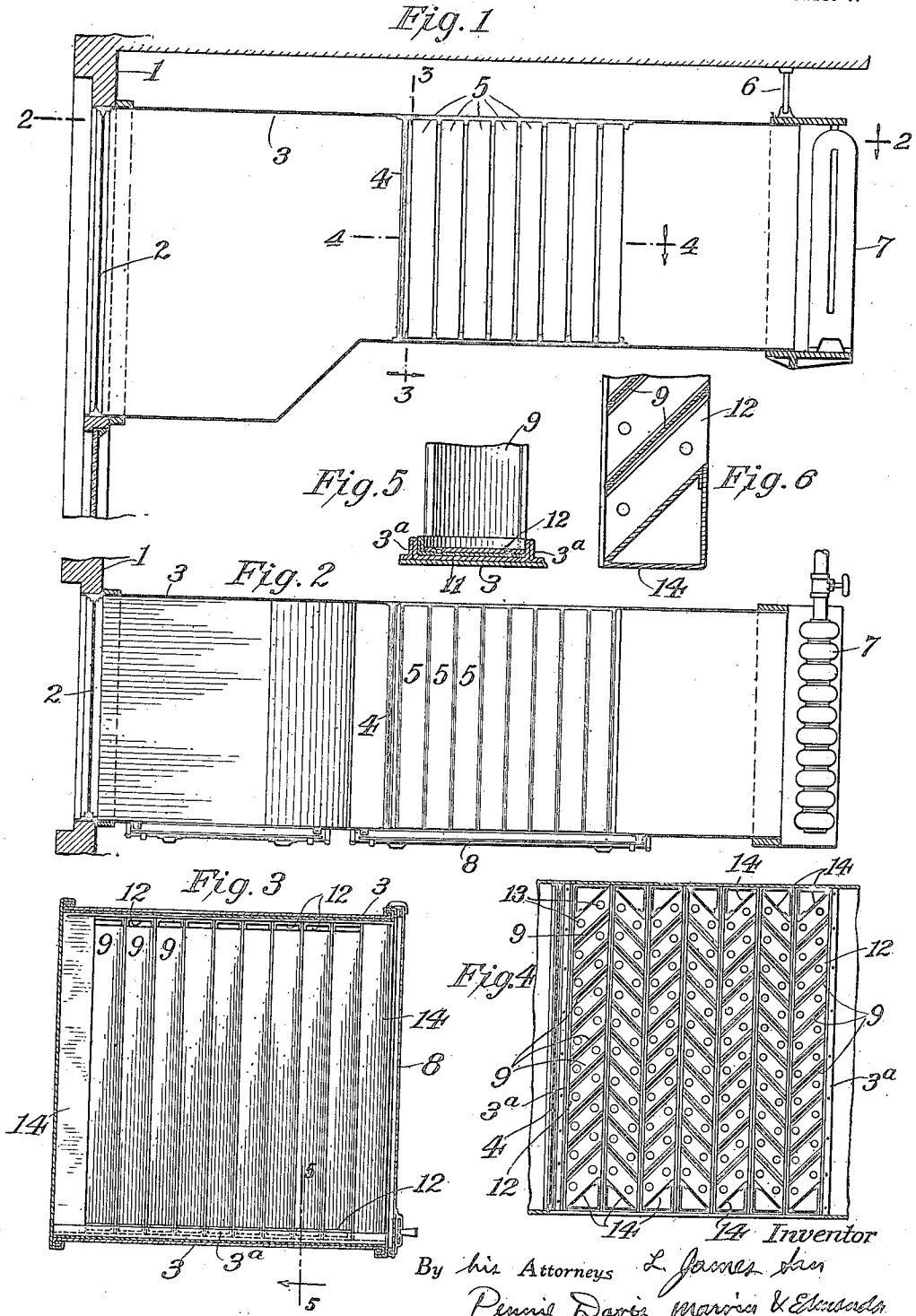


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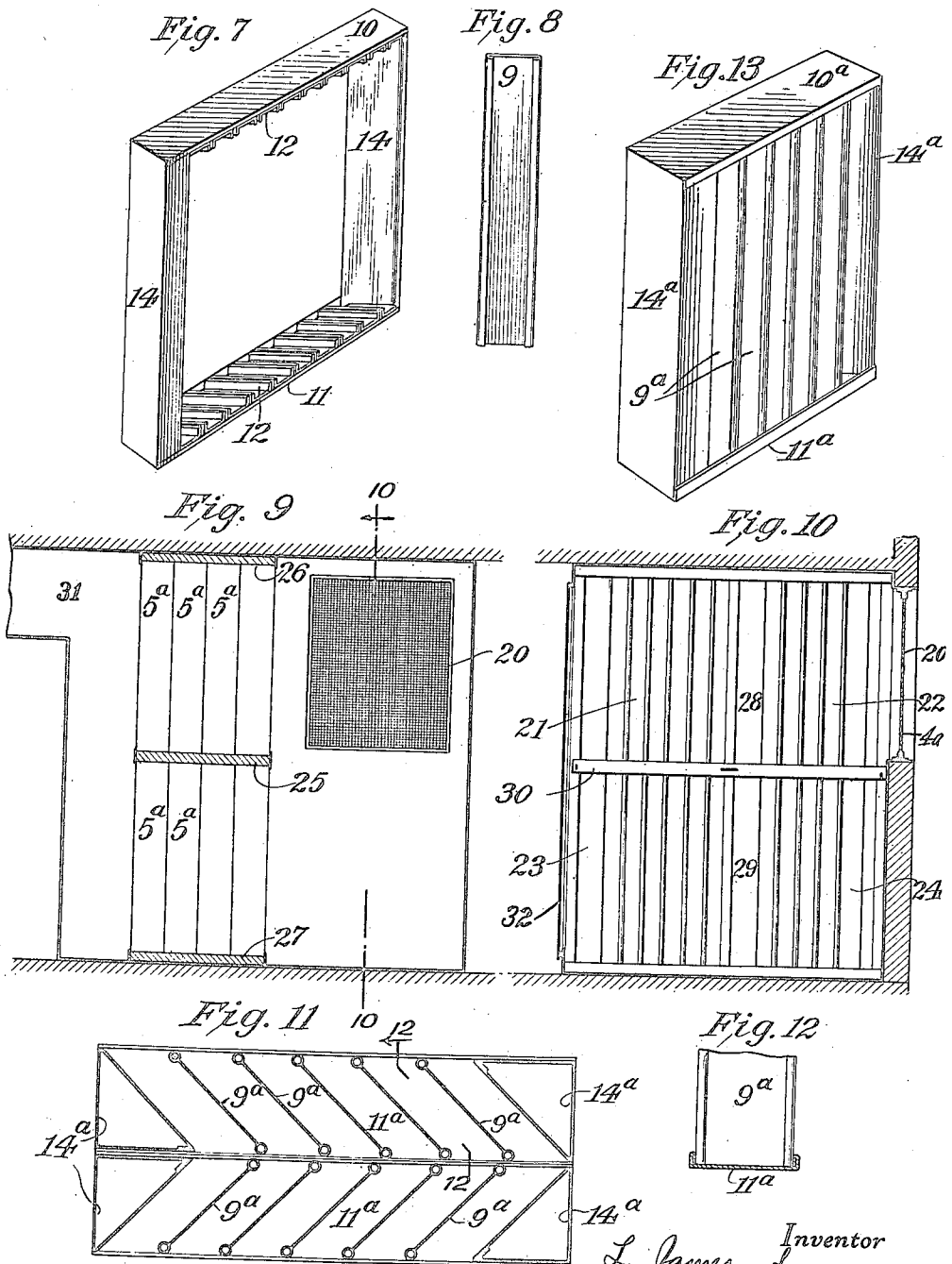
Patented Oct. 31, 1922.
 2 SHEETS—SHEET 1.



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UNITED STATES PATENT OFFICE.

LOUIS JAMES SAN, OF NEW YORK, N. Y.

APPARATUS FOR PURIFYING AIR.

Application filed June 27, 1919. Serial No. 307,200.

To all whom it may concern:

Be it known that I, LOUIS JAMES SAN, a citizen of the United States, residing at 3 West 92d Street, New York city, in the county of New York, State of New York, have invented certain new and useful Improvements in Apparatus for Purifying Air; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved apparatus for purifying the air introduced into interiors from smoke, dust, and like impurities suspended therein.

In certain interiors, for example, in laboratories engaged in the production and reproduction of motion picture films, it is important for the air introduced to be entirely free from dust and smoke particles such as are commonly found in considerable amount in ordinary air. Moreover, where drying operations, such as the drying of films, are carried out, it is important for a continual supply of fresh air to be introduced so that it may assist in the drying operation and be continually renewed as its moisture content becomes above that of effective and efficient drying. The problem is therefore presented of obtaining a continual supply of fresh dry air free from even finely divided particles of the character referred to. If even the smallest particles of dust or smoke are allowed to come in contact with the moist gelatin surface of a film, while it is undergoing drying, these particles will adhere and cause a defect in the film when reproduced. This defect is multiplied and becomes increasingly objectionable if the dust particles settle upon a negative film, inasmuch as all positives made therefrom will be correspondingly defective.

Various expedients have heretofore been proposed for purifying the air introduced into motion picture laboratories, including the washing of the air with water to remove the dust therefrom. Such treatment, however, tends to increase the humidity of the air and correspondingly decrease its drying capacity, so that it usually requires to be heated to an appreciably higher temperature to increase its drying properties.

According to the present invention, the purification of the air introduced into motion picture laboratories and other interiors is purified without moistening thereof so that it is supplied to the interiors in its normal state of dryness, but nevertheless freed from dust, smoke and like suspended particles. The purifying of the air, may, with advantage, be combined with the heating thereof so that its drying capacity will be thereby increased, and so that the purified air in a warm, dry state is supplied in a continuous or regulated manner to the interior.

The improvements of the present invention are particularly adapted to the purifying of air for motion picture laboratories and like interiors where the development, reproduction, and drying of motion picture films takes place; but they are adapted for use for other purposes and for other buildings, wherever it may be important or desirable to provide a continuous or regulated supply of dry air free from dust and smoke.

According to the present invention I subject the air entering from outside to a preliminary filtering through a fine mesh screen, and I then pass it through a series of zigzag or labyrinthine passages having their surfaces moistened with an adhesive or sticky material, such as petroleum jelly, so that the air has its direction repeatedly and abruptly changed and so that it is thereby brought into repeated contact with the moistened surfaces, with the result that the particles of dust and smoke in suspension in the air are caused to adhere to the moist surfaces and are thereby eliminated, while the purified air passes to the interior where it is desired.

Either prior to, or after, such purification, the air may be warmed or heated to the desired degree, for example, by passing it over or in contact with steam or hot water heated radiators, pipe coils or the like.

The zigzag or labyrinthine baffles and passages provided according to the present invention may advantageously be made in the form of removable sections each of which is separately removable for cleaning and for renewal of the moist coating thereon. The individual baffle plates of these separate sections may themselves be permanently affixed thereto or may be separately remov-

able therefrom, for purposes of cleaning or for renewal or repair.

The invention will be further described in connection with certain embodiments thereof illustrated in the accompanying drawings; but it will be understood that the invention is illustrated by and is not limited to, the specific embodiments thus illustrated and described.

10 In the accompanying drawings—

Fig. 1 shows, in a conventional and somewhat diagrammatic manner, and in vertical section with parts in elevation, one embodiment illustrative of the invention;

15 Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

Fig. 3 is a vertical sectional view taken on the line 3—3 of Fig. 1;

20 Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 1;

Fig. 5 is an enlarged sectional view taken on the line 5—5 of Fig. 3;

Fig. 6 is an enlarged horizontal sectional view of part of one of the sections 5;

25 Fig. 7 shows one of the sections with the removable baffles removed therefrom;

Fig. 8 shows one of the removable baffles;

30 Fig. 9 is a vertical sectional view with parts in elevation showing a modified embodiment of the invention;

Fig. 10 is a view taken on the line 10—10 of Fig. 9;

Fig. 11 is a horizontal sectional view of two of the sections 5^a of Figs. 9 and 10; and

35 Fig. 12 is a vertical section further illustrating the construction of the sections 5^a.

In the embodiment of the invention illustrated in Figs. 1 to 6, inclusive, the outer wall of a room or interior is indicated at 1 and a window or opening in this wall at 2. Secured to this window or opening, and suitably supported as by the hanger 6 from the ceiling, is the casing or conduit 3 having therein a fine mesh screen 4 and the removable sections 5 which form the labyrinthine or zigzag passages above referred to. Beyond these sections and passages is arranged a radiator 7 which may be used to heat the air entering the room. It is equally adapted for use as a refrigerator, by passage of cold brine therethrough to cool the air entering the room where this may be desirable. Ordinarily, however, for motion picture interiors, and especially in moist humid weather, steam drying of the air will be desirable.

The screen 4 is preferably a metal fabric screen, for example, of bronze, and of appropriate fineness, such as about 90 mesh. This screen is preferably removable so that it can be washed or otherwise cleaned to remove the particles of dust or smoke adhering thereto. In the course of a day a screen of the fineness referred to will remove a very considerable amount of dust

and dirt from the air entering through the apparatus; but such a screen can be readily cleaned by washing or brushing.

That portion of the conduit 3 containing the removable sections 5 is provided with a suitable closure, indicated conventionally at 8, by means of which the conduit may be closed when in use, or access had when removal of the sections for cleaning or for other purposes becomes desirable.

The removable sections, as illustrated in Figs. 3 to 7, are made of top and bottom plates 10 and 11 of suitable material, such as sheet steel, and of side frame members 14 which may be of galvanized sheet metal bent into the shape shown and suitably secured to the top and bottom frame members 10 and 11 by riveting, soldering, or otherwise. The side frame members 14 are of a general triangular cross section, as indicated in Figs. 4 and 6, so that they give added strength to the frame, and so that the diagonal portion thereof forms a diagonal baffle. Secured to the top and bottom frame members 10 and 11 are diagonally arranged guides 12 riveted or otherwise secured thereto and with upturned edges between which the diagonally arranged baffle plates 9 are to be slid. These baffle plates 9 may be of galvanized sheet metal and may have one or both of their edges turned so that they are thereby stiffened, as indicated in Fig. 8. The bottom frame 11 may have an upturned flange on one edge thereof to limit the movement of the baffle plates when inserted, or other suitable means may be provided for preventing the baffles from going too far. A flange or similar means is particularly desirable where the sections are to be arranged horizontally instead of vertically.

That portion of the conduit 3 which contains the sections 5 is provided with suitable guides 3^a as best shown in Fig. 5, for holding the sections spaced apart and in proper position.

As above stated, the diagonally arranged baffles 9 and the diagonally arranged portions of the side frames 14 are coated with petroleum jelly or other moist material to which the particles of dust or dirt will adhere. In referring to a "moist" material, I do not limit the material to petroleum jelly, nor do I mean a material which will moisten the air, but rather any suitable material which is unobjectionable because of its odor or its tendency to vaporize, and which will maintain a sticky or adhesive surface to which the dust or dirt will adhere and be thereby removed from the air. Compositions such as are used on "sticky" fly paper can thus be used. I have found ordinary petroleum jelly well adapted for use at ordinary temperatures for the purification of air entering motion picture labora-

tories. In hotter or colder climates or weather the material may require to be modified so that it will remain sticky or adhesive at the particular temperature at which it is used.

The zigzag nature of the baffles and of the passages therethrough will be apparent from Fig. 4. From this figure it will readily be seen that the direction of the air is repeatedly and abruptly changed so that repeated opportunity is given to the particles of dust or smoke to come in contact with and be held by the moist or adhesive surfaces of the baffles. With the ordinary moderate flow of air required by a motion picture laboratory I have found that the first few baffles will remove almost all of the dust and smoke and that the baffles beyond the first few remain relatively free from dust and dirt for long periods of time. It is therefore the first few baffles in particular which require occasional or periodic cleaning and renewing of the adhesive or sticky coating thereon.

When it is desired to remove the sections for cleaning or renewal they can be readily removed by opening the door 8. If then it becomes of importance to remove the separate baffles 9, this can readily be done, and the entire section and its parts be thereby readily exposed for cleaning and renewal of the surface coating.

Figs. 9 to 13, inclusive, show a modified embodiment of the invention. In the construction of these figures similar parts to those of Figs. 1 to 7 are indicated by the same reference numerals with the suffix *a* appended thereto. The sections 5^a are thus similarly made up of upper and lower frame members 10^a and 11^a and side members 14^a and they have similar diagonally arranged baffles 9^a. These baffles, however, in this modification of the invention are permanently secured to the frame as by soldering, brazing or otherwise and the lower frame member 11^a may be provided with flanged edges, as indicated in Fig. 12, to assist in holding the baffles in place.

The arrangement of the apparatus illustrated in Figs. 9 and 10 is likewise somewhat different from that illustrated in Figs. 1 and 2, and illustrates another of the many forms in which the invention may be embodied. In this modification, the opening from the outside is indicated at 20 and has the screen 4^a therein corresponding to the screen 4 of Fig. 1. The baffles 5^a are arranged in four series indicated respectively at 21, 22, 23, and 24. These sections are held in place by a suitable frame work of which the upper, central and lower members are indicated conventionally at 26, 25 and 27. The sections 5^a are held in place in the frame work in any suitable manner, for example, by the upright holding members

28 and 29 and the horizontal holding member 30.

The arrangements of the baffles of this modified form of invention is generally similar to that of the modification first described. There are provided a series of diagonally arranged baffles forming zigzag or labyrinthine passages through which the air passes and in which its direction is frequently and abruptly changed so that the particles of dust and dirt carried thereby are brought in contact with the moist surfaces of the baffles, moistened with the adhesive or sticky material.

The means for effecting the introduction of the air is not illustrated, but may be a suction or exhaust fan by means of which the air is either drawn into the room or forced out at another portion of the room. It will be evident that if an exhaust fan is arranged to draw air from the room and force it outside, a corresponding amount of fresh air will be drawn in. In the modification of Figs. 9 and 10, the conduit will convey the purified air to the room or portions of the room desired, and this air may be passed over heating or cooling coils, (not shown) for the purpose of heating it or cooling it, as may be desired. It will be evident that a suitable suction fan (not shown) may be connected to the conduit 31 to bring about the necessary introduction of air through the apparatus.

Inasmuch as the ordinary windows and doors permit a great deal of air to enter thereby, it is important, if the air in the interior is to be kept free from dust and dirt, that the introduction of air through the ordinary means be prevented. It is therefore, important, in motion picture laboratories and like places, to seal the windows so that no air can be introduced therethrough or around the usual window frames. It is also important that any doors leading to the outside should be similarly provided with means that will prevent ingress of unpurified air. It is of course necessary for the fresh air introduced to be ultimately removed in corresponding amount. Such removal may be permitted through the usual doors, in case the air is forced into the room, or it may be removed by specially provided exhaust openings provided for that purpose. Where the air is forced into the room by means of a suitable fan, the natural outflow of the air around any doors will tend to prevent inflow of air from this source.

Instead of introducing air from out of doors through the purifying apparatus above described, air may be in part recirculated from the interior through the purifying apparatus, and the relative amounts of fresh air introduced, and of the air in the room which is recirculated may be regu-

lated and varied. For example, where the air in the room is still dry and is capable of taking up considerable moisture, it may be in part recirculated through the apparatus and admixed with fresh air from the outside. Thus, in winter time, it may be possible to recirculate part of the warm air and thus avoid the necessity for introducing a large amount of cold air. Where the air is to be used for drying there will be a limit beyond which effective drying will not take place and it will accordingly be necessary to introduce sufficient fresh air to enable the air as a whole to perform its intended drying function. In the modification of Figs. 9 and 10 a separate door or opening 32 is provided by means of which access to the apparatus may be had, or air from the interior introduced to combine with air entering through the window 20. When suction is applied to the outlets 31 it will then draw air in part from the outside and in part from the opening 32.

The apparatus of the present invention is adapted for use generally where the purification of air from dust and smoke is of importance. It can thus be used in connection with heating systems where the air during heating is contaminated with smoke or with ashes or other dust which would otherwise be carried into the interior and there deposited.

The apparatus and process of the present invention are similarly available for use in hospitals or laboratories where freedom of the air from dust and smoke particles is of importance.

I claim:

1. An apparatus for purifying air by

separating particles of dust and the like therefrom, comprising a casing and a plurality of frames arranged one behind the other in removable relation therein, each of said frames supporting a plurality of smooth-surfaced baffles diagonally disposed with reference to the frame and adapted to form zigzag passages with the baffles of adjacent frames, said baffles being coated with a material which is adapted to catch and hold particles of dust and the like.

2. An apparatus for purifying air by separating particles of dust and the like therefrom, comprising a casing and a plurality of frames arranged one behind the other in removable relation therein, each of said frames having guides therein to receive a plurality of smooth-surfaced baffles diagonally disposed with reference to the frame and adapted to form zig-zag passages with the baffles of adjacent frames, said baffles being coated with a material which is adapted to catch and hold particles of dust and the like.

3. An apparatus for purifying air by separating the particles of dust and the like therefrom, comprising a casing and a plurality of frames arranged one behind the other in removable relation therein, each of said frames having triangular-shaped side members and a plurality of smooth-surfaced baffles arranged so as to form zig-zag passages with the side members and adjacent baffles, said baffles being coated with a material which is adapted to catch and hold particles of dust and the like.

In testimony whereof I affix my signature.

LOUIS JAMES SAN.