

Nov. 1, 1927.

1,647,763

G. W. ALDEEN

WASHING AND DRYING APPARATUS

Filed Feb. 7, 1923

5 Sheets-Sheet 1

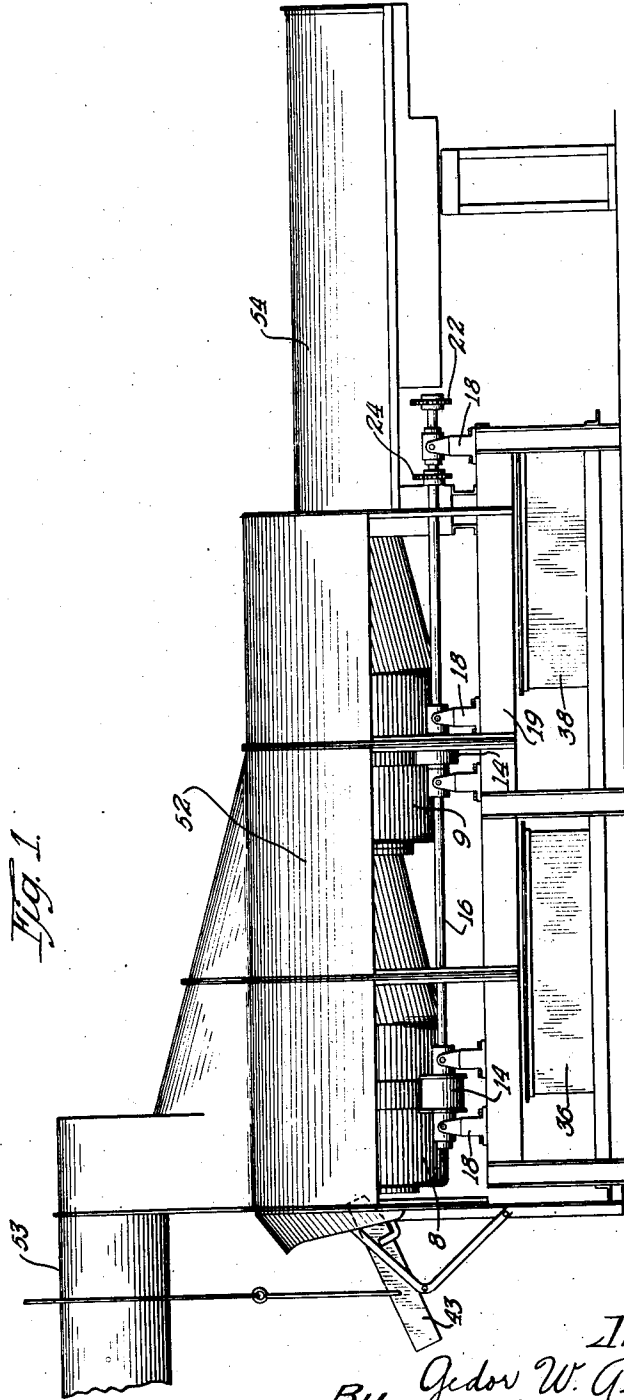


Fig. 1

Witness:
Lois Conde.

Inventor:
By Gidon W. Aldeen
Wilson & McCanna
Attys.

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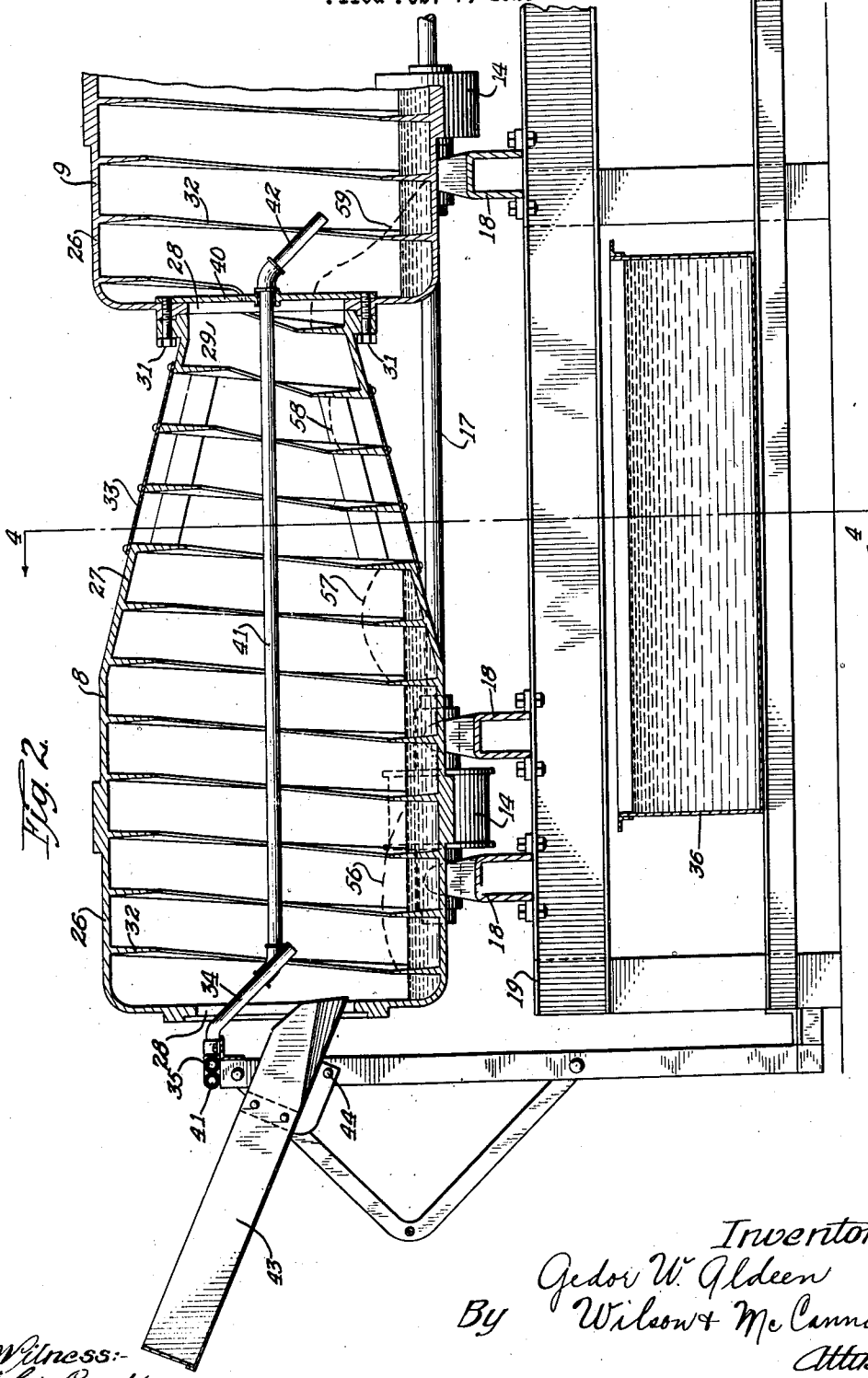


Fig. 2

Witness:
Lois Coule.

Inventor:
Gedon W. Aldeen
By Wilson & McCanna
Attors.

Nov. 1, 1927.

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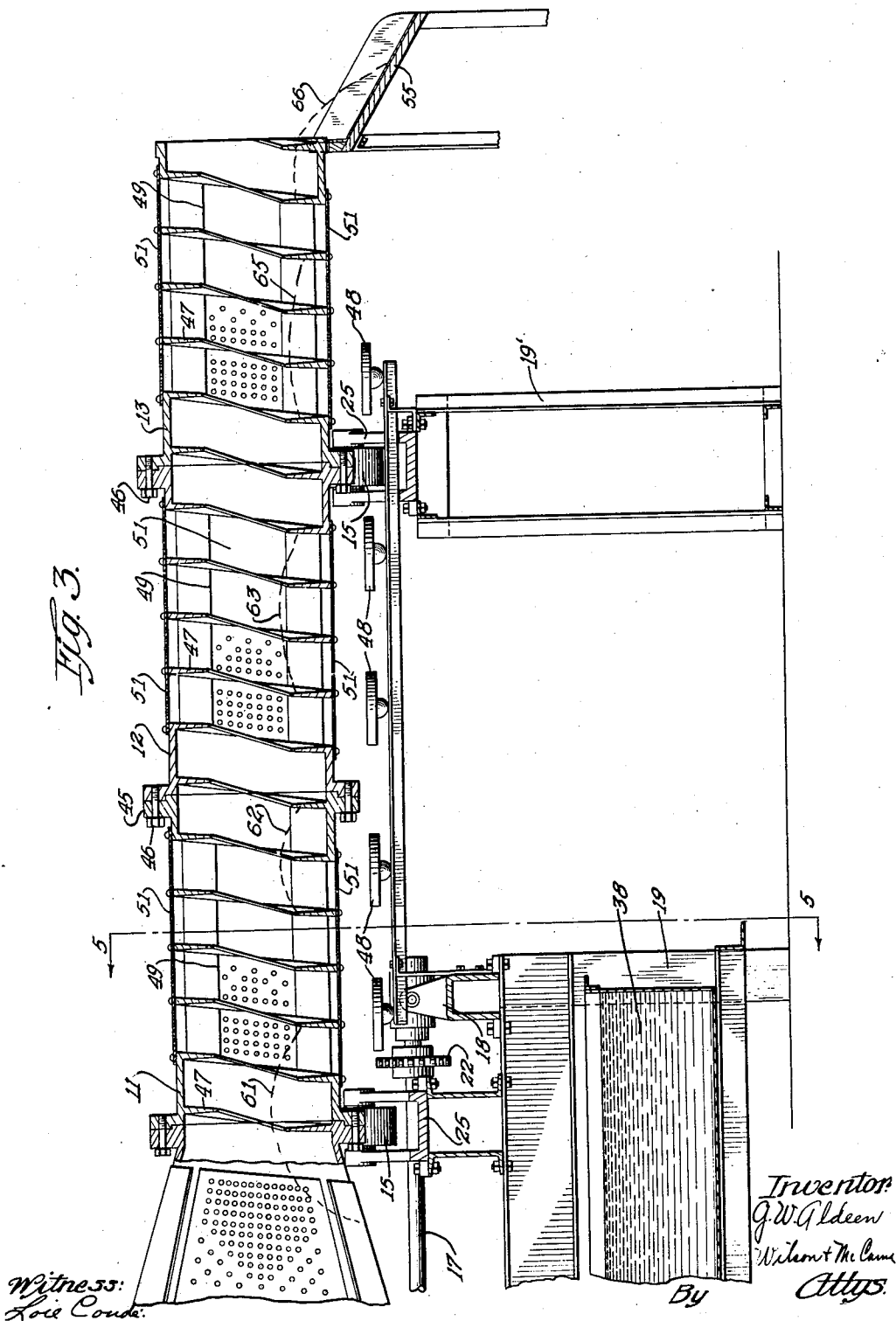
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Fig. 3.



Witness:
Lois Conde.

Inventor:
G. W. Aldeen
Witness: The same
By Atty.

Nov. 1, 1927

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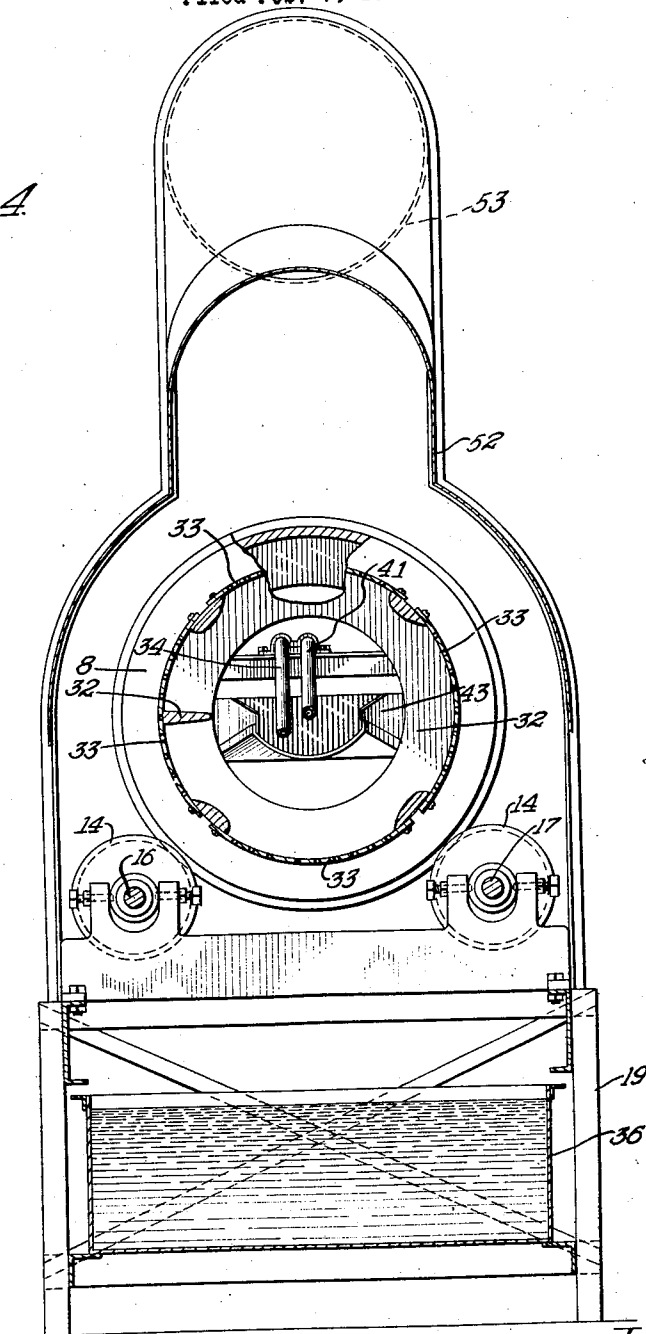
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5 Sheets-Sheet 4

Fig. 4



Witness:
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Inventor:
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Nov. 1, 1927.

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WASHING AND DRYING APPARATUS

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Fig. 5.

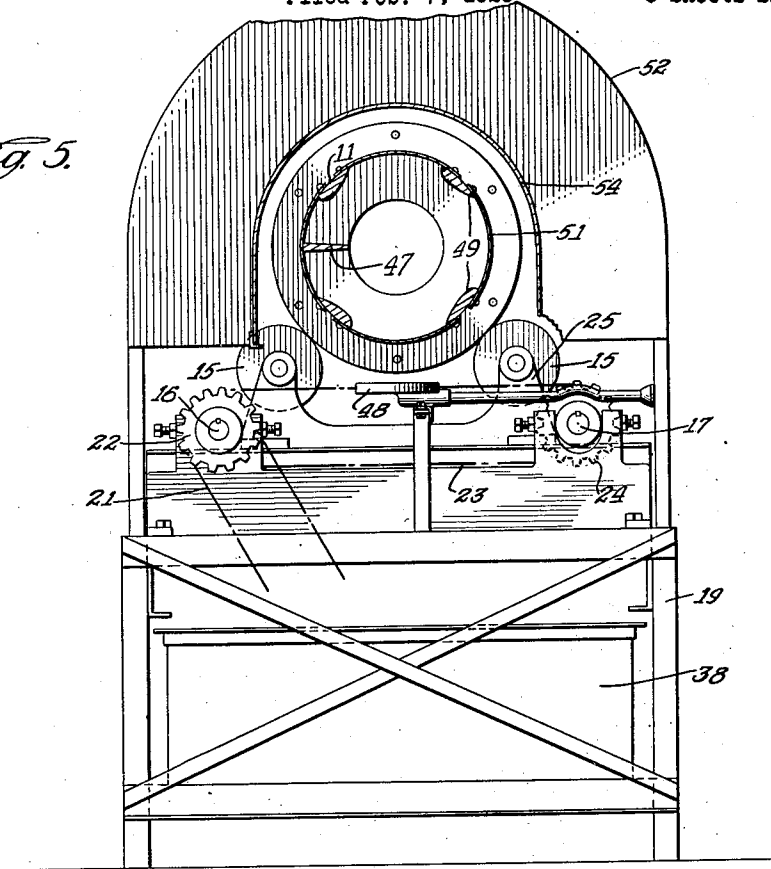
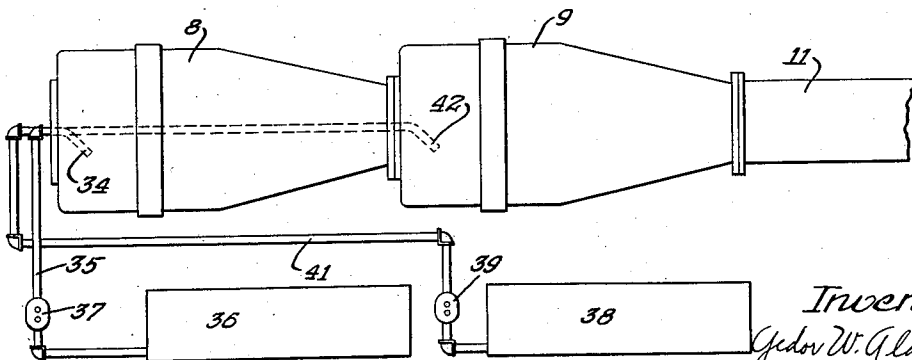


Fig. 6.



*Witness:-
Loie Conde.*

By

*Inventor:
Gedon W. Aldeen
Wilson & McCarra
Attys.*

UNITED STATES PATENT OFFICE.

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WASHING AND DRYING APPARATUS.

Application filed February 7, 1923. Serial No. 617,462.

This invention pertains to industrial apparatus designed primarily for washing and drying manufactured articles, such as screws, bolts, nuts, rivets and the like. In view of the large number of sizes, materials and shapes of such articles, and of different operations required in their manufacture, it has become customary to handle them in comparatively small batches, as in pans or other containers, which may be easily and conveniently transported between machines without confusion or mixing.

One of the primary objects, therefore, of the present invention is to provide apparatus for washing and drying these batches expeditiously and economically.

Another object is to provide apparatus of this character in which the batches are tumbled while being washed and dried without intermingling or confusing the parts of one batch with another, and in which the total time for the passage of each batch through the apparatus or machine is substantially uniform.

My invention further contemplates the washing and drying of articles and materials other than those specified above, whether fed to the apparatus continuously or intermittently, and whether in bulk or in batches. And as will be presently apparent, my invention is not limited to the operations of washing and drying but comprehend any operation or treatment to which the contents may be subjected while passing through the apparatus.

In furtherance of the foregoing general objects, I have provided a plurality of tumbling drums coupled in series and having internal spiral ribs for positively feeding the batches or contents to be treated lengthwise from the inlet to the discharge end of the respective drums. In one or more of these drums the contents will be washed or subjected to treatment in a bath, and in a following drum or drums will be dried or subjected to a different treatment. I have provided each washing drum or drums with a conical spiral conveyor flight for elevating the contents from the bath for rinsing and delivering to the next succeeding station, thus insuring continuity of feed, and

a substantially continuous conveyor flight from the charging to the discharging end of the apparatus. By means of this apparatus, the batches will be entered in succession at short intervals and will be fed uninterruptedly through the respective drums without varying their relative relation, thus insuring regularity and uniformity in the travel of the batches without mixing or intermingling the contents of one with another.

A further object is to provide apparatus of the character described in which the drums are interchangeable and constitute units which may be assembled in the most satisfactory relation for the needs of the particular work at hand.

My invention also contemplates the provision of washing and drying apparatus of novel construction which may be produced at a comparatively low cost and maintained and operated economically.

Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawings, in which—

Figure 1 is a side elevation of apparatus embodying my invention;

Fig. 2 is an enlarged vertical longitudinal sectional view through the washing end of the apparatus;

Fig. 3 is a similar sectional view through the drying end;

Figs. 4 and 5 are cross-sectional views taken substantially on lines 4—4 and 5—5 of Figs. 2 and 3, respectively; and

Fig. 6 is a diagrammatic view illustrating the circuit of the washing fluid.

While the embodiment disclosed herein has been particularly designed for the washing and drying of comparatively small manufactured articles as described above, it should be understood that my invention is applicable to operations other than washing and drying, and to the handling of articles or material of different descriptions in bulk as well as in individual batches. It should be understood, therefore, that the number and arrangement of drums, their mounting

and appurtenances are illustrative merely of this particular embodiment, and in no way limit the scope and application of the invention.

5 In the present case, I employ two washing drums 8 and 9 and three drying drums 11, 12 and 13 connected in series in co-axial relation and mounted to rotate as a unit. The articles or contents to be washed or
10 otherwise treated will be fed into the drum 8, and after traveling through the successive drums and subjected to treatment therein will be discharged from the remote end of the drum 13.

15 Any suitable means may be employed for supporting and revolving the drums, and in the present instance I have mounted the washing drums upon and between rollers 14, and the drying drums on rollers 15. The
20 rollers 14 also employed as drivers, are fixed to shafts 16 and 17 journaled in suitable bearings 18 fixed to a supporting frame structure designated generally by 19. Power may be applied from any suitable
25 source for driving the shafts 16 and 17, and at present I have indicated diagrammatically on Fig. 5, a driving chain 21 trained over a sprocket gear 22 fixed to the shaft 16 which in turn drives the shaft 17 through
30 the agency of a chain 23 and sprocket wheels 24. The rollers 15 are carried on suitable brackets 25 mounted on the frame structure 19 and 19'. Because of the lead of the spiral conveyor which will be presently described, the drums will be revolved in a
35 clockwise direction, viewing Figs. 4 and 5.

The washing drums 8 and 9 being identical, a description of one will suffice. Referring more particularly to Figs. 2 and 4,
40 it will be seen that the drum 8 is composed of cylindrical and conical portions 26 and 27, respectively, and has an inlet opening 28 at one end and an outlet opening 29 in its opposite end. The drum, is preferably cast
45 to shape, but may be of a built-up construction. Each end of the drum is shaped to interfit with the end of an adjoining drum, and these interfitting ends may be coupled together by any suitable means such as bolts
50 31. A spiral rib 32 cast on the internal wall of the drum reaching from end to end thereof constitutes a continuous spiral conveyor adapted for positively feeding the contents to be washed or treated from the
55 inlet to the outlet end. This spiral rib is of uniform depth throughout the cylindrical and conical portions of the drum. The latter portion of the drum has relatively large, circumferentially spaced openings through
60 its peripheral wall covered by perforated plates 33, which permit the washing fluid reaching this level to drain through.

The washing fluid is fed into the drum 8
65 through means of a nozzle 34 connected by a pipe 35 to a supply tank or reservoir 36,

a rotary pump 37 being employed for feeding the fluid. For the purpose of washing small metal parts such as screws, bolts and the like, I employ a soda solution at a high temperature. A separate tank 38, pump 39,
70 pipe casing 41 and nozzle 42 supply a weaker washing solution to the drum 9, the pipe 41 being supported at its nozzle end in a bearing carried by a bracket 40, fixed to the inlet end of the drum 9. The second bath
75 may, however, be used for rinsing, and as already explained, the nature and number of baths are not essential to the present invention. Likewise the feed capacity is not important, although it is sufficient to cause the
80 washing solution to overflow through the perforated plates, or more particularly, to be fed up the conical portions of the drum by the spiral ribs.

Articles or material fed into the drum 8
85 through the inlet opening 28 will be tumbled by rotation of the drum and fed lengthwise therein by reason of the spiral conveyor 32. While being tumbled, the articles will be partially or wholly submerged in the washing
90 fluid and thereby thoroughly cleansed. It will be observed that the articles confined between two adjoining ribs will gravitate to the bottom of the drum and during the continued tumbling action will be advanced by
95 and between these ribs and thereby positively fed lengthwise along the bottom of the drum. Where one batch of articles covers or is spread over two or more adjoining channels, this relation will be maintained throughout the travel of the batch
100 through the drum. Consequently by charging the drum at short intervals, there will be a gap in the spiral channel between batches and each batch will maintain its initial relation to the preceding batch. As
105 the articles are elevated by the spiral ribs through the conical portion of the drum, the washing fluid carried to this level will drain through the perforated plates 33. It will be manifest that each batch after draining
110 will be discharged directly into the next succeeding drum in which it will be immediately picked up by the spiral conveyor and fed forwardly.
115

For convenience in charging the drum, I provide a charging hopper 43 pivoted at 44 and normally occupying the lower position shown in Fig. 1. The operator empties a
120 pan or container of the articles into the hopper 43 in this lowered position, and then tilts the outer end of the hopper upwardly to the position shown in Fig. 2, discharging the contents into the drum.

The drying drums 11, 12 and 13 are somewhat similar in construction to the washing drums, except that they are of uniform and smaller diameter from end to end. These drums having flanged ends 45 coupled together by bolts 46, are likewise cast to shape
125
130

with integral internal spiral ribs 47. It will be observed that the drums are so connected that the continuity of the conveyor ribs is not broken, consequently the batches will feed from the washing drum 9 into the drying drum 11 and through the succeeding drums without interruption, where they will spread out somewhat because of the smaller diameter of the drying drums and thus be thoroughly dried. These cylindrical drums are obviously interchangeable with the conical drums so that any combination or series arrangement may be effected.

Suitable means may be employed for artificially drying the articles during their passage through the drying drums. At present, I employ gas burners 48 for heating the drums. I have also perforated these drums peripherally to facilitate circulation of heated air through the batches as they are being tumbled; and to this end each drum has elongated circumferentially spaced openings 49 of substantial width covered by perforated plates 51.

In order to draw off the steam and vapor arising from the tanks 36 and 38 and from the draining solution, I have provided a hood or canopy 52 over the drums 8 and 9 which connects with a suction pipe 53. At the opposite end of the machine, it is desired to conserve the heat, and I have provided a separate hood 54 covering the drying drums.

The batches of articles to be washed and dried are fed at short intervals into the hopper 8 as described above, and each will be continuously and positively fed through the successive drums from station to station and finally discharged down the chute 55.

It will now be observed that the batches may vary in quantity so as to fill more than one conveyor channel, and to illustrate a typical case, I have indicated by dotted lines batches 56 to 66 inclusive in their travel through the machine. Inasmuch as the drums revolve at a uniform speed, the space between batches is directly proportional to the intervals between which the batches are fed into the first drum. The total time of travel is approximately the same for each batch. Consequently, apparatus of this character is very efficient and satisfactory for washing and drying of articles which vary considerably in size, number and material. This is attributed mainly to the fact that each batch maintains its identity, the articles of one batch are not mixed or intermingled with those of another, the batches are continuously and positively fed during their entire travel through the machine, and the relative relation of the batches in transit remains constant.

An important feature of my invention is, therefore, the continuous spiral conveyor composed of a series of conveyor flights

which carry the batches to different levels during and at which they are subjected to different treatments and conditions, as for example in the present case the contents are washed, drained and dried. It should be manifest that the spiral conveyor need not necessarily be in the particular form shown. Likewise, the drum structure might be varied to suit the requirements of different classes of work, and of the nature of the bath or other treatment.

In the event that the articles or material to be treated is fed continuously or in bulk into the drum 8, it will be observed that even though the contents piles up in the drum, the spirals through the conical portion will pick up only a limited quantity, thereby insuring a uniform capacity feed through the machine.

In the claims the word "contents" is used in the sense of describing the articles or material of any nature whatsoever, which are fed through the apparatus and subjected to the different treatments.

It is believed that the foregoing conveys a clear understanding of the objects prefaced above, and while I have illustrated but a single working embodiment, it should be understood that considerable change might be made in the construction and arrangement without departing from the spirit and scope of the invention as expressed in the appended claims.

I claim:

1. Apparatus of the character described for washing and drying individual batches of small parts without intermingling the parts of one batch with those of another, comprising a rotary drum having coaxial cylindrical washing and drying portions joined by an intermediate conical draining portion, an internal rib in the drum extending throughout said portions providing a continuous spiral conveyor for continuously and positively moving the batches through, and a feed chute for discharging separate batches into one end of said drum to go through the same at short intervals, from the inlet end to the outlet end of the drum so as to keep their identity and avoid intermingling of unlike articles of different batches.

2. In a washing and drying apparatus of the character described, washing, draining and drying drums coextensive and coaxial and connected to turn together for the tumbling and continuous feeding from end to end of individual batches of small parts at intervals the length of the system, the washing drum being cylindrical and of comparatively large diameter to contain washing solution with the batches for thoroughly cleaning the same, the drying drum being cylindrical and of comparatively small diameter and elongated to receive the batches

in somewhat spread out condition for drying, means for heating the drying drum, said draining drum being conical in form converging from the large diameter of the washing drum to the small diameter of the drying drum and provided with walls through which the washing solution may drain, and a continuous internal spiral rib throughout the system from end to end providing a continuous spiral conveyer for continuously and positively feeding the batches therethrough at short intervals from the inlet end to the outlet end of the system.

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