C. G. THROOP.

SPRAYING SYSTEM.

APPLICATION FILED DEC. 17, 1917.

1,305,180.

Patented May 27, 1919.

5 SHEETS—SHEET 1.

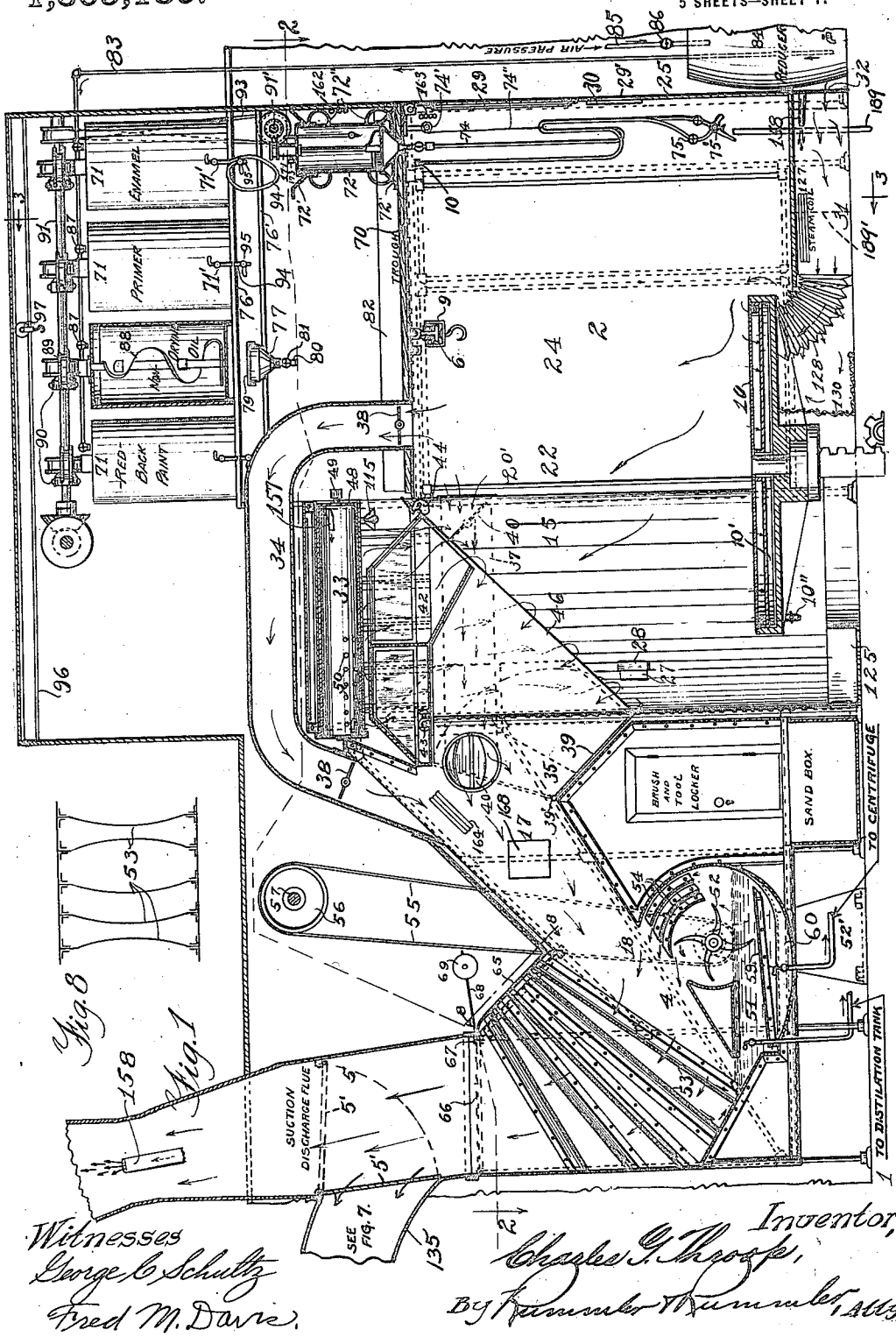


Fig. 8

Fig. 1

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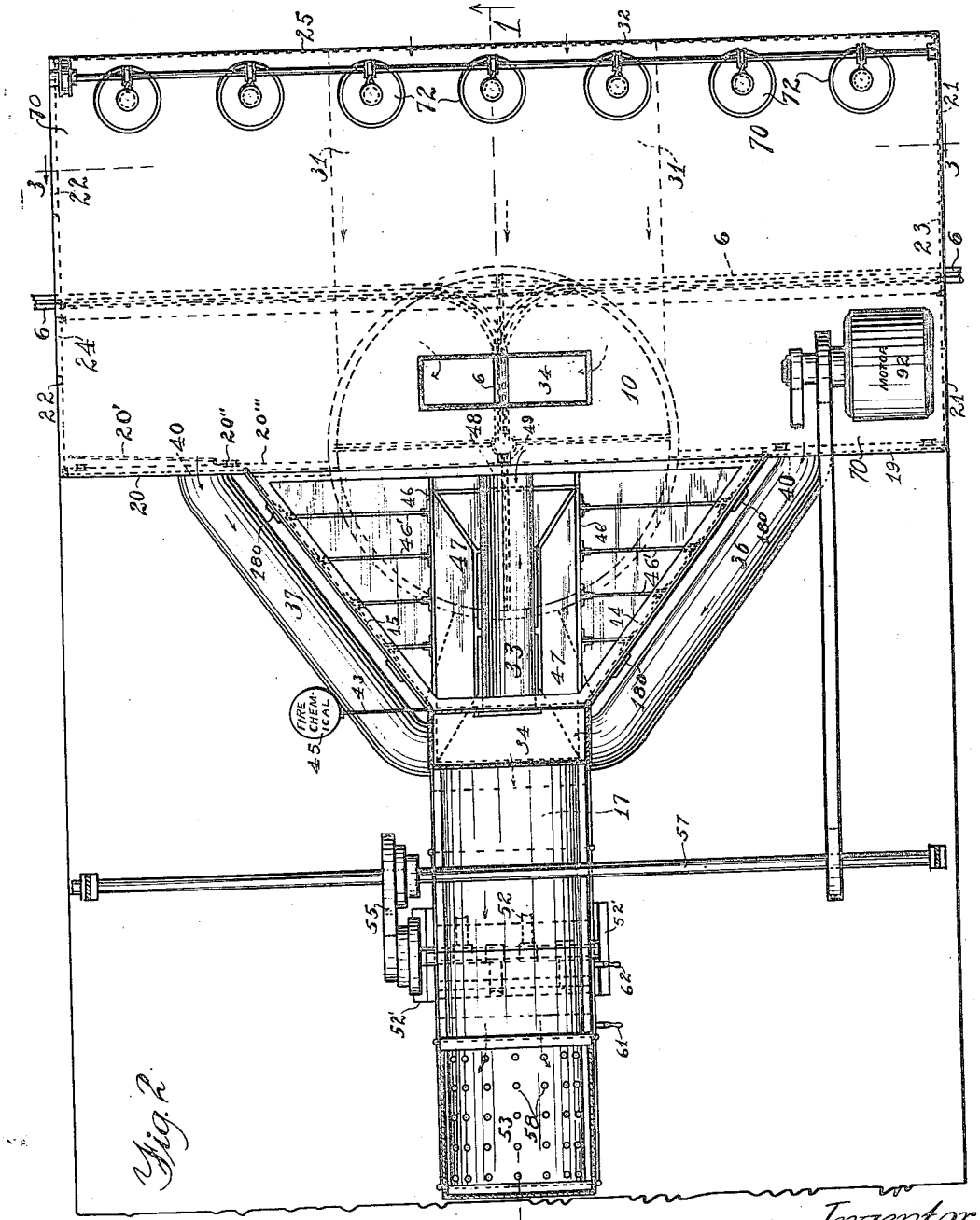


Fig 2.

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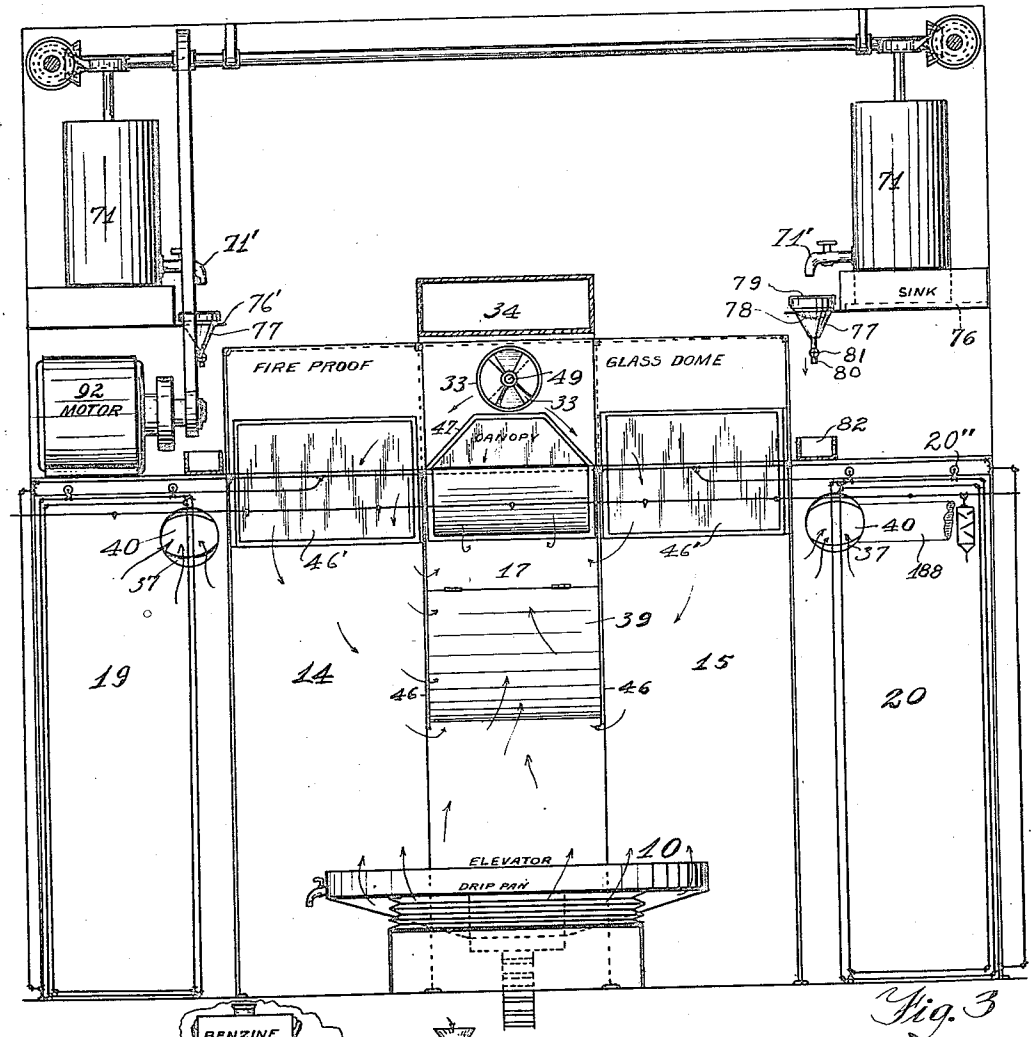


Fig. 3

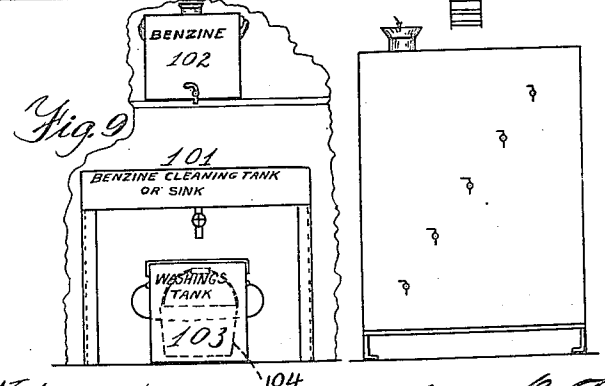


Fig. 9

Fig. 10

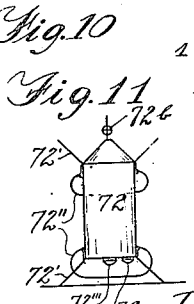
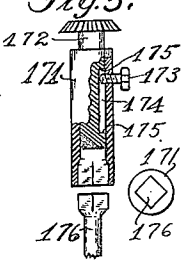


Fig. 11

Fig. 5.



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5 SHEETS—SHEET 4.

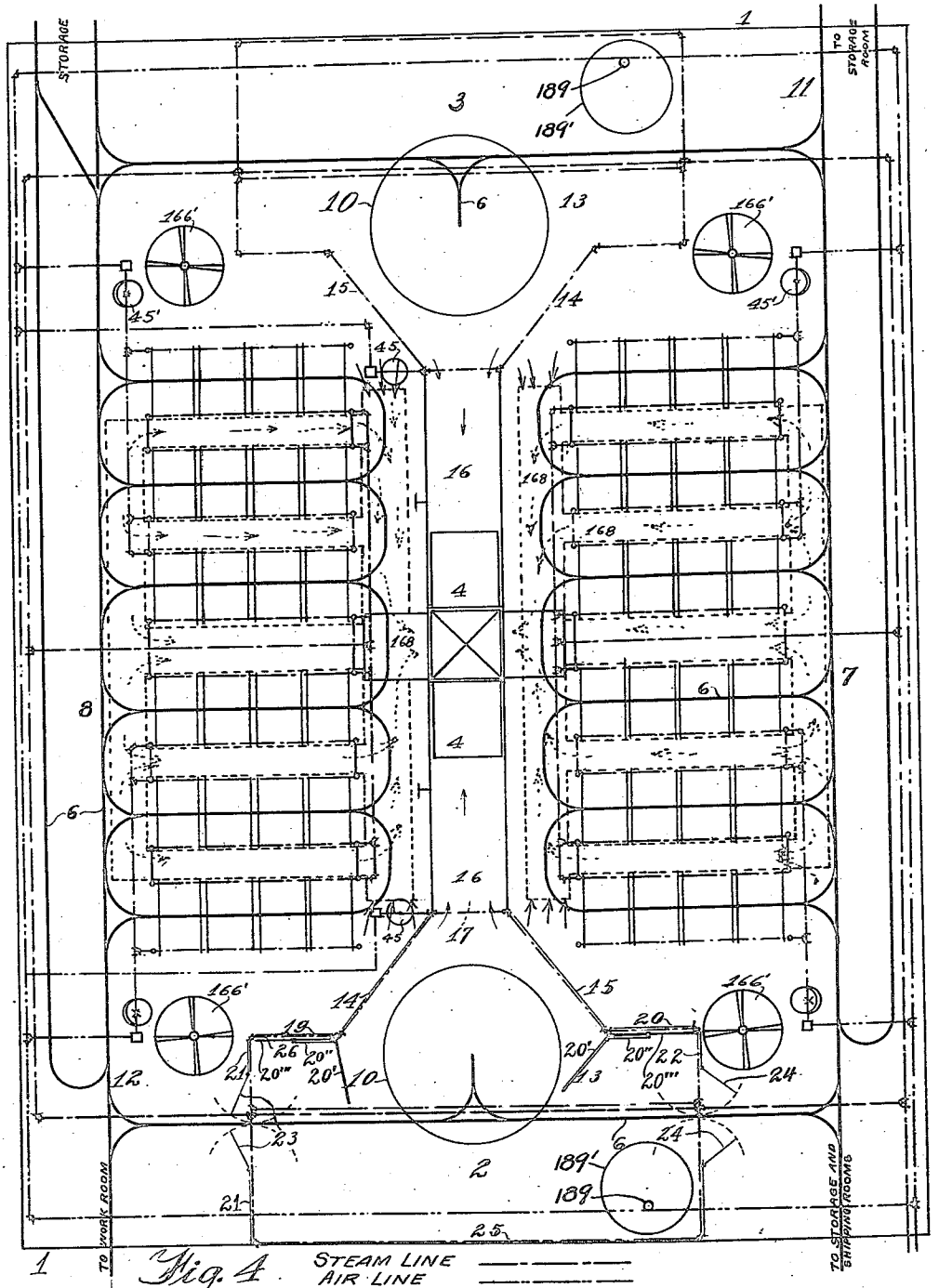


Fig. 4.

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5 SHEETS—SHEET 5.

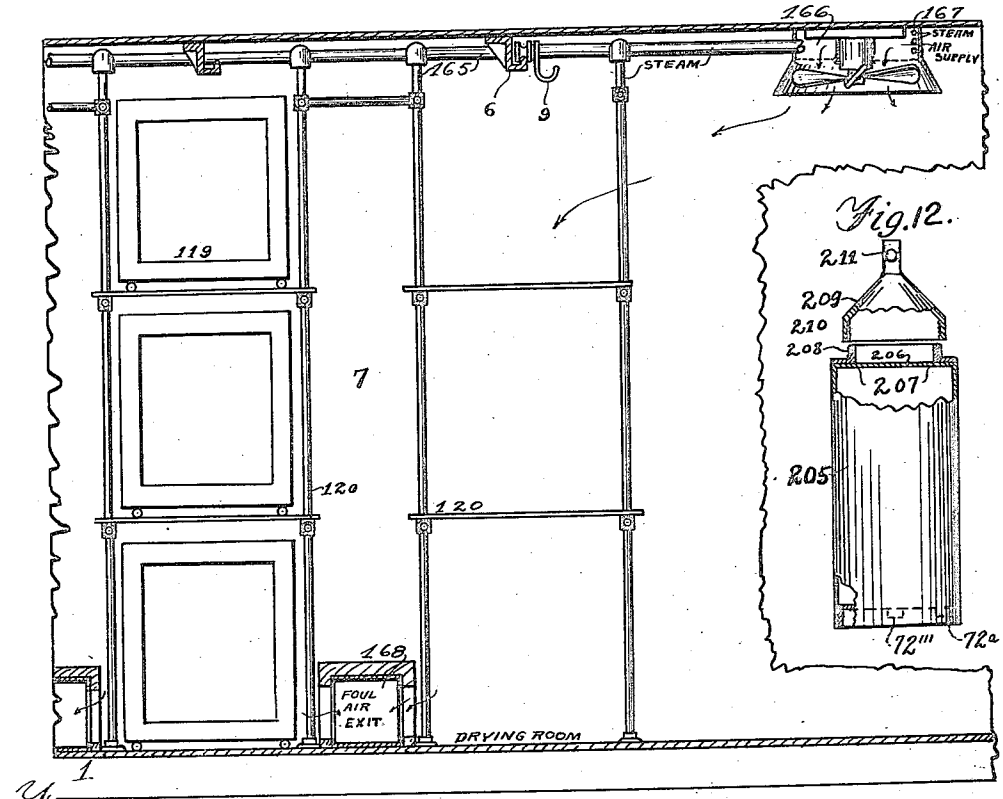


Fig. 6

Fig. 12.

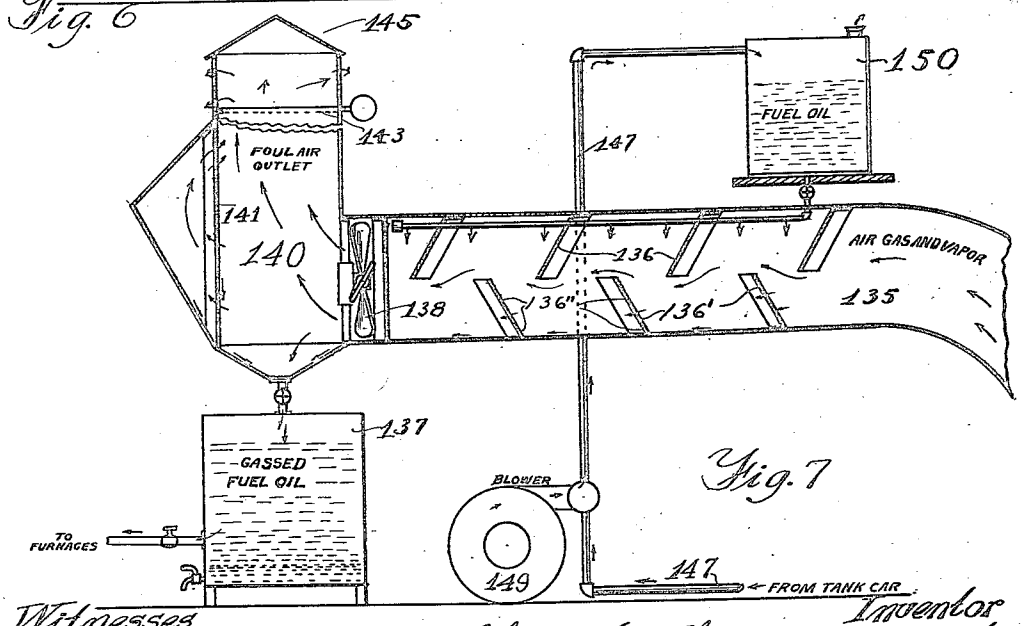


Fig. 7

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UNITED STATES PATENT OFFICE.

CHARLES GRANT THROOP, OF CHICAGO, ILLINOIS.

SPRAYING SYSTEM.

1,305,180. Specification of Letters Patent. Patented May 27, 1919.

Application filed December 17, 1917. Serial No. 207,483.

To all whom it may concern:

Be it known that I, CHARLES GRANT THROOP, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Spraying Systems, of which the following is a specification.

This invention relates mainly to economic methods for paint shops, to methods and means for treating objects with paint, varnish, or other materials as may be required in the form of spray, dust, vapor or the like and for drying or setting the material applied when same is in a liquid form, to means for recovering and utilizing certain products otherwise substantially lost, and to methods and means for efficient handling of the objects to be treated.

Heretofore in certain branches of the art it has been found difficult to properly eliminate and economically dispose of the waste vapors produced in painting and varnishing process, and as a result of such inadequate handling of the vapors serious inconvenience and injury to health has occured to the workmen employed.

In factories for manufacturing furniture, vehicles, aeroplanes, et cetera, it has been customary to handle and convey in various ways the objects to be painted or otherwise treated, and the methods and means for handling such objects and for applying and drying the finishing material used thereon have been but little correlated and the different steps of the processes have usually been substantially independent and unrelated, except as effected by the arbitrary intervention and direction on the part of the workman, and especially when different parts of the work are done on different floors. Moreover there has been very little done toward systematic recovery of materials contained in the ineffective part of the spray, or in the vapors from the drying rooms.

In my booth Patent No. 1,218,718 of March 13, 1917, I showed a certain form of spraying booth and attachments adapted to accomplish certain purposes. My present invention includes with other features a form of booth which is an improvement on and has many advantages over the booth of my said patent.

The main objects of this invention are to combine, harmonize, and unify the successive steps in the process of treating the articles or products to be finished; to provide for efficient routing of the objects treated both for spraying and drying, and also for subsequent coats; to provide means for as far as possible eliminating arduous manual labor; to effect a more uniform and satisfactory result through the process carried out; to render the working conditions of the operators more healthful than heretofore, particularly with respect to elimination of harmful vapors, gases, dust, fumes, et cetera, which are produced both in the paint rooms and spraying chambers and in the drying rooms; to provide improved means for coating objects with paint, varnish, enamel, cement and other materials in liquid or dust form; to provide more efficient means adapted to prevent the gathering and hardening of spray materials on the walls of the booth and passageways; to provide for enriching liquid fuels with gases otherwise wasted into the air; to reduce the fire hazard; to provide means of improved form for controlling the waste vapors which escape past the object treated and into the air incident to spraying methods, and to means for collecting and condensing, or otherwise recovering the spray, solid particles, pigments, vapor and gaseous materials from the air both of the spraying room and the drying room; to provide improved means for so controlling the temperature and humidity as to render the spraying and drying operation most efficient with respect to the objects treated, quality of materials used, and the health of the workmen; to so lighten the manual requirements that whenever necessary women operators may readily handle the work; and to minimize the amount of necessary supervision.

Illustrative embodiments of this invention are shown in the accompanying drawings, in which:

Figure 1 is a vertical section, mainly on or near the line 1—1 of Fig. 2.

Fig. 2 is a plan of the spray booth and accessories shown in Fig. 1, certain upwardly projecting parts being broken away, substantially on the line 2—2 of Fig. 1.

Fig. 3 is a front elevation of the booth and accessories as viewed from the line 3—3 of Figs. 1 and 2.

Fig. 4 is a plan or floor diagram of the

spraying and drying system as a whole, showing a pair of spraying booths arranged in alinement on opposite sides of the discharge flue, with drying rooms disposed symmetrically also on opposite sides, and including a track or routing system for the objects to be treated.

Fig. 5 is a view, partly in axial section, of one of the mixer couplings.

Fig. 6 is a vertical cross section through a part of one of the drying rooms and shows how the painted objects are placed on drying frames, and also shows how the foul air is removed.

Fig. 7 is mainly a vertical section through a discharge flue adapted for removing and recovering certain of the more volatile vapors and gases from the fluid mixture passing from the spraying booth and drying rooms.

Fig. 8 is a top view of the baffle plates as assembled in the discharge flue the cover being removed and the view being taken on the line 8—8 of Fig. 1.

Fig. 9 is a front elevation of one of the washing outfits for cleaning the paint brushes, tubes, mixers, et cetera.

Fig. 10 is a front elevation of a paint, pigment, and oil settling tank having a plurality of taps at different heights for removing liquids of different densities, respectively.

Fig. 11 is a side view of a paint can stood upside down.

Fig. 12 is a view, partly in section, of a can adapted for shipping paint and also for use in the booth.

In the embodiment shown in the floor plan view, Fig. 4, the plant as a whole is designed primarily for a two-coat process, whereby the articles of furniture or other objects to be treated may at one place first be given an initial coat of paint or other material to be applied, whereupon they may be moved forward to a first-coat drying room, and thence to a second spraying point or booth, from whence they may again be moved forward to a second-coat drying room. The equipment provided for this purpose comprises, in a building 1, a pair of spraying booths or rooms 2 and 3 disposed on opposite sides of a common separator 4 having a central discharge gas flue 5 for waste gases et cetera. This plurality of booths or booth spraying compartments combined in one device constitutes substantially a compound booth.

Guide means preferably in the form of an overhead track 6 extend through or past the front part of each of the spraying booths and through the drying rooms 7 and 8, in substantially continuous closed circuit arrangement, whereby suitable trucks or carriers 9 may be routed in succession past or through said booths and through said drying rooms.

Elevators 10 are provided one for each booth whereon the objects may be supported if desired during the spraying process, and whereby the heavier objects may be raised for attachment to the carriers. Additional or supplementary elevators of a suitable size may also be provided wherever they may be most useful, as for instance one at the outlet end of the first drying room, as at 11, and the other at the outlet end of the second drying room, as at 12, for discharging objects treated, according to whether such object is to be treated with one or two coats respectively. Preferably the track 6 leads directly to the various work, storage and shipping rooms et cetera, where suitable elevators or other means may be provided to handle the goods, as will be understood.

The booths 2 and 3 may each be constructed and arranged substantially as shown in the large sectional view of booth 1, shown in Fig. 1. Said booth comprises a normally closed chamber 13 having side walls, two of which are preferably arranged V-shape as shown at 14 and 15 of Fig. 4. The convergent ends of these walls fit against the separator housing 16 containing the flue 17 leading to the separator chamber 18. From the divergent ends of said walls 14 and 15, oppositely extending walls 19 and 20 run a short distance and fit tightly with the oppositely disposed parallel walls 21 and 22 which are provided with doors 23 and 24. Said booth is closed on the opposite side from said convergent walls by a front wall 25, preferably of glass, connecting the outer ends of the walls 21 and 22. The said doors 23 and 24 are mounted to swing readily for opening and closing, preferably being operable by means of the pushing action of the carriers 9 operating on the track 6. Hence suitable springs are provided for said doors, as understood in the art, adapted to urge them yieldingly to their closed position, no latches being required.

The said walls are all of fire-proof material, preferably sheet iron, and are supported on a tubular metal frame 26, the elements of which may be utilized for supplying air, steam, fire-chemical or other material, as may be required, preferably chemical as indicated by the code at the foot of Fig. 4.

Draft inlet apertures 27 are provided in the walls, particularly where they will communicate with the drying rooms and so help dispose of the gases therefrom, shutters 28 being provided to close said apertures when required, as in walls 14 and 15, (see Figs. 1 and 4).

Fresh air for the booth is provided through inlets both at the top and bottom, as well as through the doors 23 and 24 when

open. Suction exhaust means are provided as hereinafter described. The front wall or window part 25 is provided with sliding windows 29 and may also have air inlets 29′ provided with regulators 30. (See Fig. 1.) The bottom entrance is through the conduit 31 provided with a screen or air strainer 32 at its outer end. Said conduit preferably communicates directly with the open air outside of the building. The means provided in the roof for supplying fresh air to the booth is in the form of a flue 33 in a canopy hereinafter described.

Exhaust means are provided in the roof for removing foul air containing waste spray vapors, gases, dust, or other impurities, said means being in the form of a suction flue 34 leading to the flue 17. Air discharging means, namely a port 35, is provided at the back of the booth communicating directly with the flue 17 leading to the separator.

Discharge flues 36 and 37 are also provided at the sides of the booth for removing the foul air laterally and around to the separator flue 17. The several discharge passages are provided with adjustable closures or dampers 38, 39, and 40 respectively, so that the discharge of air may be controlled in accordance with the specific conditions from time to time at the will of the operator. Damper 39 is pivoted at 39′. Air movement or draft is induced mainly by a blower or fan connected to the discharge flue 5, being arranged to cause suction in the booth and in the flues leading to the separator. In case a branch flue is provided as shown in Figs. 1 and 6 it is necessary to supply control means.

The roof canopy or air guide member 42 containing the flue 33 is pivoted at 43, so as to swing down automatically to close the port 35 in case of fire, the front part of said canopy being normally held up by a fuse controlled latch 44.

Fire extinguishing means are operatively connected to the swinging member 42 (see Figs. 2 and 4) whereby lowering of said member will operate the extinguisher. For this purpose a can 45 containing suitable chemicals affected by gravity is mounted coturnably on the pivot shaft 43, which is hollow and has discharge apertures communicating with said can, so that the chemical is automatically squirted into the booth or wherever it may be desired to direct it.

The said canopy (see Fig. 2) is made of fire-proof materials, preferably comprising fire glass set in metal frames, and includes suitable draft guides 47, which are preferably so inclined and joined at the top as to cause the air from the intake tube to be deflected sidewise as it moves downward. On opposite side of the canopy the roof is closed, and downward louvers or guides 46 are disposed one on each side of canopy 42. Said louvers 46 extend from the lower edges of said members 47 downward in triangular shape. Outside of each guide 46 is a series of vertically disposed transverse louvers 46′ arranged to direct the incoming air downward, from whence it is then drawn backward under the inclined forward edges of said guides 47, and into the discharge flue 17 carrying the spray and vapors with it and so preventing deposit on the canopy and windows.

The entrance of air to the canopy flue 33 is controlled by the damper 48 having a handle or turning means 49. The air is distributed from flue 33 through the perforation 50.

In order to permit of adjustable restriction of air entrance way to the actual working area or spray zone over the elevator or support 10, a pair of movable walls or screens in the form of doors 20′ are mounted on sliding wall carriages or trucks 20″ arranged to travel on tracks 20‴ secured to the walls 19 and 20 respectively. Said trucks 20″ may be moved inward toward the elevator 10 or away therefrom. The doors 20′ may be swung back against the booth walls when not needed.

In order to recover such parts of the vapor and gases entering the discharge flue 17 as may be condensed or absorbed by suitable liquids, a separator is provided in or at the lower end of said flue, as illustrated in the lower left hand part of Fig. 1. Said separator comprises a reservoir 51 for liquid and an agitator or paddle wheel 52 therein adapted for splashing the liquid, preferably a non-drying oil, and throwing same up into and across the passage-way, so that the passing gases and vapor may become intimately mixed with the liquid and absorbed thereby. Said wheel 52 is supported on the pillow blocks 52′. The upwardly thrown spray is directed against perforated baffle plates 53 by means of the upwardly curved guide members 54 shown at the upper right hand side of the agitator 52. Said paddle wheel is driven by any constant source of power, as for instance a belt 55 and pulley 56 on the drive shaft 57. The said baffles are in the form of perforated plates, those nearest the paddle wheel having relatively large apertures and the more remote plates having successively smaller apertures respectively, as shown at 58, (see Fig. 2). As the moisture laden air and gases strike the baffle plates the liquids are precipitated thereon together with the pigments or other paint materials et cetera carried by the air, and these materials all trickle down into the settling tank 51. Said tank has a partition 59 near the bottom, same being inclined

somewhat and extending nearly but not wholly across the separator as viewed in Fig. 1.

The heavier liquids and solids settle on the underside and the lighter liquids including non-drying oil being lighter remain on the upper side. The lower compartment 60 is provided with a tap 62, and the main chamber with a tap 61. (Fig. 1). The upper tap 61 may be connected by a pipe 63 to a refining or distilling apparatus, not shown, and the lower tap may lead through a pipe 64 to a centrifuge or other means (not shown) for separating materials of different specific gravity.

The baffle plates 53 are demountably secured slidably and are accessible through the door 65. Above said plates on the discharge is a closure damper 66 in the flue 5. It is pivoted at 67 and has a balance arm 68 and a weight 69 so adjusted that the damper is normally closed by gravity but is readily opened by a slight upward draft in the flue 5.

Centrally located in each booth is one of the elevators 10 adapted to receive the furniture or other goods to be sprayed, said elevator or at least the middle part being adapted to rotate on its axis in order to facilitate manipulating the object supported thereon, so as to provide most ready access to all its parts for applying the spray.

The roof of the booth includes a platform part 70, in front of and beside the canopy 42, adapted to support containers 71 and 72 for the paint, varnish, and other materials to be used for spraying purposes. The smaller containers or cans 72 having braces or legs 72′ and handles 72″, are specially formed to be set in floor apertures 73 and are adapted for attachment of a supply pipe 74 leading to a spray brush 75 suspended from the upper part of the booth below, as by means of spring rollers 74′ and cord 74″. The heavier containers or barrels 71 are to advantage mounted on heavy wall shelves 76, so as to facilitate distributing their contents to the various paint cans or as may be otherwise required.

Wherever paint is used and especially where exposed to the air, particles of dust and other light objects floating in the air or driven by the wind collect in the paint, and moreover there is a tendency for thin hard films or "skins" to form on the surface of the paint, so that any surplus paint must be either thrown away and wasted or else purified. In order to prevent waste of the paint and other materials used a strainer receptacle 77 is mounted on a shelf 76′ adjacent to the supply tanks 71. The receptacle 77 is provided with a strainer which may be composed of suitable fabric 78 suspended on the inside. A tight cover 79 is also provided. The container is preferably funnel-shape and the downward apex is provided with a discharge tube 80 controlled by a valve 81. Whenever a bucketful of paint or any surplus quantity of any such material is to be purified, it is poured into the container 77 where it is strained through the member 78. The outlet 80 may connect directly to a reservoir or the purified paint may be run into buckets, and thence poured into one of the tanks 71. In order to avoid waste a trough 82 is placed under the strainer device 77 and also in line with the faucets 71′ of the supply tanks.

In order to facilitate raising the materials such as paint, oil, et cetera, to the supply tanks 71, a pipe line 83 running past the tops of said tanks extends down to the main floor or to the ground where it communicates with a main source, either a tank-car, barrel 84, or the like, and suitable means as for instance air pressure supplied through a pipe 85 and valve 86, is applied for forcing the liquid up into the corresponding tank or tanks, said pipe 83 being provided with a series of outlet faucets 87 one for each of said tanks.

In order to properly mix the contents of the tank before drawing off any of its contents, and in order to keep it thoroughly mixed during the drawing operation, mixers 88 are provided one for each tank. Said mixers are preferably in the form of rotary spirals disposed coaxially and having suitable gearing 89 at their upper ends controlled by separate clutches 90 which may be thrown into gear at will. Said clutches are arranged for driving said mixers from a common shaft 91 geared or otherwise connected to any suitable source of power, as for instance the motor 92, as will be understood.

In a somewhat similar manner the paint cans 72 are provided with mixers having gearing and clutch means for operation by the power shaft 91′, which may also be operatively connected to said motor. If desired the shafts 91 and 91′ may be provided with pulleys, so as to drive the shaft 91′ by means of a belt 93.

In order to replenish any can 72 from a corresponding supply tank 71, each tank is provided with a flexible tube 94 attached to the nozzle of the faucet 71′, said tube at its free end being provided with another faucet 95. In order to facilitate moving the tanks 71 whenever required, a line of track 96 is arranged over the tank shelf and is supplied with a suitable truck 97 adapted to support a tank.

In operation the various utensils and parts of the apparatus used become more or less coated with the paint or other materials used. Hence in order to facilitate cleaning

the various devices and parts of the equipment used, a washing sink 101 is provided preferably adjacent to the front wall of the booth where the spray brushes, tubes, and other objects may be placed and cleaned. A convenient source of benzin is provided preferably in the form of a tank 102 having a faucet arranged to discharge benzin directly into the sink. The sink is provided with an outlet faucet whereby the contaminated benzin may be drained off into a suitable receptacle 103 beneath the sink from time to time, as for instance at the end of the day after the various utensils have been cleaned.

In order to facilitate separation of the solid materials from the liquid, there is also provided in the vessel 103 an inner receptacle 104 somewhat resembling a pail or basket of sieve-like character fitting removably so that the solid materials collecting therein may be removed from time to time separately from the liquid. In order to facilitate cleaning the various apparatuses on the platform 70 above the booth, a similar sink may to advantage be there installed, as will be understood. In this instance the upper sink is preferably provided with a discharge pipe leading down to the common waste collecting receptacle or tank 103. In this upper sink the paint cans and covers therefor as well as the mixing apparatus may be conveniently cleaned from time to time. A front view of the cleaning tank or sink, together with the benzin supply tank and washing tank, is shown in Fig. 9. The contents of the washing tank may be disposed of from time to time by emptying same into the large settling tank 64 represented by Fig. 10. Said settling tank is provided with a series of outlet faucets arranged at different heights, so as to permit of drawing off liquids of different density which tend to separate upon standing.

Air pipes 110 are provided in and about the booth to supply the spray brushes and to assist wherever desirable in controlling the draft and to effect the operation of certain devices herein elsewhere more fully described. The air pressure may be derived from the blower 41 or from any suitable tank and pump (not shown) as understood in the art.

Ample lighting is provided for during the daytime by means of the glass wall and windows in front of the booth (as shown in Fig. 1) and the glass dome over the upper back part of the booth (as shown in Figs. 1 and 3). This may be supplemented by the artificial spot light 115 shown under the forward end of the air inlet tube 33 (see Fig. 1). This lamp throws a very strong light directly down upon the platform or elevator, well in front of the operator.

The operation of the spraying and drying system as a whole may be described as follows: The objects to be sprayed are brought from the work-room to the initial spraying booth in any manner desired, preferably by means of the conveyer and trolley track, the doors 23 being opened automatically by the conveyer. The goods are then placed on the rotary platform or elevator 10, the automatic control of which either by water, air, gearing, or electricity, as will be understood, is regulated by hand. The goods are then moved forward to the drying room through the doors 24 which also swing automatically. In the drying room said goods 119 are removed from the carriers and placed on the supports or frames 120 provided therefor. When the spray material has thoroughly dried or set, the goods are then moved forward either to a storage room or to the next spraying booth where a second coat of material may be applied. From the second booth the goods may be transferred to a second drying room, and from thence may be sent to a storage or shipping room. The precise routing may of course be varied widely in accordance with local conditions and the particular requirements to be met.

The spray booth operator may adjust the ventilation drafts in accordance with the goods operated upon and other local conditions, by means of the various dampers and the movable partitions or doors 20′. When the goods are in place on the platform 10, the operator selects the spray brush corresponding to the particular material to be applied, as for instance filler material, shellac, paint, varnish, or enamel. Several of these may of course be used on different parts of the same piece of goods or furniture. When the brushes are not in use they are drawn back and raised automatically by the spring rollers 74′. The air and material supply tubes for each brush or spray gun are provided with manual shut-offs or connections, as at 75′.

From time to time the operator sprays the interior of the booth with non-drying oil, whereby the collection and setting of spray materials is prevented. This oil together with the spray materials runs down the sides of the booth and is collected in trays or drip pans 125, made in sections, at the foot of the booth from whence it may be removed to the strainer device 77 shown in the upper right-hand part of Fig. 1, and then placed in a corresponding supply receptacle, or if necessary in a gravity settling tank, such as represented by Fig. 10.

The fresh air entering through the duct 31 under the floor where the operator stands is warmed somewhat by the adjacent steam coil 127 and is distributed beneath the elevator platform by means of the air bag or supplementary strainer 128, and is prevent-

ed from passing directly back under the platform by means of the fabric or shield 130 suspended in front of the elevator raising means, so that the air is caused to rise about the front and side edges of the elevator, from whence it moves upward around and past the goods to be treated and into the discharge suction conduits which lead to the separators 4.

Spray falling on the platform 10 drains down through the perforate top into the chamber 10′ from which it may be removed from time to time, as by means of a tap 10″. Removable drip pans 10‴ may be provided in the space 10′ beneath the perforated top as hereinafter referred to.

In case of fire the fuse control latch 44 causes the air guide member 42 to drop and close the port 35, and thereby release the fire extinguishing material in the can 45. The operator may make his escape instantly by means of the fire pole 189 leading to the floor below through aperture 189′.

Circulation of air in and about the drying room is effected by fans as shown in Figs. 1 and 6. The air in the drying rooms may be adjustably heated by means of steam coils or the like. Humidity may also be supplied.

A further economic provision may to advantage be employed in some instances. As the mixed air and the vapors pass through the separator, the greater part of the recoverable materials are taken out and deposited in the form of liquids, but some of the lighter vapors and gases pass on with the air to the waste flue or chimney. In order that waste may be reduced to a minimum the discharge flue may to advantage be arranged as shown in Fig. 7, whereby fuel oil may be caused to take up or absorb the greater part of the lighter vapors and gases, this being especially advantageous where fuel oil is used in connection with the shop or factory containing the spraying apparatus herein described.

In order that this absorption by the fuel oil may take place efficiently, the air and gas mixture is caused to pass through a flue or branch 135 containing a series of baffles 136 and 136′, the latter being perforated as at 136″, and fuel oil is distributed in small streams along the length of said flue. The oil thus having a large surface area exposed, absorbs the vapors and gases and then flows from the flue into a storage tank 137, from which it may be piped to the furnaces. In order to insure proper draft action, a fan 138 is placed in the flue and arranged to be driven either by a shaft or by an electrical motor, preferably the former in order to avoid danger from sparks, as will be understood in the art, or draft may be induced as in Fig. 1.

The discharge end of the oil gassing flue is provided with an enlargement or chamber 140 having a large baffle plate 141 against which the air is discharged. From this point the flue extends upward to an automatic closure 143 adapted to open by pressure of the air when the device is in operation, said closure being effected by gravity when the air pressure is cut off. The top of the flue is protected by a hood 145.

The fuel oil to be enriched by the foregoing process is caused to flow from a tank car or other source through a pipe 147 by means of a blower 149, whereby the oil is discharged into the tank 150 disposed above the absorption flue so as to feed by gravity from said tank. The blower may be of any suitable form but is preferably of a positive type adapted to produce a very substantial pressure when required. The flue 135 serves as a branch of flue 5, as illustrated in Fig. 1. The draft may be controlled by a damper such as 5′ of Fig. 1.

There are many different forms of draft producing means and it is to be understood that the specific forms herein shown are merely for illustrative purposes. Although common fans and centrifugal blowers are cheaper to install and maintain, there are many advantages in a high pressure system. In order to produce such higher pressures it is usual to furnish what are known commercially as positive rotary blowers. When such a blower is not used, it is preferable to use an ejector type of draft inducer such as illustrated in the upper left-hand part of Fig. 1, where the upwardly pointed air blast nozzle 155 is connected with a source, not shown, of air under high pressure.

When such a source of high pressure is available it is desirable also to install an ejector nozzle 157 in the flue 33 and a similar nozzle 158 in the air supply flue 31, said nozzles being connected to a common source of pressure as will be understood. Additional nozzles of various kinds may also be installed at other points wherever their use may be found advantageous. A further advantage of the high pressure air system is in the form of pneumatic pumping means for liquids shown in Fig. 7, where the oil is raised through the pipe 147 to the tank 150 by means of a jet of air discharging upwardly in said pipe 147.

When a high pressure is available, it is especially advantageous to use same to operate an ejector arranged to take the place of the fan 138 for inducing a draft through the gassing flue.

In order to best control operating conditions in and about the booth, particularly the temperature of the air and the degree of viscosity of the spray materials to be used, it is desirable to supply steam coils or pipes adjacent to the row of supply cans 72, as at 162, and also adjacent to the discharge nozzle and supply tubes, whereby the material

is fed from the cans 72, as at 163, said steam pipes preferably being mounted on the wall as shown in Fig. 1. Steam coils may also be provided at other points in order to maintain the air at the best working temperature for drying, as well as to assist in causing draft. A steam coil 164 in the flue 17 tends to prevent condensation prematurely and helps insure due passage of the vapors to the separator 4. Steam pipes and coils 165 are also provided in the drying rooms and also in the air supply duct 166, as shown at 167 in Fig. 6, where fans 166′ are provided to urge the air forward and promote circulation. The foul air from the drying rooms is carried by the discharge flues 168 leading to the separator 4.

In case a separator, such as represented in the lower left-hand part of Fig. 1, is not used the spray vapors and the air from the drying rooms may be conducted directly through the fuel gassing flue 135 shown in Fig. 7. This flue and the chamber 140 are adapted to very effectually separate the heavier materials, such as pigments and gums, which will be carried downward with the oil into the tank 137 where they will settle and may be drawn off through the faucet there shown.

In order to best facilitate interchangeability of material cans 72 a coupling 171, such as shown in Fig. 5, is provided adapted to slide up and down on the upper driving shaft 172, a set screw 173 being supplied therefor the latter being arranged to travel in the slot 174 having stops 175 at each end. The lower end of the sleeve 171 and the upper end of the mixing can shaft 176 are formed for mutual engagement by a suitably formed cup and plunger head, preferably formed square so as to insure coturning when engaged.

The platform for supporting the goods to be treated in the booth may be either stationary or in the form of an elevator, perforations being provided therein to drain off the spray material, non-drying oil, and other fluids which would otherwise tend to collect thereon, and the chamber 10′ may be provided with interchangeable sectional drip pans, which may from time to time be emptied into the gravity tank of Fig. 10.

The drip pans 125 fit snugly against the walls to catch all liquids and solids arrested thereby, and may be variously formed in accordance with the particular shape and style of booth used. Said pans are made in sections to facilitate handling. In Fig. 2 said pans are provided with handles represented by the numerals 180.

If the incoming air is free from dust the bag 128 may be omitted, though it assists somewhat in diffusing the air and letting it into the booth more gently.

Although the frame of the booth is made preferably of tubular materials in order to facilitate distribution of steam, fire chemicals, air, and other fluids, it may in some instances be preferable to use ordinary structural materials and to run the fluid supply pipes independently of the booth structure, as will be understood.

Access may be had to the platform 70 from the floor below, by means of an elevator, ladder, or stairway (not shown), as will be understood.

In order to facilitate shipment of spray materials, and more particularly when such materials are desired in smaller quantities than barrel lots, the supply cans 72 may be replaced by the shipping cans 205, shown in Fig. 12. Said cans 205 may be substantially like the can 72, except as to the funnel-shaped end. In order that the cans may be sealed tightly as usual for shipping paint in cans, the upper end as viewed in Fig. 15 may be sealed tightly at 206, the middle part being adapted for cutting out along a circular line as at 207. The said upper end is provided with a threaded cylindrical flange 208 adapted to receive the funnel-shaped cover member 209, which is provided with a cylindrical flange 210 correspondingly threaded to engage the flange 208. The apex of the funnel part is formed and provided with a valve 211, substantially as shown on the cans 72. When the can 205 is received, the conical part 209 is unscrewed and the closure part 206 is removed by means of a knife or other can opener. In some instances it will be preferable to omit the conical part 209 from the cans in shipping, and use the same funnel member for all of the cans 205 when the same are to be placed in position for use as shown in Fig. 1.

Referring to Fig. 4 it will be seen that the booth 2 is substantially an inclosed booth being provided with walls on all sides and with doors which are normally closed. This feature is advantageous, particularly in combination with the system of draft control hereinbefore described. It permits of definite and positive control of the circulation of air through the booth and the proper removal of the spray and gases.

Another point of advantage in the system above described, particularly relating to the means for cleaning the walls and recovery of materials, is the substantially complete elimination of all cotton waste and rags in and about the booth and consequent elimination of the serious fire hazard which always accompanies waste materials of the character referred to when saturated with paints and oils. Whenever the walls are cleaned the non-drying oil is first sprayed thereon, and then a window cleaner or the like, made preferably of fabric or leather, is applied for thoroughly removing any of the material that does not run down freely of its own ac-

cord. Said cleaners or any bits of cloth that may be used in or about the booth may be readily washed in the benzin tank shown in Fig. 9, and then hung up in the booth over night, whereupon they will be entirely clean and dry ready for subsequent use the next day. This washing of the cloths or rags saves the waste of paint materials as well as the cloths themselves, which ordinarily go to the scrap heap as soon as used.

There is a suitable form of non-drying oil on the market known commercially as "bloomless spindle oil" that resembles light lubricating oil of rather thin character, but is not volatile.

Although several embodiments of this invention are herein shown and described it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined by the following claims.

I claim:

1. A spraying and drying system for paints and other materials, comprising a spraying booth and a drying room communicating with each other, common discharge draft means for removing the spray and vapor from said booth and room, and means in the path of the discharge draft for collecting said spray and vapor and condensing same or such parts thereof as are capable of recovery.

2. In combination a spraying booth, a drying room, and a condensation chamber, flues extending from said booth and room to said chamber, and means for propelling the spray and vapor laden air from said booth and room into said chamber through said flues, means being provided in said chamber adapted to separate the spray and other matter from the air.

3. In combination a spraying booth, a drying room, and a condensation chamber, flues extending from said booth and room to said chamber, and means for propelling the spray and vapor from said booth and room into said chamber through said flues, said means including a fan or the like disposed on the outlet side of said chamber and arranged to produce suction whereby the vapor laden air may be drawn from the booth and drying room into and through said chamber.

4. In a system of the character described, a spraying booth, a drying room, and a condensation chamber, means for transmitting air and vapor from said booth and room to said chamber, and means for regulating the temperature of said booth and room respectively.

5. A spraying and drying system, comprising a spraying booth in combination with a drying room, separating means adapted for extracting such vapors and gases as may be condensed or liquefied from the mixed air and vapors produced in the booth and drying room, and means for conducting said mixture to said separating means.

6. A compound spraying booth having a plurality of spraying chambers and a common discharge flue for the vapors, in combination with a drying room and a guideway, and truck means adapted for conveying objects to be treated in succession from one booth compartment to another through said drying room.

7. A compound spraying booth having a plurality of spraying chambers, a common discharge flue and separator for the vapors generated in said chambers, a drying room for each of said chambers, a continuous track extending through said chambers and said drying rooms, conveying means adapted to travel on said track, and means for loading and unloading said conveyers.

8. The combination of a spraying booth, a platform or support for the goods to be treated, a draft supply flue leading to the under side of said platform, and means to draw away the air as it becomes fouled with vapor.

9. The combination of a spraying booth, a platform or support for the goods to be treated, a draft supply flue leading to the under side of said platform, a bag-like strainer for said flue, and means to prevent escape of the air backward under the platform.

10. A spraying booth having back and side walls, a discharge flue in its back wall and lateral discharge flues in its side walls, said flues all being convergent and joined to a common vent, and dampers for each of said flues respectively, whereby the draft may be regulated according to the variable position of the operator.

11. A spraying booth having a roof part, an air inlet flue in said roof part, said roof part having downwardly projecting guide means beneath said flue and adapted and arranged for distributing the air outward and downward, and a draft passage in the back of the booth for removing the air.

12. A spraying booth having a discharge draft passage in its back part, means for supplying air to the upper part, and means for guiding the air supply downward laterally on opposite sides of the draft passage and somewhat forward, whereby fresh air may be supplied to the operator and the surplus spray may be removed from the booth.

13. In a system of the character described, a spraying booth in combination with a reservoir for material to be sprayed, automatic mixing means therefor, and a source of power communicating therewith.

14. In a system of the character described, a spraying booth in combination with a

reservoir for material to be sprayed, automatic mixing means therefor, a source of power communicating therewith, and a clutch therefor.

15. In a system of the character described, a spraying booth in combination with a reservoir from which material may be taken for use, a dispensing receptacle for the material to be used, and a straining receiver for purifying the remainder of materials coming from said receptacle so that same may be returned to said reservoir.

16. In a system of the character described, a spraying booth provided with an elevated platform in combination with a shelf disposed above said platform, a supply tank thereon having a faucet for drawing off material, a strainer receptacle mounted on said shelf whereby materials may be purified, and means for drawing off purified material from said receptacle for return to said tank.

17. In a system of the character described, a spraying booth provided with a platform, a reservoir above said platform, a source of spray material below said platform, and pneumatic means for running said material up to said reservoir automatically.

18. In a system of the character described, a spraying booth provided with a track, a truck thereon, and a shelf beneath said track whereon reservoirs or tanks of spray material may be deposited by said truck.

19. A device of the character described, comprising a separator for mixed air and vapor, a forked discharge flue for said separator, and means for directing the discharge into either of the branches of said flue, one of said branches having means for mingling the gaseous contents thereof with fuel oil whereby the latter may absorb some of the gases.

20. In a device of the character described, a spray booth, and a discharge flue for removing the mixed air and vapor, said flue having a part fitted with an oil supply pipe and being adapted for mingling oil along its length with the contents of the flue whereby the oil may become enriched by the absorption of such vapors and gaseous matter as may be discharged through said flue.

21. In a device of the character described, a discharge flue for mixed air, gas, and vapor, in combination with a source of fuel oil, means for distributing the oil in finely divided particles along the length of said flue, a series of baffles arranged to retard the flow of gaseous material whereby the oil may come into intimate contact with and absorb such part of the gas and vapor as may be readily taken up thereby, and means for collecting the enriched oil which may then be used for fuel.

22. In a spraying system, a support for the object to be sprayed, means on one side of said support opposite from the operator for withdrawing air and surplus vapor, a platform disposed over said support and extending backward over the operator, a plurality of supply receptacles mounted on said platform, a plurality of spray brushes corresponding with said receptacles respectively and disposed thereunder in accessible position for the spray operator, and means for the operator to gain access to said platform.

23. In a spraying system, a support for the object to be sprayed, means on one side of said support opposite from the operator for withdrawing air and surplus vapor, a platform disposed over said support and extending backward over the operator, a plurality of supply receptacles mounted on said platform, a plurality of spray brushes corresponding with said receptacles respectively and disposed thereunder in accessible position for the spray operator, and means for the operator to gain access to said platform, the spray and air removing means including a suction member opening downward through said platform above the spraying space and suction means disposed back of said support.

24. A spraying booth, having walls in combination with swinging doors slidably mounted on said walls whereby the effective size of the operating part of the booth may be adjusted.

25. A spraying booth closed on one side, air outlet means on the closed side, swinging doors adapted and arranged for varying the degree of closure on the opposite side, said doors being provided with movable supports, and guides for said supports whereby the doors may be moved bodily either convergently or divergently.

26. A spraying booth having a wall part, a draft passage in said wall part, a swinging door mounted substantially on or adjacent to said wall part, and means for sliding the hinge part of the door horizontally for varying the position of the door bodily.

27. A spraying booth for treating goods with spray, a source of spray material to be applied to the goods, a source of non-drying oil, and means for spraying said material and oil within the booth, whereby the latter may be used as a wash to remove the former.

28. A safety spraying booth of the character described, having a hole in the floor and a fire pole therein down which the operator may quickly slide in case of fire.

29. In a system of the character described, a spraying booth and a drying room having in common a plurality of shiftable walls adapted to change the relative size of said booth and room.

30. In a system of the character described,

a spraying booth provided with a platform, a reservoir above said platform, a source of spray material below said platform, a dispensing container on said platform below the level of said reservoir, gravity means for replenishing said container from said reservoir, and pneumatic means for running said material up to said reservoir automatically.

31. A spraying booth having a support for the goods to be sprayed, said support including a perforated top through which spray material may pass by gravity, and a removable drip pan positioned beneath said top to receive said surplus material.

Signed at Chicago this 11th day of Dec., 1917.

CHARLES GRANT THROOP.