Nov. 27, 1928. 1,692,812

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MACHINE FOR WASHING AND DRYING SHEET METAL BOXES OR CANS

Filed Jan. 17, 1921 4 Sheets-Sheet 1

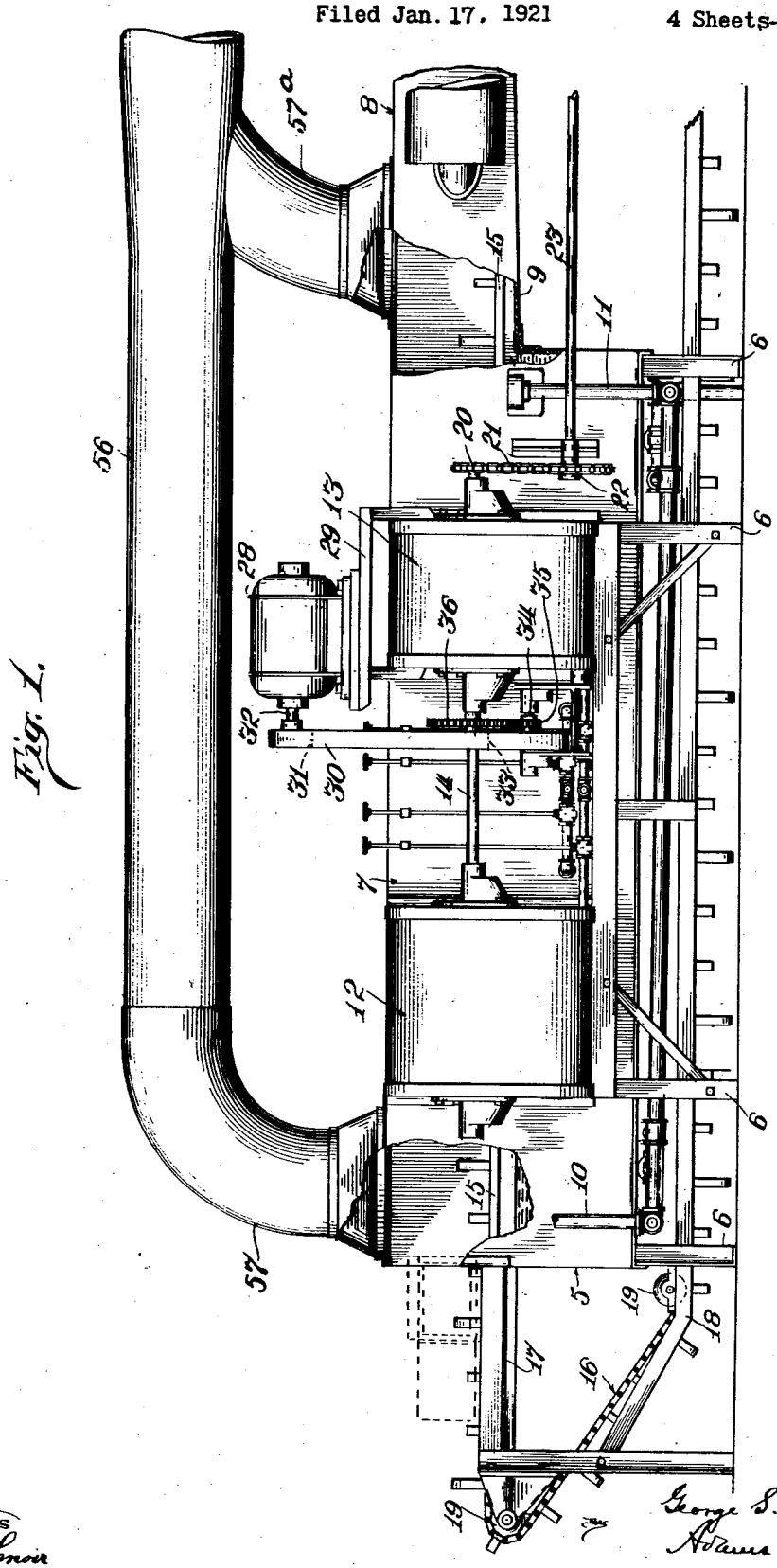


Fig. 1.

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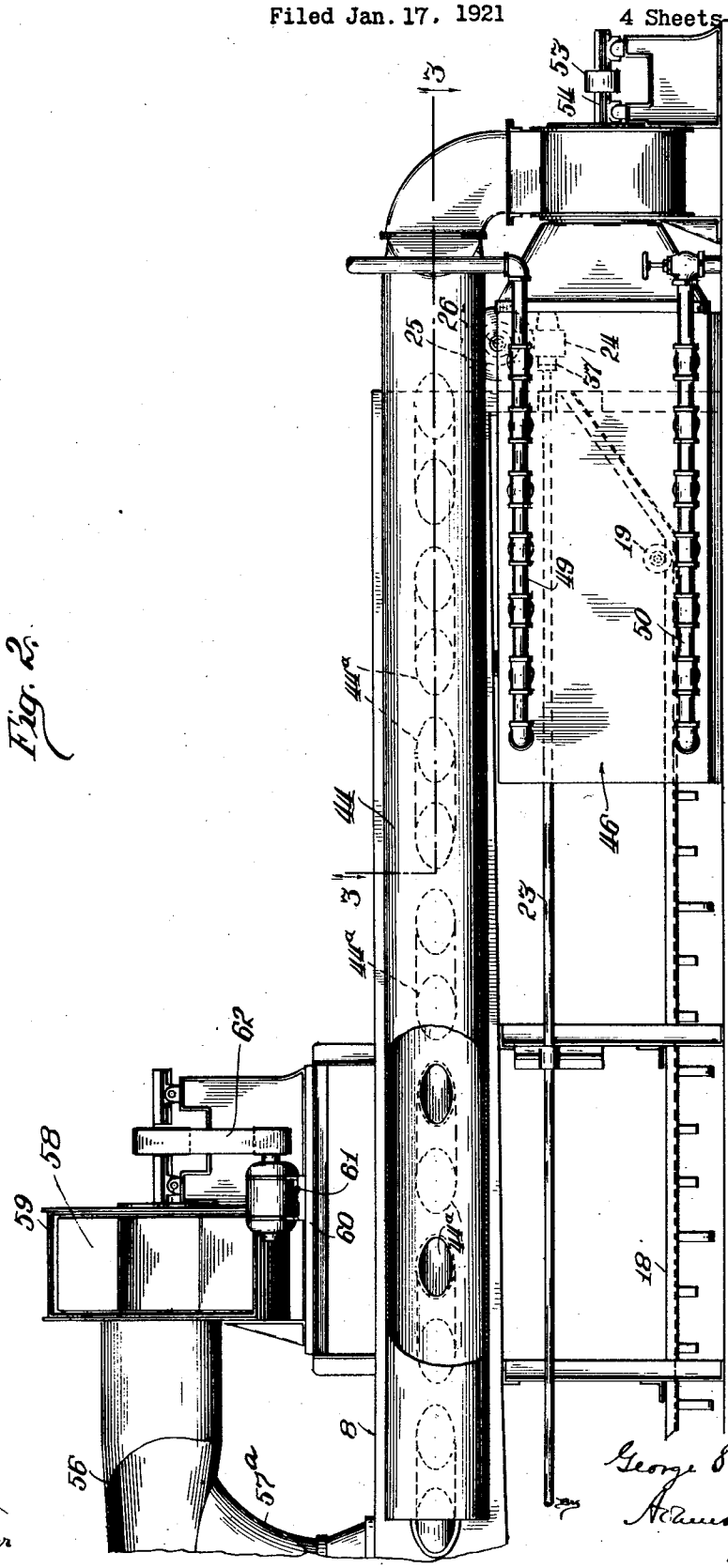
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Fig. 2.



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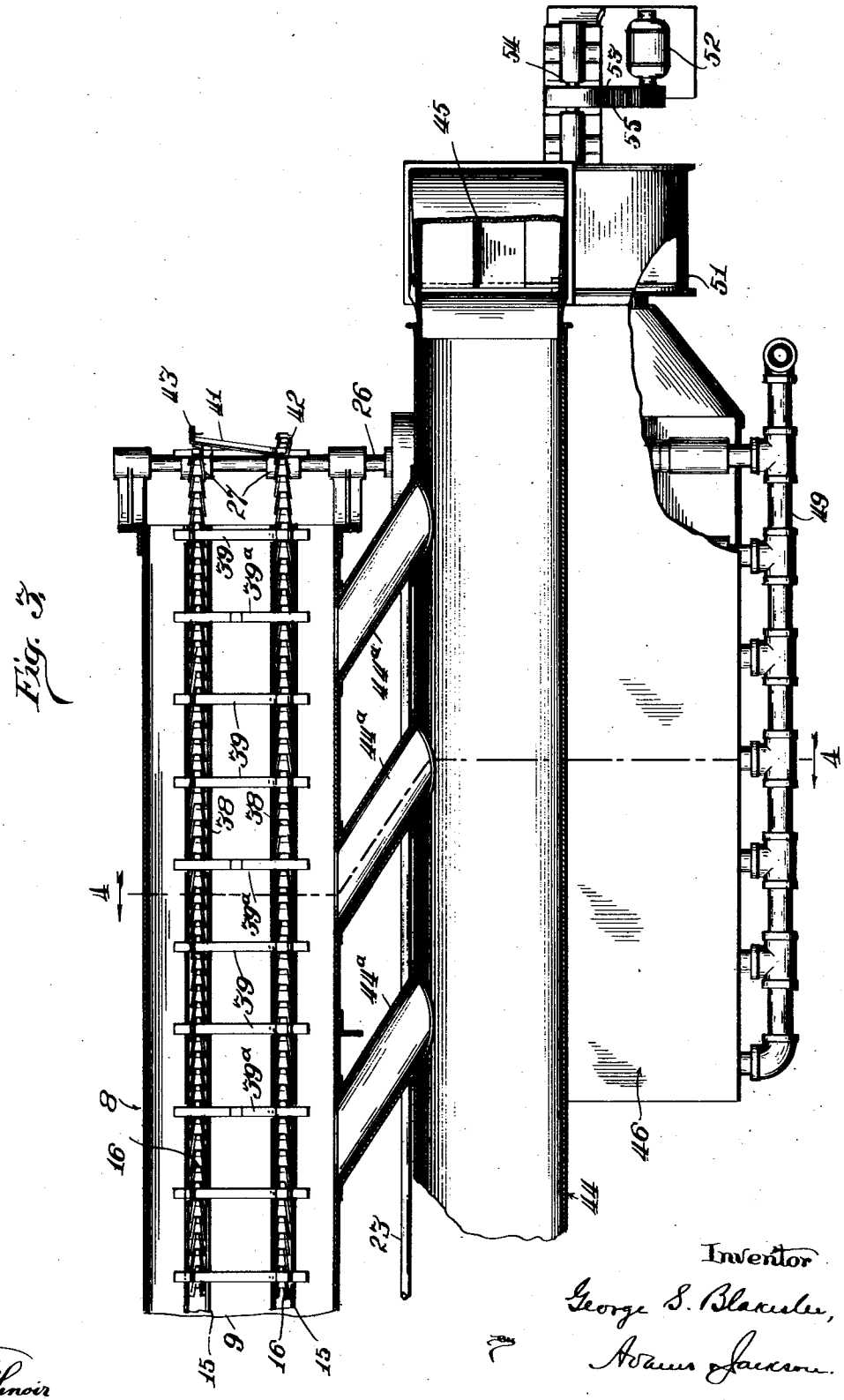


Fig. 3

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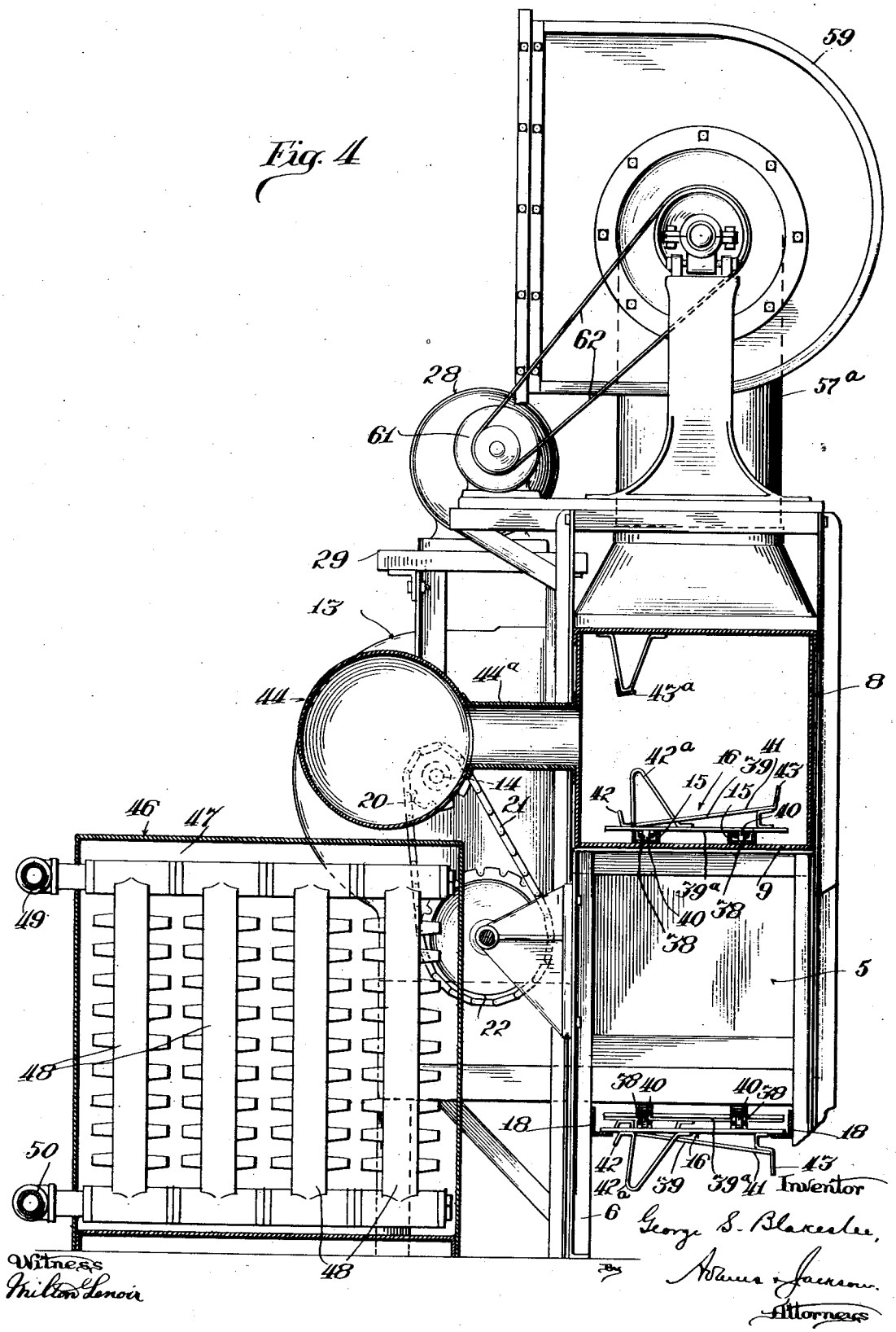
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MACHINE FOR WASHING AND DRYING SHEET METAL BOXES OR CANS

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Fig. 4



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UNITED STATES PATENT OFFICE.

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MACHINE FOR WASHING AND DRYING SHEET-METAL BOXES OR CANS.

Application filed January 17, 1921. Serial No. 437,826.

My invention relates to machines for washing and drying biscuit tins or similar sheet metal boxes. Such tins, which are usually provided with hinged lids, are returned to the manufacturer for refilling, but before they can be re-used it is necessary to cleanse them thoroughly as they are often returned in a very filthy condition. The washing of such tins is a difficult operation owing to the fact that they are often encrusted with remnants of the articles originally packed in them or with other forms of dirt, and it is therefore necessary that they be subjected to wash water thrown forcibly into and upon them, and that after the washing operation they be thoroughly rinsed. It is also of vital importance that they be thoroughly dried to prevent rusting, and to provide a machine which will perform these several operations efficiently, expeditiously and economically is the object of my present invention. I accomplish this object as illustrated in the accompanying drawings and hereinatfer described. What I regard as new is set forth in the claims.

In the accompanying drawings,—

Fig. 1 is a side elevation, some parts being broken away, showing the inlet end of the machine, which comprises the washing and rinsing mechanism;

Fig. 2 is a similar view of the outlet end of the machine, which comprises the drying mechanism;

Fig. 3 is a horizontal section on line 3—3 of Fig. 2 showing the drying mechanism and the conveyor by which the tins are moved through the machine; and

Fig. 4 is a cross-section on line 4—4 of Fig. 3.

Referring to the drawings,—5 indicates a tank which is divided transversely about midway of its length into two compartments, the first of which is designed to hold wash water and the second rinsing water, substantially as shown and described in Letters Patent No. 1,423,300, granted to me July 18, 1922. This tank is supported on suitable standards 6 so that it is held a short distance above the floor. The side walls of the tank are extended upward above the water level and are connected with the top to form a housing 7 which encloses the washing and rinsing compartments and merges into an elongated housing 8 extending horizontally from the rinsing compartment for a considerable distance and forming a drying compartment. 9 indicates the bottom of the horizontally disposed drying compartment which is slightly above the level of the water in the washing and rinsing compartments. 10—11 indicate adjustable overflow pipes for controlling the level of the washing and rinsing water, as best shown in Fig. 1. 12, 13 indicate cylindrical compartments at one side of the washing and rinsing compartments, respectively, in which are mounted paddle wheels arranged to dip into the water in their respective compartments and throw it upward and laterally into and around the tins to be washed, as described in my said Letters Patent. These paddle wheels are mounted on a shaft 14, as shown in Fig. 1, by the rotation of which the paddle wheels are operated. 15 indicates channel bar rails which extend longitudinally of the machine over the water in the washing and rinsing tanks and along the bottom of the drying compartment. These rails are adapted to support the upper loop of an endless conveyor 16 which carries the articles to be washed horizontally through the machine and returns underneath the washing and rinsing compartments, as shown in Figs. 1 and 4. It also travels over an apron 17 at the inlet end of the machine, which provides a convenient arrangement for loading the articles to be washed upon the conveyor. The lower loop of the conveyor is supported as it returns to the inlet end of the machine by angle iron rails 18 secured to the standards 6, as best shown in Fig. 4, and guide rollers 19 are provided at the end portions of the machine for guiding the conveyor. The conveyor is driven from the shaft 14 by means of a sprocket wheel 20 mounted on the shaft 14 and connected by a chain 21 with a sprocket wheel 22 mounted on a shaft 23 which extends to the outlet end of the machine and is there connected by a worm 24 and worm wheel 25 to a transverse shaft 26 provided with sprocket wheels 27 which engage the links of the conveyor 16, as shown in Figs. 1, 2 and 3. The shaft 14 is itself driven by an electric motor 28 mounted on a platform 29 arranged over the housing 7 and connected with said shaft by a belt 30 operating over a pulley 31 mounted on the armature shaft 32 of the motor, and over a pulley 33 mounted on a shaft 34, as shown in Fig. 1. The latter shaft carries a pinion 35 which meshes with a gear 36 mounted on the shaft 14, as shown in said figure. By this construction, when the

paddle wheels are in operation the conveyor is also driven. The worm 24 is preferably provided with a slip clutch 37, indicated by dotted lines in Fig. 2, arranged to slip in the event that the conveyor encounters extraordinary resistance, and thereby prevent breakage.

As shown in Figs. 3 and 4, the conveyor comprises two parallel endless chains 38 spaced apart and connected by cross-bars 39, 39ª which are provided at their under sides with rollers 40 adapted to run on the rails 15. Two adjacent cross-bars 39 are intended to support the body of the tin while the cover thereof is supported by an adjacent cross-bar 39ª. The cross-bars 39 at their upper sides are provided with inclined brackets 41 having upturned lips 42, 43 which support the tins in an inclined position, and the bars 39ª are provided with upright brackets 42ª disposed in position to support the covers of the tins when they are open and are at right angles to the sides of the tins, thereby bracing them against the impact of the washing and rinsing water. A rail 43ª is also provided above the tins to hold them down as they move along through the machine, as illustrated in Fig. 4.

The tins to be washed are placed on the brackets 41 with the covers open and resting against the brackets 42ª, so that the tin is supported in an inclined position, the lower margin of its open end resting against the lip 42. In this position the tins are carried through the washing and rinsing compartments, during which time washing and rinsing water is thrown violently into and over them by the operation of the paddle wheels. As the wash water is hot and contains a suitable cleansing agent, the tins including the covers are thoroughly cleansed. The rinsing water is also hot so that when the tins pass from the washing and rinsing compartments they need only to be thoroughly dried. The inclined position of the tins during the washing and rinsing operation insures drainage of water therefrom.

After the tins have been washed and rinsed they pass into the drying compartment and are there subjected to the drying action of hot air supplied by apparatus which will now be described. 44 indicates a hot air flue which extends longitudinally of the drying compartment at one side thereof, and is connected therewith at intervals by diagonally-disposed pipes 44ª, as best shown in Fig. 3. That end of the flue 44 which is nearest the inlet end of the machine is closed while its opposite end is open and leads into a chamber containing a fan 45 by the operation of which hot air is supplied to the flue and travels therein toward the inlet end of the machine, and is directed through the pipes 44ª into the drying chamber in which it flows toward the washing and rinsing compartments, or, in other words, in the opposite direction to that in which the articles under treatment travel, as hereinafter more fully described. Arranged below the flue 44 is a housing 46 forming a chamber 47 in which are placed steam coils 48 supplied with live steam through an inlet pipe 49, as shown in Fig. 4. 50 indicates a steam outlet pipe communicating with the opposite end of the coil 48. The housing 46 communicates at one end with the chamber 51 containing the fan 45, and the other end of said housing is open, so that by the operation of the fan 45 air is drawn into the chamber 47 over the coil 48 and is then forced into the flue 44. The chamber 47 is made relatively large, as is also the flue 44, so that a large volume of hot air at low velocity is supplied to the drying chamber, which I have found to be the arrangement which secures the best results. The fan 44 is preferably driven by an electric motor 52 which drives a pulley 53, mounted on the fan shaft 54, by means of a belt 55, as best shown in Figs. 2 and 3. In order to carry off the moist air resulting from the drying operation, and also to prevent moisture from the washing and rinsing compartments from passing into the drying compartment or from passing out at the inlet end of the machine, a flue 56 is provided arranged over the machine and connected by an elbow 57 with the inlet end of the washing compartment, and by an elbow 57ª with the inlet end of the drying compartment or the outlet end of the rinsing compartment. This flue is provided with a fan 58 mounted in a housing 59 supported on a platform 60 arranged above the machine, which fan is driven by an electric motor 61 by means of a belt 62 operating over pulleys on the armature shaft of the motor and the shaft of the fan 58. By this arrangement said fan operates not only to draw off the vapors from the washing and rinsing compartments, but also aids the fan 45 in causing a flow of dry hot air through the drying compartment toward the cleansing compartments, which not only carries off the moist air resulting from the drying operation, but also effectually prevents the vapors in the cleansing compartment from passing into the drying compartment. The air drawn through the flue 56 by the fan 58 is discharged into the atmosphere.

While the machine described is designed primarily for washing and drying biscuit tins, I wish it to be understood that it may also be used for any other purpose to which it is adapted, and the claims hereinafter made should be construed accordingly.

What I claim as my invention and desire to secure by Letters Patent, is—

1. A machine of the class described comprising a horizontally extending housing, one portion of which constitutes a cleansing compartment and another portion of which con-

stitutes a drying compartment, said compartments being directly contiguous and in constant communication, a conveyor passing through said cleansing and drying compartments for conducting articles through both, means in said cleansing compartment for cleansing said articles, said means tending to saturate the air contained in said cleansing compartment with moisture, a first outlet flue connected to said housing adjacent the inlet end of said cleansing compartment, a second outlet flue connected to said housing adjacent the inlet end of said drying compartment, suction means connected to both of said outlet flues, a hot air flue extending alongside said drying compartment, means establishing communication between said hot air flue and said drying compartment at a plurality of spaced points, and means for impelling a flow of heated air through said hot air flue, the circulation of heated air being in a direction counter to the movement of the articles through said compartments and said circulated air being exhausted through both of said outlet flues, whereby the moisture laden air of said cleansing compartment is prevented from passing into or through said drying compartment.

2. A machine of the class described comprising a horizontally extending housing, one portion of which constitutes a cleansing compartment and another portion of which constitutes a drying compartment, said compartments being directly contiguous and in constant communication, a conveyor passing through said cleansing and drying compartments for conducting articles through both, means in said cleansing compartment for cleansing said articles, said means tending to saturate the air contained in said cleansing compartment with moisture, a first outlet flue connected to said housing adjacent the inlet end of said cleansing compartment, a second outlet flue connected to said housing adjacent the inlet end of said drying compartment, suction means connected to both of said outlet flues, and means for maintaining a circulation of heated air through both of said compartments in a direction counter to the movement of the articles for exhausting through both of said outlet flues, whereby the moisture laden air of said cleansing compartment is precluded from moving through said drying compartment with the articles.

3. A machine of the class described comprising a horizontally extending housing, one portion of which constitutes a cleansing compartment and another portion of which constitutes a drying compartment, said compartments being in constant communication, a conveyor passing through said cleansing and drying compartments for conducting articles through both, means in said cleansing compartment for cleansing said articles, said means tending to saturate the air contained in said cleansing compartment with moisture, an outlet flue connected to said housing adjacent the inlet end of said cleansing compartment, a suction device connected to said outlet flue, and means for maintaining a circulation of heated air through both of said compartments in a direction counter to the movement of the articles, a portion of said air being exhausted through said outlet flue whereby the moisture laden air in said cleansing compartment is prevented from entering said drying compartment.

4. A machine of the class described comprising a horizontally extending housing, one portion of which constitutes a cleansing compartment and another portion of which constitutes a drying compartment, said compartments being in constant communication, a conveyor passing through said cleansing and drying compartments for conducting articles through both, means in said cleansing compartment for cleansing said articles, said means tending to saturate the air contained in said cleansing compartment with moisture, means for maintaining a circulation of heated air through said housing, and means for exhausting the heated air from said housing, the direction of flow of said air and the point of exhaust being so related as to preclude the passage of the moisture laden air from said cleansing compartment through said drying compartment.

5. A machine of the class described comprising a horizontally extending housing, one portion of which constitutes a cleansing compartment and another portion of which constitutes a drying compartment, said compartments being in contiguous alinement and in constant communication, a conveyor passing through said cleansing and drying compartments for conducting articles through both, means in said cleansing compartment for cleansing said articles, said means tending to saturate the air contained in said cleansing compartment with moisture, means for impelling a flow of heated air through said drying compartment, an outlet flue connected to said housing, and suction means connected to said outlet flue, the direction of flow of said heated air and the point of exhaust of said outlet flue from said housing being so related as to prevent the passage of moisture laden air through said drying compartment.

6. A machine of the class described comprising a horizontally extending housing, one portion of which constitutes a cleansing compartment and another portion of which constitutes a drying compartment, said compartments being in contiguous alinement and in constant communication, a conveyor passing through said cleansing and drying compartments for conducting articles through both, means in said cleansing compartment for cleansing said articles, said means tend-

ing to saturate the air contained in said cleansing compartment with moisture, a blower, heating means associated with said blower, a flue cooperating with the blower and said heating means for discharging the heated air to said drying compartment, an outlet flue connected to said housing adjacent said cleansing compartment, and a suction fan connected to said outlet flue, the direction of flow of the heated air being counter to the motion of the articles through said drying compartment, and the point of exhaust of said outlet flue being so disposed as to prevent the moisture laden air of said cleansing compartment from passing into or through said drying compartment.

7. A machine of the character described, comprising a drying compartment, means for conveying tins having hinged covers through said compartment and having means for supporting the covers in open position, and means for causing heated air to flow through said compartment.

8. A machine of the character described, comprising a drying compartment, means for conveying tins having hinged covers through said compartment and having means for supporting the covers in open position, means for causing heated air to flow through said compartment, and means for cleansing the tins before they enter said drying compartment.

9. A machine of the character described, comprising a drying compartment, a conveyor extending through said drying compartment, said conveyor being composed of endless belts and spaced cross-bars, certain of said cross-bars having means for supporting tins having hinged covers, and certain other of said cross-bars having means for supporting the covers in open position, and means for causing heated air to flow through said compartment.

10. A machine of the character described, comprising a drying compartment, a conveyor extending through said drying compartment, said conveyor being composed of endless belts and spaced cross-bars, certain of said cross-bars having means for supporting tins having hinged covers and certain other of said cross-bars having means for supporting their covers in open position, means for causing heated air to flow through said compartment, and means for cleansing the tins before they enter said drying compartment.

11. A machine of the character described comprising a drying compartment, means for conveying tins having hinged covers through said compartment and having means for supporting the covers in open position, and means for causing heated air to flow through said compartment in a direction opposite to that in which the tins travel.

12. A cleansing and drying machine comprising a washing compartment having means for washing the articles to be treated, a drying compartment communicating with said washing compartment, means for conducting the articles from the washing compartment to the drying compartment, and means for maintaining a flow of hot air through the drying compartment toward the washing compartment.

13. A cleansing and drying machine comprising a washing compartment having means for washing the articles to be treated, a drying compartment communicating with said washing compartment, means for conducting the articles from the washing compartment to the drying compartment, means for maintaining a flow of hot air through the drying compartment toward the washing compartment, and means for drawing off vapors from said washing compartment.

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