June 24, 1930. S. OLSON 1,765,996

DISH DRYING APPARATUS

Filed June 21, 1926

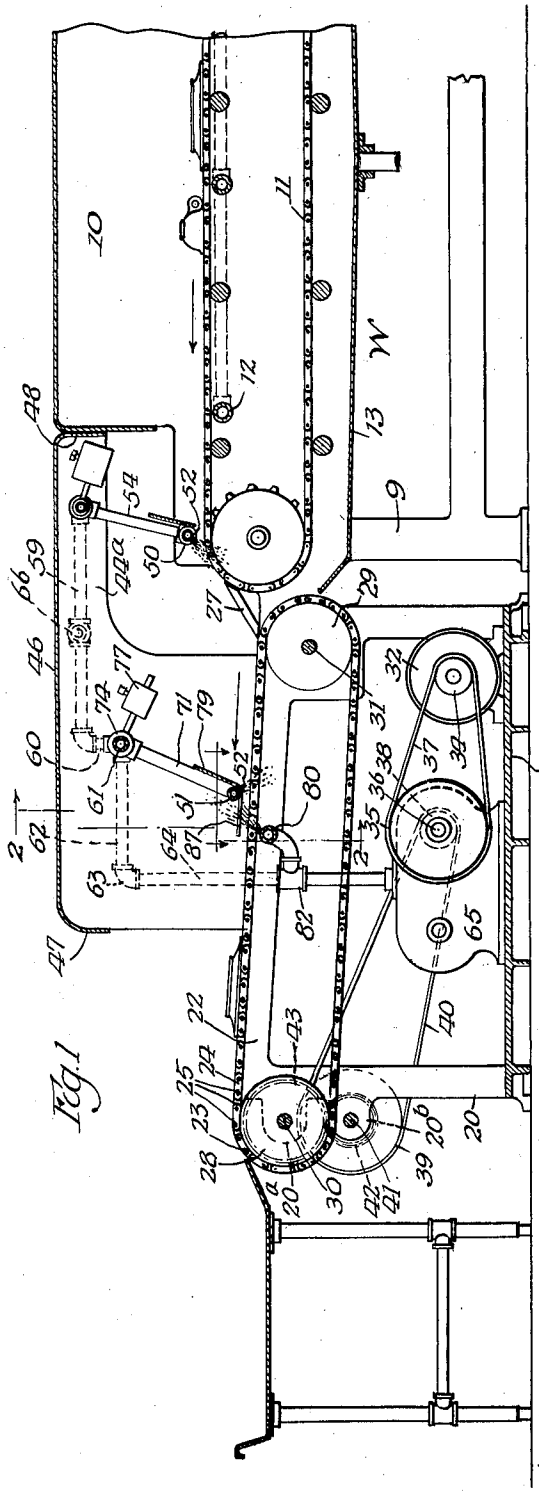


Fig. 1

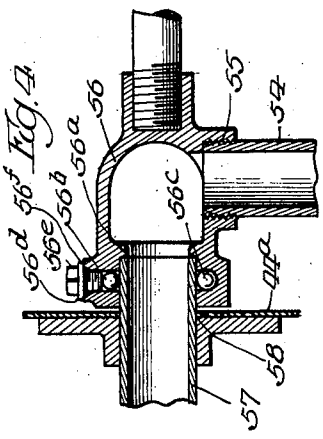


Fig. 4

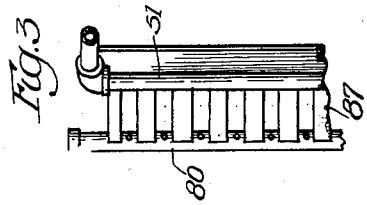


Fig. 3

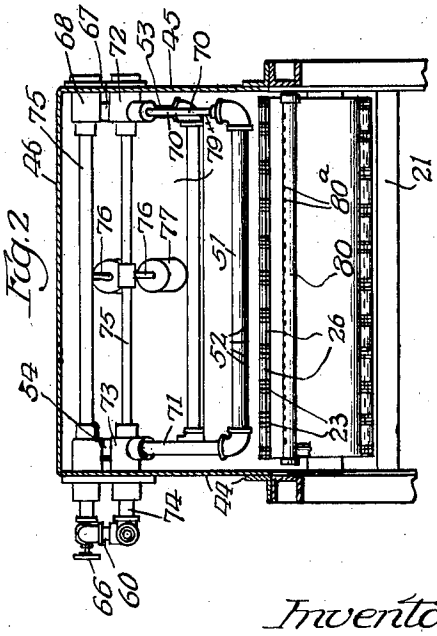


Fig. 2

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UNITED STATES PATENT OFFICE

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DISH-DRYING APPARATUS

Application filed June 21, 1926. Serial No. 117,306.

The invention relates to apparatus for drying dishes and other such articles.

The object of the invention is to provide a drier of the type that is adapted for association with a washer, which requires a minimum of space, is efficient in its operation, and is of new and improved construction.

Other and incidental objects of the invention will appear from the detailed description hereafter.

The invention consists in the several novel features hereinafter set forth and more particularly defined by the claims at the conclusion hereof.

In the drawing: Fig. 1 is a vertical longitudinal section of a drier embodying the invention, and a washer with which the drier is adapted to be associated, a portion of the washer being omitted. Fig. 2 is a vertical section taken on line 2—2 of Fig. 1. Fig. 3 is a detail of the presser member which is adapted to hold the articles upon the conveyor belt. Fig. 4 is a detail section of the pivotal connection between the delivery arm of one of the pipes for delivering jets of air to the top surface of the dishes, and the air delivery pipe.

The invention is exemplified in a drier for dishes which is adapted for association with a washer W of the type which comprises a frame-work 9; a washing chamber 10; an endless conveyor belt 11 which is supported on the frame-work and is operable to convey the soiled dishes through the washing chamber; a plurality of pipes 12 extending transversely across the washing chamber and disposed below the conveyor belt and provided with openings for delivering jets of water onto the dishes as they pass through the chamber to clean them; and a drain 13 which is supported by the frame-work, is disposed below the conveyor belt 11, and is adapted to receive the waste water which is sprayed against the dishes in transit through the washing chamber, as well understood in the art.

The new and improved drier for the dishes and other such articles comprises standards 20, cross beams 21, and longitudinal beams 22, all of which are rigidly secured together to form a frame-work for supporting the drying chamber, the drying apparatus, and an endless conveyor belt 23. The latter extends longitudinally across the top of the drier frame-work, is adapted to carry and propel the dishes and articles through the drying chamber, and comprises links 24 which are pivotally connected to cross rods 25 and are spaced relatively to each other by sleeves 26 so as to form spaces therebetween. The receiving end of conveyor 23 is adapted to be positioned adjacent the discharge end of the conveyor 11 of the washer to receive dishes and other articles from the washer after they have been washed. The receiving end of the conveyor 23 is disposed at a lower level than the discharge end of the washer conveyor so that the dishes discharged from the latter will fall by gravity onto conveyor 23. A slideway 27 is disposed between the discharge end of the conveyor 11 and the receiving end of conveyor 23 to facilitate the delivery of the dishes. This slideway may be supported from either the washer or drier frame-work in any suitable manner. Belt 23 is supported at its ends by means of drums 28 and 29. These drums are secured to shafts 30 and 31 respectively which are rotatably mounted in bearings formed in lugs 20^a which are integrally formed with standards 20. The mechanism for driving conveyor belt 23 comprises an electric motor 32 which is mounted on a base 33 which extends between and is secured to standards 20; a pulley 34 which is mounted on the motor shaft and is driven thereby; a pulley 35 which is mounted on one end of a shaft 36 and connected to be driven from pulley 34 by an endless belt 37; a pulley 38 which is mounted on the other end of shaft 36; a pulley 39 which is connected to be driven from pulley 38 by an endless belt 40 and is mounted on one end of a shaft 41 which extends transversely across the frame-work and is journalled in suitable bearings formed in a pair of lugs 20^b which are integrally formed with standards 20; a gear 42 which is mounted on the other end of

shaft 41; and a gear 43 which meshes with gear 42 and is mounted on one end of shaft 30.

The drying chamber through which the dishes are propelled by conveyor belt 23 is formed by a sheet metal housing or enclosure which comprises a pair of side walls 44 and 45 which are secured to the sides of the frame-work and are provided at their top with portions 44[a] which extend outwardly of the receiving end of the conveyor 23 and over the discharge end of washer W; a top wall 46 which connects the side walls 44 and 45 and portions 44[a]; and a front and rear wall 47 and 48 which terminate at a sufficient distance above belts 23 and 11 respectively to form openings through which the dishes and articles may pass.

The apparatus for drying the dishes comprises a pair of air pipes 50 and 51 which extend transversely across the drying chamber and are disposed normally adjacent the top surface of belts 11 and 23 respectively. Each of these pipes is provided with a series of jet openings 52 which extend downwardly toward the articles so that the latter will be subjected to jets of air under pressure to disperse and absorb the moisture thereon. Pipe 50 is disposed adjacent the discharge end of washer conveyor 11 and the air discharged therefrom is adapted to disperse the water remaining on the dishes after the latter have been subjected to the jets of water from pipes 12. The ends of pipe 50 are provided with upwardly extending arms 53 and 54, the distal ends of which are pivotally mounted so that pipe 50 may be swung upwardly by the dishes, to permit the latter to pass thereunder. Pipe 50 normally assumes a position which is in close proximity to the upper surface of the conveyor. The upper end of arm 54 is connected by a screw-thread connection 55 to a fitting 56 which extends laterally and is pivotally or rotatably mounted around the inner end of a branch pipe 57. The latter extends through an opening 58 in the front end of portion 44[a] of side 44 and is connected to receive air under pressure from a supply pipe 59. This pipe extends longitudinally of and adjacent the outer surface of portion 44[a] and is connected by a pipe 60 to a fitting 61. The latter is connected by a pipe 62, a fitting 63, and a pipe 64 to a compressor 65 which is mounted on base 33 and is connected to be driven by shaft 36. A valve 66 is connected to pipe 59 to control the amount of air delivered to pipe 50. Branch pipe 57 is suitably supported adjacent opening 58. Fitting 56 is provided adjacent the inner end of pipe 57 with an annular integral flange 56[a] which is adapted to abut against the inner end of said pipe to limit the outward movement of the fitting. An annular groove 56[b] is formed in the fitting outwardly of flange 56[a] and in which are disposed a plurality of balls 56[c] which form a suitable bearing for the fitting. A cylindrical opening 56[d] is formed in the fitting and communicates with the groove to permit the balls 56[c] to be inserted or removed therefrom. A plug 56[e] is connected by a screw thread connection 56[f] to the fitting and is adapted to close openings 56[d]. Arm 53 is solid and is connected at its outer end by a screw-thread connection 67 to a laterally extending fitting 68 which is pivotally mounted on portion 44[a] of side 45 by a suitable ball bearing.

Pipe 51 for absorbing any moisture which may remain on the dishes, extends across the central portion of conveyor belt 23 and is provided at its ends with arms 70 and 71. The distal ends of arms 70 and 71 are pivotally connected to fittings 72 and 73 respectively which are similar in construction to fittings 68 and 56. Fitting 73 is rotatably mounted around the inner end of a pipe 74 which extends through side wall 44 and is connected to fitting 61 to receive air under pressure therefrom. Connecting rods 75 extend between the fittings on the arms of the pipes 50 and 51 respectively to space them apart. Each rod is provided with a shaft 76 extending downwardly and in the opposite direction to the pipe arms. A weight 77 is slidably mounted on each shaft 76 and acts as a counter-balance for the pipe. Each weight is provided with a thumb screw whereby it may be secured in a fixed position. A strip 79 extends longitudinally of each pipe 50 and 51 and forms a surface against which the dishes will abut to swing the pipes into an elevated position. These strips are formed of resilient material such as rubber and are secured to the arms of pipes 50 and 51 respectively. A pipe 80 is disposed adjacent the under surface of the conveyor belt 23 adjacent pipe 51 and is provided with a plurality of jet openings 80[a] which are inclined upwardly and are adapted to deliver jets of air through the spaces in the conveyor belt to the under surfaces of the articles so as to absorb the moisture thereon. Pipe 80 is suitably supported and connected by a fitting 82 to supply pipe 64.

In practice, it has been found that the force of the jets of air discharged from pipe 80 is sufficient to raise the articles from the conveyor belt 23. To prevent this, pipe 51 is provided with a horizontally extending flexible strip or member 87 which is disposed in the path of the jets of air discharged from pipe 80 and is adapted to press the dishes against the conveyor belt as they pass under pipe 51. This strip is provided with a plurality of slots which extend directly in the path of the jets of air discharged from pipe 80 so that the air may pass unobstructed

and without imparting movement to the strip or pipe 51 when no dishes are passing thereunder.

The operation of the drier will be as follows: After the dishes have been washed, they will be propelled by the conveyor belt of the washer into contact with pipe 50 of the drier which will subject the articles to jets of air under pressure to disperse the water thereon. Upon reaching the end of belt 11 of the washer, the dishes will be discharged onto slideway 27 from which they will be received by the receiving end of the conveyor belt 23 of the drier. This conveyor will then propel the dishes and articles through the drying chamber where they will abut against pipe 51 and cause the latter to be swung upwardly a sufficient distance to permit the articles to pass thereunder, during which movement their top surfaces will be subjected to jets of air under pressure from pipe 51 and their lower surfaces will be subjected to jets of air under pressure from pipe 80. These jets will absorb any moisture on the dishes, thereby completely drying them. The articles will then pass from the drying chamber to the discharge end of the conveyor belt 23 from which they may be delivered onto any suitable receiving member.

The invention exemplifies a dish drying apparatus of new and improved construction in which provision is made for suspending an air pipe over the discharge end of a washer, whereby the dishes on the latter will be subjected to jets of air under pressure to disperse the moisture thereon, and in which provision is made for pressing the dishes against the conveyor belt of the drier so that they will not be raised therefrom or displaced when subjected to jets of air from the pipes for absorbing the moisture on them. A characteristic of the present invention is that the apparatus requires only a minimum of space, due to the arrangement of the several parts thereof.

The invention is not to be understood as restricted to the details set forth, since these may be modified within the scope of the appended claims, without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:

1. In combination with a dish washer comprising a conveyor, a drying apparatus comprising a frame, a conveyor supported by the frame and adapted to receive the dishes discharged from the washer-conveyor, means supported by the frame and adapted to extend over the discharge end of the washer-conveyor for delivering air under pressure to the dishes carried by said washer-conveyor to disperse the water thereon, said means being movably mounted and shiftable by the articles carried by the washer-conveyor, and means supported by the frame for drying the dishes carried by the drier-conveyor.

2. In combination with a dish washing apparatus embodying an endless conveyor, an independent drier unit adapted to be used in conjunction with the washer apparatus comprising a frame having a portion thereof adapted to overhang the discharge end of the washer conveyor, an endless conveyor supported by the frame and adapted to receive the dishes discharged from said washer conveyor, means supported by the overhanging portion of the frame and adapted to extend transversely across the discharge end of the washer conveyor for delivering air under pressure to the dishes carried by said washer conveyor to disperse the water thereon, and means supported by the frame for delivering air under pressure to the dishes carried by the drier conveyor to dry them.

3. In combination with a dish washing apparatus comprising an endless conveyor, an independent drier unit adapted to be used in conjunction with said washer apparatus and comprising a frame, an endless conveyor supported by the frame and adapted to receive the dishes discharged from the washer conveyor, a pipe supported by the frame and adapted to extend transversely across and in close proximity to the discharge end of the washer conveyor, said pipe being provided with a series of openings for delivering jets of air to the dishes carried by the washer conveyor to disperse the water thereon, a pipe supported by the frame and provided with a series of openings for delivering jets of air to the dishes carried by the drier conveyor to dry them, and means for delivering air under pressure to said pipes.

4. In combination with a dish washer comprising a conveyor, a drying apparatus comprising a frame, a conveyor supported by the frame and adapted to receive the dishes discharged from the washer-conveyor, a pipe adapted to extend across the discharge end of the washer-conveyor and provided with openings for delivering jets of air to the dishes carried by said washer-conveyor to disperse the water thereon, means mounted on said frame for pivotally supporting the pipe to permit the latter to be swung upwardly by the articles carried by the washer-conveyor, means for delivering air under pressure to the dishes carried by the drier-conveyor to dry them, and means for delivering air under pressure to said pipe.

5. In combination with a dish washer comprising a conveyor, a drier comprising a frame, a conveyor adapted to receive the dishes discharged from the washer-conveyor, an enclosure forming a drying chamber, a portion of said enclosure projecting outwardly of the receiving end of said drier-con-

veyor and adapted to extend over the discharge end of the washer-conveyor, means adapted to extend beneath said portion of the enclosure and across the discharge end of the washer-conveyor for delivering air under pressure to the dishes carried by said washer-conveyor to disperse the water thereon, and means in said drying chamber for drying the dishes carried by the drier-conveyor.

6. In combination with a dish washer comprising a conveyor, a drier comprising a frame, a conveyor adapted to receive the dishes discharged from the washer-conveyor, an enclosure forming a drying chamber, a portion of said enclosure projecting outwardly of the receiving end of said drier-conveyor and over the discharge end of the washer-conveyor, a pipe adapted to extend across the discharge end of the washer-conveyor and provided with a series of openings for delivering jets of air to the dishes carried by said washer-conveyor to disperse the water thereon, means secured to said portion of the enclosure for pivotally supporting said pipe to permit the latter to be swung upwardly by the articles on the washer-conveyor, a pipe in said chamber for delivering air under pressure to the dishes carried by the drier-conveyor, and means for delivering air under pressure to said pipes.

7. In a drying apparatus of the character described, the combination of a conveyor for dishes, having openings therein, means disposed beneath said conveyor for delivering air under pressure through the openings to the under side of the dishes carried by the conveyor, and a resilient strip disposed adjacent the means and operative to press the dishes against the conveyor to prevent them from being displaced by the air delivered from said means.

8. In a drying apparatus of the character described, the combination of a frame, a conveyor for dishes mounted on the frame, said conveyor having openings therein, means disposed beneath the conveyor for delivering air under pressure through the openings to the under side of the dishes carried by the conveyor, a member supported by the frame and mounted to swing, said member extending across and being positioned adjacent said means, and a strip secured to and co-extensive with said member, said strip being adapted to hold the dishes against the conveyor to prevent them from being displaced by the air from said means.

9. In a drying apparatus of the character described, the combination of a frame, a conveyor for the articles to be dried mounted on the frame, said conveyor having openings therein, a pipe disposed beneath the conveyor and provided with a series of openings for delivering jets of air under pressure through the openings in the conveyor to the under side of the articles, a member supported by the frame and mounted to swing, said member extending across the conveyor and being disposed adjacent the pipe, and a strip connected to the member and adapted to hold the articles against the conveyor to prevent them from being displaced by the jets of air, said strip having a series of slots formed therein corresponding to the series of holes in the pipe and arranged in alignment therewith.

10. In combination with a dish washer comprising a conveyor, an independent drier unit adapted to be associated with the washer and comprising a frame, a pipe-element supported by the frame and adapted to be positioned over and across the discharge end of the washer-conveyor, said pipe-element being provided with an opening for delivering a jet of air to the dishes carried by said washer-conveyor to disperse the water thereon, means for movably supporting said pipe-element so that it will move upwardly when engaged by said dishes to permit the latter to pass thereunder, and means for delivering air under pressure to the pipe-element.

11. In combination with a dish washer comprising an endless conveyor, an independent drier unit adapted to be associated with the washer and comprising a frame, said frame having an extension for overlapping the discharge end of the washer-conveyor, a pipe-element supported by said extension and adapted to extend over and transversely across the washer-conveyor said pipe-element having an opening for delivering a jet of air to disperse the water on the dishes carried by said washer-conveyor, a pivotal connection for supporting the pipe-element so that it may be swung upwardly when engaged by the dishes to permit the latter to pass thereunder, and means mounted on the frame for delivering air under pressure to the pipe-element.

Signed at Chicago, Illinois, this 8th day of February, 1926.

SAMUEL OLSON.