A. N. BLAKENEY.

DRYING OVEN.

APPLICATION FILED AUG. 2, 1918.

1,308,837.

Patented July 8, 1919.

4 SHEETS—SHEET 1.

Fig. 2.

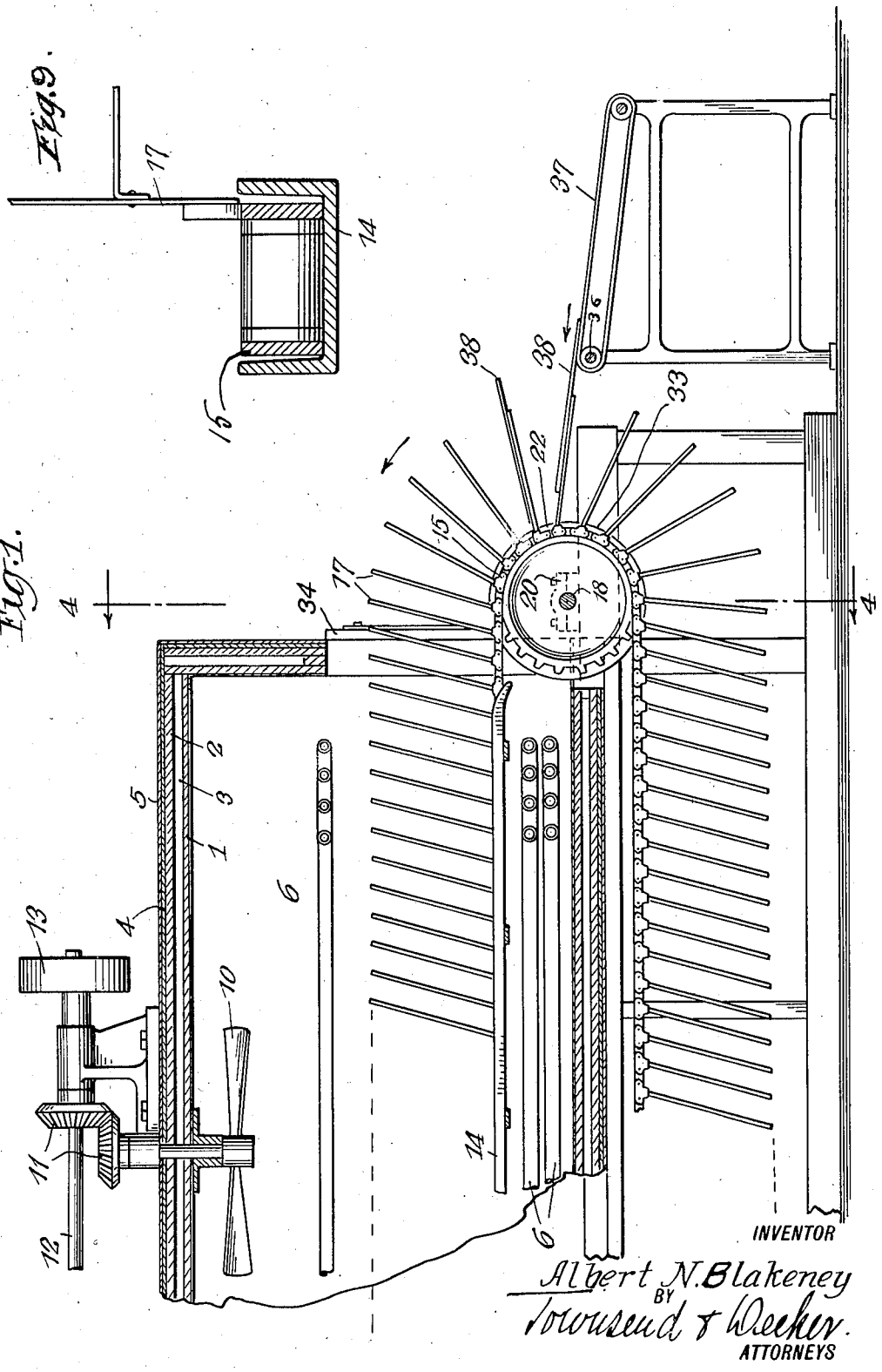


Fig. 1.

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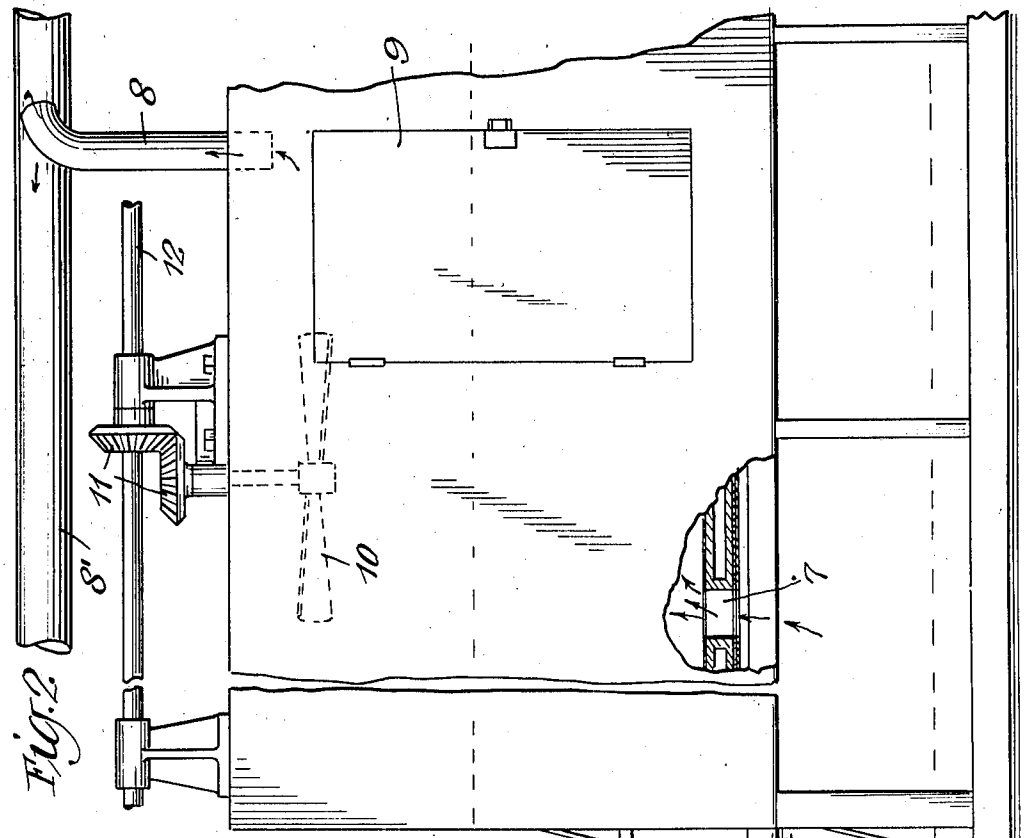
DRYING OVEN.

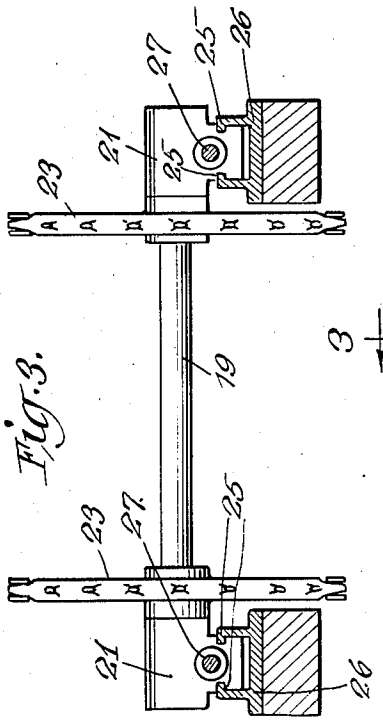
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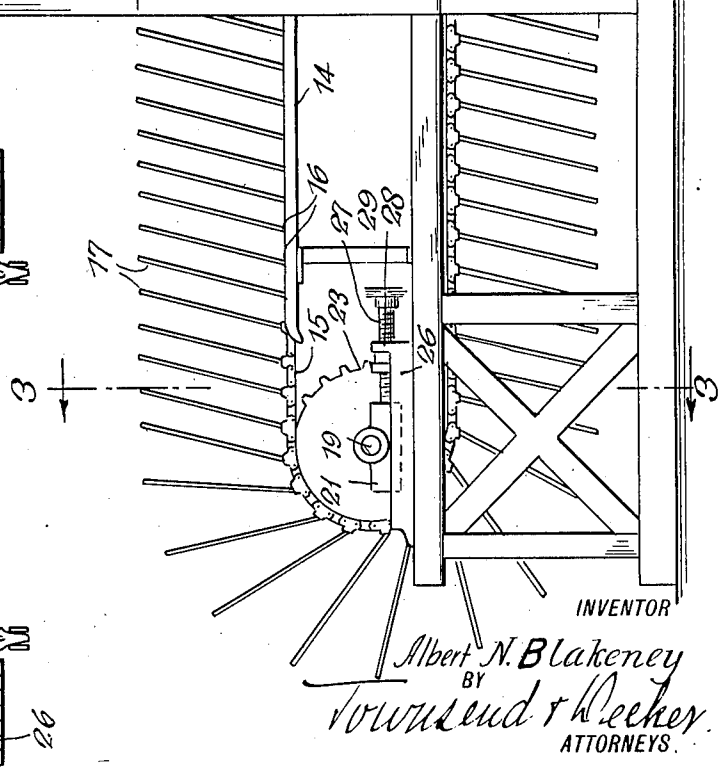
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4 SHEETS—SHEET 2.







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4 SHEETS—SHEET 3.

Fig. 5.

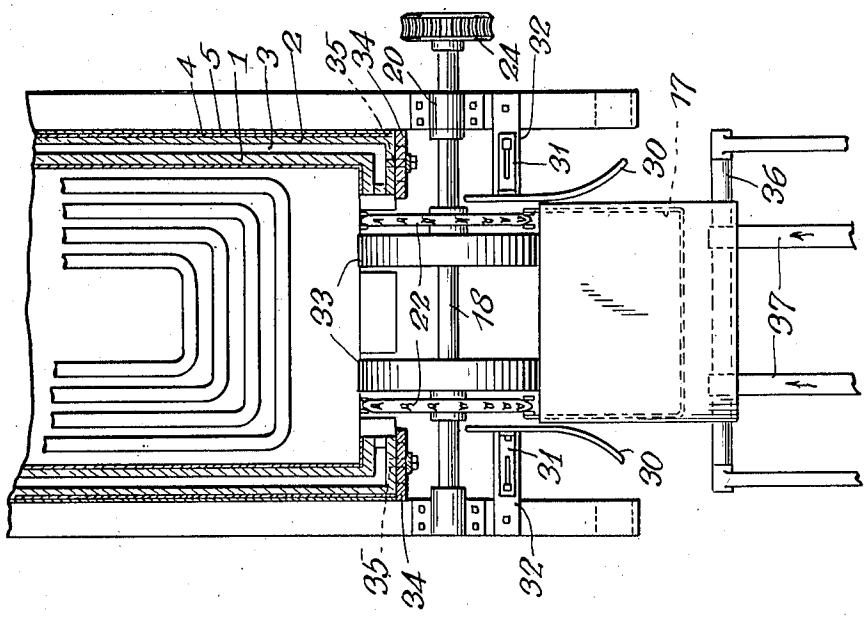
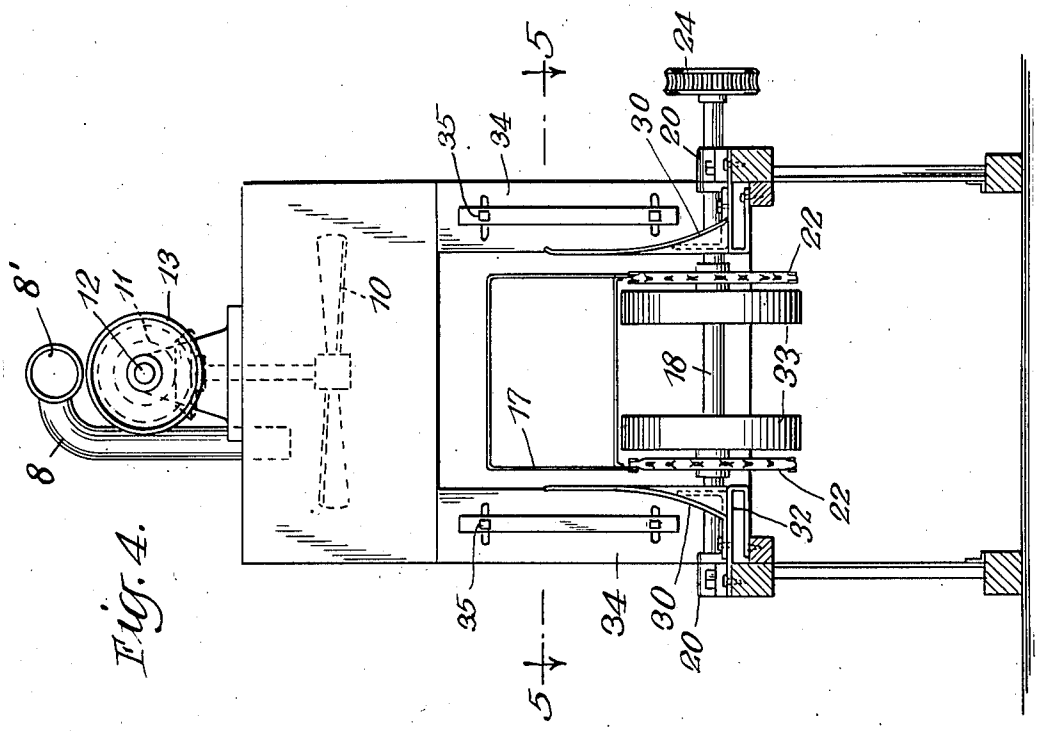


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 8

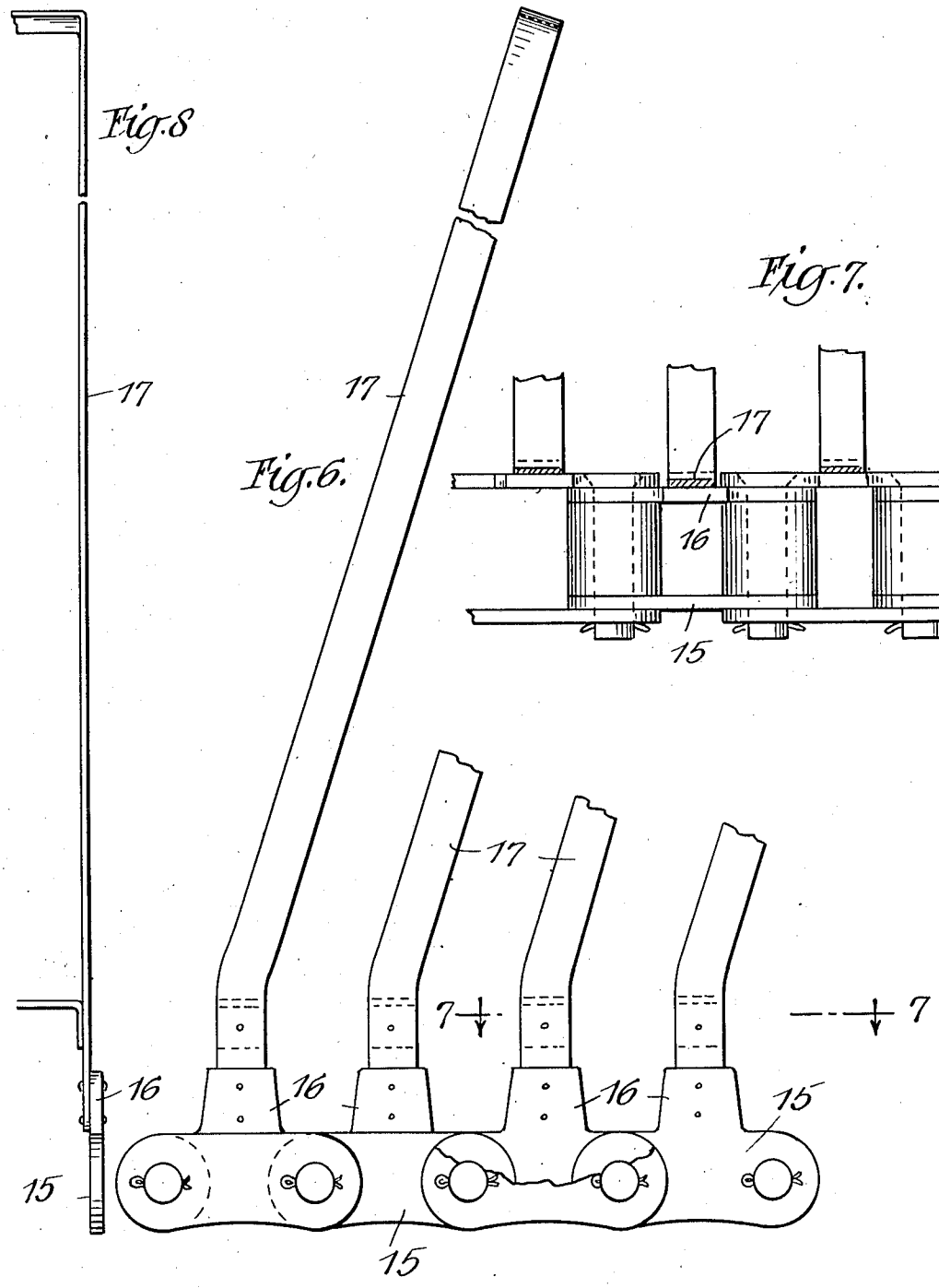


Fig. 6.

Fig. 7.

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UNITED STATES PATENT OFFICE.

ALBERT N. BLAKENEY, OF BROOKLYN, NEW YORK, ASSIGNOR TO METAL PACKAGE CORPORATION OF NEW YORK, OF BROOKLYN, NEW YORK, A CORPORATION OF NEW YORK.

DRYING-OVEN.

1,308,837. Specification of Letters Patent. Patented July 8, 1919.

Application filed August 2, 1918. Serial No. 247,922.

To all whom it may concern:

Be it known that I, ALBERT N. BLAKENEY, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Drying-Ovens, of which the following is a specification.

My invention relates to drying ovens and more particularly to ovens for drying the wet lithographing material which has been applied to tin or other metallic sheets.

The object of my invention is the production of an oven of simple construction which shall effectively and expeditiously perform its drying function without mutilation or defacement of the sheets fed therein or of the lithographing material applied to the sheets.

A further object of the invention is the production of an oven having the above characteristics and which shall also be supplied with various adjustable and other time and labor-saving devices making for the efficient and easy operation of the oven.

Other and further objects of the invention will appear from the subjoined description, the invention consisting in the various parts and combinations of parts hereinafter more particularly described and then specified in the claims.

The usual process or manner of drying lithographed tin sheets is as follows:

The sheets are fed into a machine which applies the lithographing material thereto and deposits the sheets on a plate, after which they are removed manually and placed one at a time in a rack adapted to hold a plurality of the sheets. The rack, when filled, is then rolled into an oven suitably heated and it is allowed to remain therein until the lithographing material is dry. If the sheets are to be covered with a material of two or more colors, inasmuch as the colors can be applied only one at a time and a second color cannot be applied until after the first has dried, the rack, after the lithographing material of one color is dry, is rolled from within the oven, the sheets are removed therefrom manually and fed into the machine to receive the next color of lithographing material and the whole operation is repeated. The objections to this method of drying are the time it entails, the labor it requires with its consequent expense and the large amount of heat necessary inasmuch as when the door to the oven is opened to place therein or remove therefrom the rack for carrying the plates, a large amount of heat in the oven escapes and, moreover, the cooled rack itself, which is of large size, absorbs a large amount of heat which is entirely wasted. It is to obviate these objections as well as others that I have devised my present invention.

A practical embodiment of my invention is illustrated in the accompanying drawings in which:

Figure 1 is a central horizontal section through my improved oven at the feed end thereof.

Fig. 2 is a side elevation at the delivery end of the oven.

Fig. 3 is an enlarged transverse vertical section on the line 3—3 of Fig 2.

Fig. 4 is an end view of the feed end of the oven taken on the line 4—4 of Fig. 1.

Fig. 5 is a horizontal section on the line 5—5 of Fig. 4.

Fig. 6 is an enlarged side elevation of the endless carrier.

Fig. 7 is a horizontal section on the line 7—7 of Fig. 6.

Fig. 8 is an enlarged front elevation of a part of the endless carrier.

Fig. 9 is a horizontal section taken through a part of the endless carrier and the track on which it runs.

Referring more particularly to the several figures of the drawings:

The oven proper is supported at a certain distance above the floor by a suitable framework or scaffolding as illustrated and it consists preferably of a greatly elongated rectangular-shaped closure with openings at either end thereof, all of the walls of said closure and the roof and base thereof comprising two parallel layers or walls of wood 1 and 2 separated by a space of dead air 3, said outer layer or wall of wood 2 being covered with asbestos 4 and a sheet of tin 5 covering the asbestos 4. I find in practice that walls of this construction particularly because of the dead air space 3 act as a very poor conductor and absorbent of heat and make for the efficient and economi-

cal operation of the device as a large portion of the heat is retained in the oven. Preferably also the scaffolding which supports the oven proper is inclosed within walls similar in construction to the walls of the oven, the interior of the device and its operation being hidden from view.

Extending longitudinally through the oven for heating the same are a plurality of rows of steam-pipes 6 preferably three rows in number, two of which are arranged and held, one over the other, a slight distance above the floor or base of the oven and the other row is suspended or held in any desirable manner a certain distance below the roof or top of the oven so that the endless carrier carrying the sheets or plates to be dried passes between the upper row of steam-pipes and the lower rows as illustrated in Fig. 1.

At various intervals in the floor or base of the oven I have provided inlet ports 7 (see Fig. 2) adapted to allow fresh air to enter therein and I also have provided at intervals in the roof or top outlet pipes 8 connected with a common main outlet pipe 8′ through which the gases and foul air may escape. These inlet ports and outlet pipes may be supplied with valves adapted to regulate the amount of air passing therethrough if so desired. I have found in practice that the changing of the air in the oven is necessary as the lithographing material, when subjected to heat, emits gases which are objectionable to the sense of smell and injurious to the health and which also deface and discolor the lithographing material if they are not allowed to escape from the oven. I have also provided doors 9 at various intervals in one or both of the side walls of the oven which are preferably constructed in the same manner as the side walls themselves, and which permit access to the oven for repairs or for other purposes.

To agitate the air in the oven and assist materially the drying operation I have provided a series of fans 10 suspended from the top of the oven and connected by the bevel gears 11 to a common shaft 12 to which motion is transmitted by means of pulleys 13 and belts (not shown) engaging the same or in any other desirable manner.

Extending longitudinally through the oven and protruding beyond the delivery end thereof for a certain distance, (Fig. 2) are U-shaped tracks 14 suspended or held in any desirable manner and within which the chain portions of the endless carrier are adapted to travel and to be supported thereby. The said endless carrier comprises two endless chains 15 with lugs 16 riveted or otherwise secured to the inner side of each of the links thereof intermediate the ends of said links and equidistant therefrom and rectangular-shaped skeleton frames 17 having the lower ends of their vertical arms fastened to the lugs 16 in any desired manner.

At the feed and delivery ends of the oven are horizontal shafts 18 and 19 which are journaled respectively in suitable bearings 20 and 21. Each of said shafts 18 and 19 have fixed thereto the sprockets 22 and 23 respectively which engage the chain portions 15 of the endless carrier over which sprockets the chain portions travel. Shaft 18 is provided at its end preferably with a worm wheel 24 for engagement with a suitable screw or worm (not shown) which is connected with any source of motion transmitting power in order to rotate the shaft 18, thereby causing the endless carrier to travel through the oven in an obvious manner. As is manifest, shaft 19 could be rotated instead of shaft 18 to accomplish the same result.

To regulate tautness in the chain portion 15 of the endless carrier I have provided the bases of the bearings 21 (Fig. 3) with shoulders adapted to engage flanges 25 on the channeled supporting-blocks 26 for the bearings, the said bearings being adapted to be moved longitudinally in said channeled supporting-blocks by means of the screw-threaded shafts 27 whose ends engage said bearings 21, said shafts 27 being supported by and engaging the interiorly-threaded bearings 28 and being provided with operating handles 29 for effecting adjustment of the position of the bearings and consequently slackening or tightening the chains 15.

30 indicate horizontally adjustable vertical guides having outwardly flaring ends and adapted to properly position and straighten if necessary the lithographed sheets when they are fed to the endless carrier before entering the oven. Said guides are provided with slotted horizontal holding pieces 31 resting on supporting plates 32 which are provided with screw-threaded pins extending through the slots in the holding pieces 31, said pins being adapted to receive nuts on the screw-threaded ends thereof. Obviously by this arrangement the guides may be moved horizontally to any desired position depending on the width of the sheets which are to be dried and they may then be made fast in the desired position.

Made fast to the shaft 18 intermediate the sprockets 22 are the wooden pulleys 33 against which the lithographed tin sheets abut when they are fed to the endless carrier. These pulleys of necessity must be of larger diameter than the sprockets 22 otherwise the sheets would contact directly with the metal sprockets and they would be apt

to become damaged or bent. It is to avoid injury to the metal sheets that the wooden pulleys have been provided.

34 indicate horizontally slidable adjustable doors at either end of the oven and which are provided with suitable horizontal slots as indicated, through which extend screw-threaded pins fastened to the rear wall of the oven, the ends of said pins being adapted to receive nuts so the doors may be placed in the positions desired and then held fast by means of the nuts. Thus the size of the openings at the ends of the oven may be adjusted depending on the width of the lithographed sheets which are to be carried therethrough.

The operation of my improved drying oven is as follows:

The lithographing machine is placed directly in front of the feed end of the oven but at a certain distance therefrom and a feeding device is placed intermediate the feed end of the oven and the lithographing machine and adjacent each of them. The feeding device consists of a rectangular frame supported in any desired manner and having two rollers 36 journaled in suitable bearings at either end thereof with endless belts 37 passing over said rollers 36. Motion from any suitable source is transmitted to said rollers 36 to cause them to rotate thereby causing a travel of the endles belts 37 over the rollers and around the frame, as is apparent. The lithographed sheets 38 are fed directly one by one from the lithographing machine onto the endless belts 37 and carried thereby directly into contact with the wooden pulleys 33, the guides 30 positioning them properly if they are not already in position. Each sheet is supported between two of the skeleton frames 17, the lower edge of the sheet slipping gradually on to the chain portion 15 of the endless carrier after leaving the wooden pulleys 33. The speed of the shaft 18 is so regulated as to cause a slow, steady and uniform travel of the endless carrier supporting the lithographed sheets through the oven, so that with the intense heat in the oven and because of the agitation of the hot air therein the lithographing material on the sheets has become perfectly dry after they have reached the delivery end of the oven. As is illustrated in Fig. 2, the endless carrier and the supporting tracks 14 extend for some distance outside of the delivery end of the oven. This is to give the heated sheets an opportunity to cool before they are removed from the carrier.

It is obvious from the foregoing description that little heat from the oven is lost through its escape or by radiation, so a large amount of expense for fuel is saved. The endless carrier with its skeleton frames contains a very small heat-absorbing surface and only a part of the same leaves the oven at one time and then for only a limited period of time, so that that part has not had an opportunity to lose all its heat before it has again entered the oven. Also the various adjustable and automatic features described conduce to a very efficient type of oven and make it unnecessary for the sheets to be handled after they have been fed into the lithographing machine until after they have been received at the delivery end of the oven.

What I claim as my invention is:

1. In a drying oven, a closure having an opening in either end thereof, a U-shaped track extending through said closure and openings, a carrier adapted to travel on and be supported by said track and to carry thereon the objects to be dried, means for heating said closure, means for circulating the air therein and an inlet port and outlet pipe independent of the aforesaid openings and connecting with said closure for allowing air to flow in and escape respectively from the same.

2. In a drying oven, a closure having double walls with a free space containing dead air therebetween and provided with an opening in either end thereof, a U-shaped track extending through said closure, an endless carrier for holding and carrying thereon the objects to be dried and adapted to travel on said track and through the closure and said openings and means for heating the closure.

3. In a drying oven, a closure having an opening in either end thereof, means for heating said closure, a U-shaped track, and an endless carrier adapted to pass through said openings and said closure and on said track and to carry the objects to be dried, said U-shaped track extending through said closure and terminating at a point remote from the delivery end thereof to permit the dried objects to cool before their removal from the endless carrier.

4. In an oven for drying lithographed tin sheets, a heated closure having double walls with a free space containing dead air therebetween and provided with an opening at either end thereof, a double track extending longitudinally through said closure and an endless carrier adapted to travel on and be supported by said track, said endless carrier comprising chains connected by a plurality of frames between which the lithographed sheets are loosely held.

5. In an oven for drying lithographed tin sheets, a closure having an opening at either end thereof, a plurality of steam pipes extending longitudinally through said closure for heating the same, a carrier for carrying the tin sheets through the openings and closure, an outlet pipe in the top of the closure for permitting the gases to escape there-

from, an inlet port for permitting fresh air to enter therein and means within said closure for circulating the heated air therein.

6. In an oven for drying lithographed tin sheets, a heated closure having an opening at either end thereof, an endless carrier consisting of two parallel chains connected by a plurality of skeleton rectangular-shaped frames fastened to the links thereof, said chains and frames being adapted to receive and support the lithographed tin sheets and U-shaped tracks extending in parallelism longitudinally through the closure and each receiving and supporting one of the chains of said carrier.

7. In an oven for drying sheets, a closure, a carrier adapted to pass therethrough and to support the sheets to be dried and wooden pulleys adjacent the feed end of said closure against which the sheets are fed before reaching their normal carrying position on said carrier.

8. In an oven for drying metallic sheets, a closure having an opening at either end thereof, an endless carrier comprising chains and frames joining said chains together, said endless carrier being adapted to support said sheets to be dried, a shaft journaled in suitable bearings adjacent each of said openings, sprockets carried by each of said shafts and engaging the chains of said endless carrier, wooden pulleys carried by one of said shafts and of greater diameter than the sprockets carried thereby, said wooden pulleys being adapted to have the metallic sheets fed thereagainst before reaching their normal carrying positions on said carrier and means for rotating one of said shafts to cause said endless carrier to travel through said closure and the openings thereof.

9. In an oven for drying metallic sheets, a closure having an opening at either end thereof, a carrier for supporting said sheets and adapted to pass through said closure and openings and a guide at the feed end of said closure for automatically positioning said sheets before they have assumed their carrying position on said carrier.

10. In a drying oven, a closure having an opening in either end thereof, steam pipes extending longitudinally in different planes through said closure for heating the same, tracks supported within said closure and extending therethrough and through the openings thereof and terminating at a point remote from the delivery end of said closure and an endless carrier adapted to be supported on said tracks and to carry the objects to be dried, said endless carrier being also adapted to travel through said closure between the planes of said steam pipes.

11. In an oven for drying metallic sheets, a closure having an opening at either end thereof, means for heating said closure, an endless carrier for supporting said sheets and adapted to pass through said closure and openings and a guide suitably positioned at the feed end of said closure and comprising two vertical, horizontally adjustable members having outwardly flaring ends, said guide being adapted to position the sheets on said endless carrier.

12. In an oven for drying sheets, a closure having an opening at either end thereof, means for heating said closure, a carrier adapted to support and carry the sheets through the closure and the openings thereof and adjustable horizontally slidable walls for regulating the width of the openings of the closure, said walls being provided with means for firmly holding the same in the desired position.

13. In an oven for drying sheets, a closure, means for heating said closure, a carrier for supporting said sheets and adapted to pass through said closure and a guide at the feed end of said closure for automatically positioning said sheets before they have assumed their carrying position on said carrier.

14. In an oven for drying metallic sheets, a closure having an opening at either end thereof, rows of steam pipes extending longitudinally through said closure for heating the same and a carrier adapted to support and carry the metallic sheets and to travel through said closure between the rows of said steam pipes.

15. In an oven for drying lithographed metallic sheets, a closure having an opening at either end thereof, means for heating said closure, an endless carrier adapted to support and carry the lithographed metallic sheets through the closure, a guide comprising vertical members for automatically positioning said sheets before they have assumed their carrying position on said carrier, and means for automatically feeding the sheets between the vertical members of said guide and onto the endless carrier.

Signed at Brooklyn in the county of Kings and State of New York this 31st day of July A. D. 1918.

ALBERT N. BLAKENEY.

Witnesses:
MARIE KUNTZ,
AUGUSTA HAAS.