# United States Patent

[11] **3,552,602**


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[21] Appl. No. **817,456**
[22] Filed **Apr. 18, 1969**
[45] Patented **Jan. 5, 1971**


[54] **ARTICLE TRANSFER DEVICE**
**10 Claims, 4 Drawing Figs.**


[52] **U.S. Cl.** ..... **221/235,** 214/8.5
[51] **Int. Cl.** ..... **B65g 59/10**
[50] **Field of Search** ..... 214/8.5, 8.5A, 8.5F, 8.5N; 221/235; 198/35



[56] **References Cited**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 3,253,722 | 5/1966 | DeGear | 214/8.5 |
| 3,329,310 | 7/1967 | Ramsay | 221/235 |



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**ABSTRACT:** An article transfer device including a rotatable wheel having at least one recessed pocket therein, an ejecting member disposed within the pocket and biasing means normally urging the ejecting member upwardly out of the pocket. A plate extends partially over the wheel and articles are gravitationally fed individually through an opening in the plate and into the pocket. As the wheel rotates, the article introduced into the pocket is sandwiched between the ejecting member and the underside of the plate and the biasing means are compressed. As the pocket rotates beneath a cutaway portion of the plate, the ejecting member ejects the article out of the pocket, under influence of the biasing means, and the article is directed onto a guide ramp.

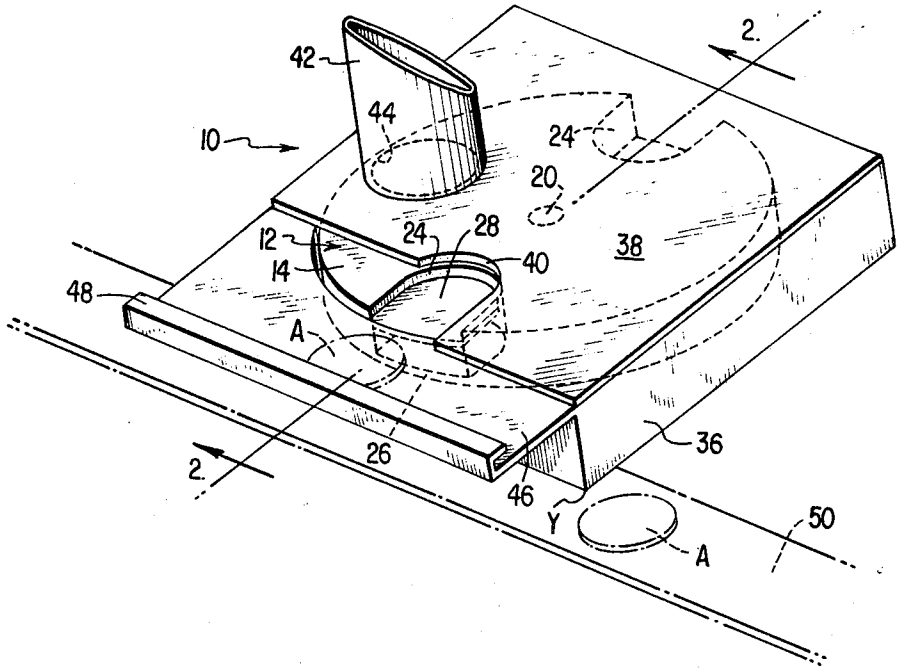
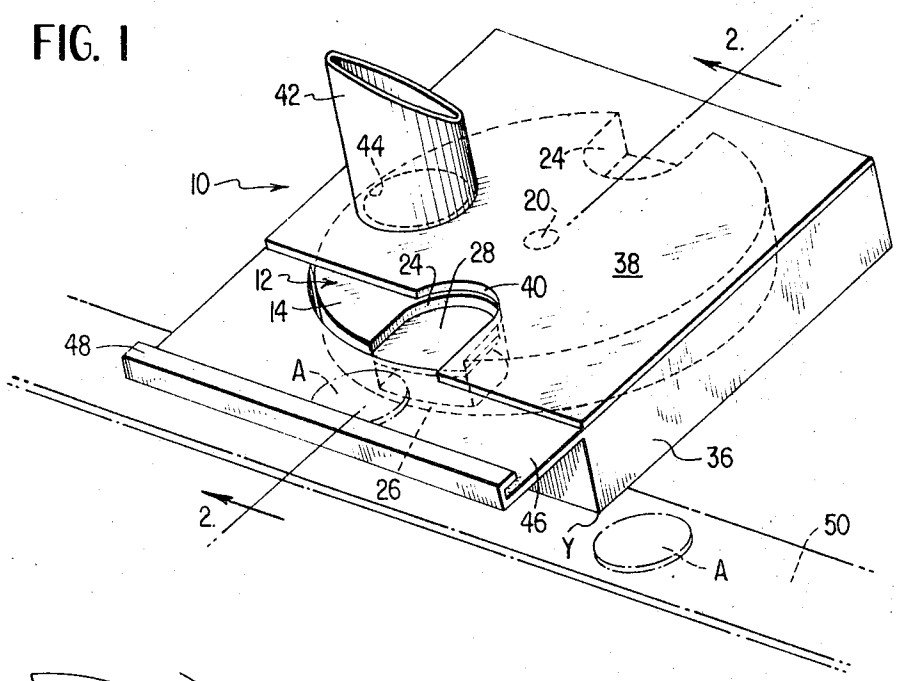



FIG. 1



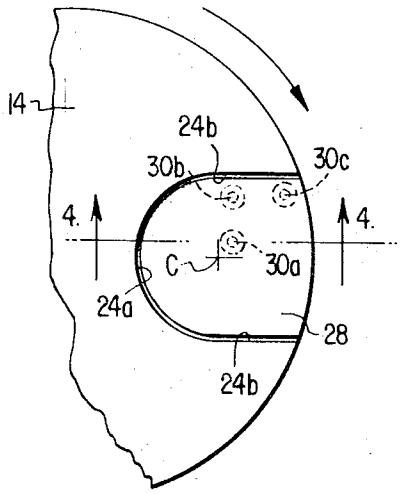




FIG. 3

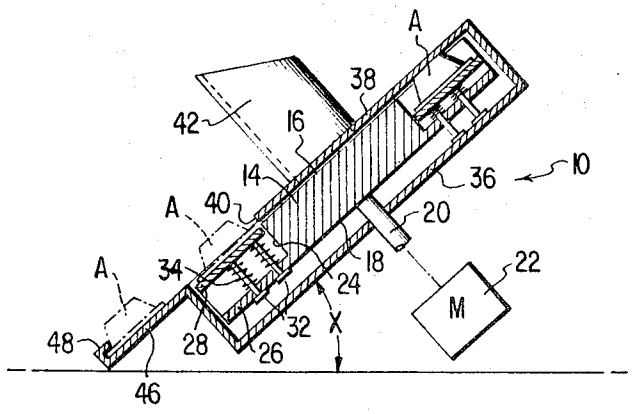



FIG. 2

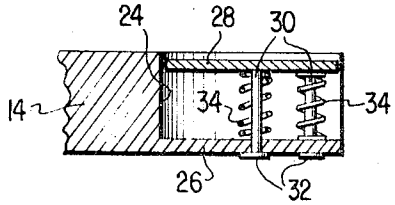



FIG. 4

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# ARTICLE TRANSFER DEVICE

This invention relates to an article transfer device, and more particularly it relates to a device which is capable of individually and incrementally feeding articles from a large stack or supply thereof.

While the present invention and its operational principles can be used with a great variety of different articles, the invention finds particular utility in connection with dishes. In commercial institutions, restaurants and other locations where a large amount of dirty dishes, of differing sizes and shapes, must be washed, it is customary practice to manually load the dirty dishes, one at a time, into a rack and to then insert the filled rack into a dishwashing machine. The present invention eliminates the need for the manually loaded rack, and instead, assures that the dirty dishes can be individually supplied to the dishwashing machine in rapid sequence. There are, of course, many other types of articles aside from dishes which could be handled and transferred by apparatus in accordance with the present invention. For example, many manufactured items have to be coated or sprayed or baked or cooled or otherwise treated. The present invention provides a unique and valuable device which can take such articles, one at a time, and transfer the same rapidly from a supply stack to the treating station, or to a conveyor which in turn moves to or through the treating station.

With the foregoing in mind, it is, therefore, an object of the present invention to provide a new and improved device for transferring articles.

Another object of the present invention is to provide an article transfer device which operates simply and efficiently, yet is relatively inexpensive and maintenance-free.

Another object of the present invention is to provide a device which can rapidly and positively move articles out of a stack thereof and transfer such articles to a remote location.

Another object of the present invention is to provide an article transfer device which is relatively "automatic" in operation and which can perform the desired transfer function without the presence of any human attendant or operator.

Other objects, advantages and salient features of the present invention will become apparent from the following detailed description, which, taken in conjunction with the annexed drawings, discloses a preferred embodiment thereof.

The foregoing objects are attained generally by providing a rotatable wheel having at least one axially recessed pocket therein. The pocket contains an ejecting means in the form of a movable ejecting member and biasing means normally urging the member toward an ejecting position. The wheel is mounted for rotation beneath a plate member having a cutaway portion so that as the wheel rotates, the pocket normally underlies the plate, but during rotation the pocket will eventually pass beneath the cutaway portion and thus be exposed. An article supply means in the form of a chute or other supply chamber is provided above the plate, and an opening is formed in the plate, in alignment with the pocket so that articles can gravitationally feed downwardly through the opening in the plate toward the pocket. As the wheel rotates, the empty pocket passes beneath the opening and a single article drops into the pocket. As the wheel continues to rotate, the article is sandwiched between the ejecting member and the underside of the plate, thus compressing the biasing means. When the wheel rotates through a sufficient arc to reach the cutaway portion, the upper restraint on the article is removed and hence the ejecting member is forced upwardly by the biasing means to thus "pop" the article out of the pocket. The article itself can then pass along a guide ramp and can drop onto a movable conveyor or the like.

Referring now to the drawings, which form a part of this original disclosure:

FIG. 1 is a perspective view of an article transfer device in accordance with the principles of the present invention;

FIG. 2 is a transverse sectional view thereof taken along the line 2–2 of FIG. 1;

FIG. 3 is an enlarged fragmentary plan view of a portion of the wheel; and



FIG. 4 is a sectional view taken along the line 4–4 of FIG. 3.

Referring now to FIGS. 1 and 2, the article transfer device in accordance with the principles of the present invention is generally designated **10**. The device includes a rotatable means generally designated **12** in the form of a thickened wheel **14** having an upper surface **16** and a lower surface **18**. The wheel includes a stub shaft **20** extending perpendicularly from the rear surface **18** thereof and adapted to be mounted to and driven by a suitable motor or other drive means **22**.

The wheel **14** includes at least one pocket **24** formed at the periphery thereof, although in the illustrated form of invention, two such pockets **24** are provided, with the pockets being offset **180** degrees from each other. Each pocket **24** is recessed from the upper surface **16** axially of the axis of rotation of the wheel, i.e. axially of the shaft **20**. The recessing of the pocket **24** in this manner leaves a web portion **26** of the wheel extending beneath the pocket.

The configuration of each pocket **24** can best be seen from FIG. 3 wherein the inner portion **24*a*** of the pocket is formed as a semicircle generated about a central point C. The sides **24*b*** of the pocket extend parallel to one another as tangent lines to the circular portion **24*a***.

Within each pocket, an ejecting member **28** is movably mounted. The member **28**, as shown in FIGS. **1** and **3**, is shaped substantially identically to the shape of the pocket **24**, but is slightly smaller than the pocket to thus enable the plate to move freely upwardly and downwardly within the pocket, without contact against the sides **24*b*** or the inner portion **24*a*** of the pocket. Biasing means are provided for urging the ejecting member **28** upwardly or out of the pocket **24**, and as shown in FIGS. **2** and **4**, such biasing means includes a plurality of pins **30** having one end attached to the underside of the ejecting member **28** and having the other end projecting through the web portion **26** of the wheel and terminating in an enlarged head **32** which abuts against the underside of the wheel at the web portion **26**. Each pin **30** is surrounded by a compression spring **34** which reacts between the top of the web portion **26** and the bottom of the ejecting member **28**. As a result, when the ejecting member **28** is depressed, the pins **30** are moved downwardly, the heads **32** are moved away from contact with the web portion **26** and the springs **34** are compressed. When the force against the ejecting member **28** is released, the springs **34** will urge the same upwardly until the heads **32** contact against the underside of the web portion **26** in the manner shown in FIG. **4**. The preferred placement for the pins **30** is shown in FIG. **3** from which it will be noted that three such pins **30** are provided, the pins being respectively designated **30*a***, **30*b*** and **30*c***. Pin **30*a*** is coincident with or quite near to the center point C. Pin **30*b*** is radially aligned with pin **30*a*** along a radius which is substantially coincident with the intersection of the pocket portions **24*a*** and **24*b***. Pin **30*c*** is aligned with pin **30*b*** along a line substantially parallel to the side **24*b*** of the pocket. This placement of the pins, of course, assumes a direction of rotation as shown by the arrow in FIG. **3** which indicates the wheel **14** to be rotating in a clockwise direction.

The wheel **14** may remain exposed, or may be positioned within a surrounding housing or casing **36**, as shown in FIG. **2**, but in either event, the wheel is disposed at an angle *x* with respect to horizontal. This angle can be varied somewhat, but is preferably in the neighborhood of 45° to assure proper gravitational movement of the articles being transferred.

Regardless of whether or not a casing **36** is employed, there is, in any event, a plate member **38** provided in overlying relationship to the wheel **14**. If the casing **36** is provided, then the plate **38** can form the top surface thereof, and if no such casing is used, then some other means must be provided for mounting the plate **38** in a manner so that the same closely overlies the top surface **16** of the rotatable wheel **14**. The plate **38** is provided with a cutaway portion **40**, as shown in FIG. **1**, with the configuration of this portion being such that a pocket **24** on the rotating wheel **14** is fully exposed and uncovered as it passes beneath the cutaway portion **40**.

Means are provided for introducing an article into each pocket **24** of the rotatable wheel **14**, and one suitable such means is a chute means **42** which is attached to and projects above the plate **38**. At the base of the chute means **42**, an opening **44** is formed through the plate, with the placement of this opening being determined so that a pocket **24** will be positioned directly therebeneath as the wheel **14** rotates.

Articles designated A may be disposed in stacked relation within the chute means and can be supplied thereto by any suitable method. For example, the chute means, which has been illustrated as foreshortened for purposes of simplification, may be quite elongated, and the same may be manually loaded with articles A. Alternatively, the chute means **42** can be simply located beneath a manufacturing machine in which articles are fabricated, so that as the articles A are formed, they simply drop into the chute means. As another alternative, if the articles A are dirty dishes to be washed, they may simply be manually loaded into the chute means **42**. In any event, due to the disposition of the chute means **42**, the articles stacked therein will gravitationally feed toward the bottom and toward the opening **44** in the plate **38**.

The lowermost article A in the chute means **42** will thus be disposed within the opening **44** through the plate **38** and will be resting upon the top surface **16** of the rotating wheel means. This lowermost article will not, however, move any lower until a pocket **24** moves into alignment with the opening **44**. At this point, the lowermost article will drop into the pocket and become supported by the ejecting member **28** which will still be biased upwardly by the biasing springs **34**. The weight of the other articles in the chute means will, to some degree, depress the ejecting member **28**, but such depression is not even necessary. This is so because the continuing rotation of the wheel **24** will cause the leading edge of the article to once again pass beneath the plate **38**. This causes the article to be pressed downwardly, and to in turn depress the ejecting member **28** against the biasing force of the springs **34**. In other words, as the wheel **14** rotates to move the pocket **24** out of alignment with the opening **44**, the article within the pocket is "sandwiched" between the underside of the plate **38** and the ejecting member **28**. This "sandwiching" of the article will continue until the pocket rotates a sufficient distance to reach the cutaway portion **40**. At this point, the upper restraint of the plate **38** is removed and the biasing springs **34** thus force the ejecting member **28** upwardly to eject or "pop" the article A out of the pocket.

A guide ramp **46** can be provided at the forward end of the device **10**, and while this ramp **46** is shown in FIGS. **1** and **2** as being formed integrally with the casing **36**, it can be mounted in some other fashion if the casing is not employed. A lip portion **48** is provided at the lowermost end of the guide ramp so that the articles being ejected from the pocket will pass across the guide ramp **46**, will engage against the lip **48** and will then slide laterally along the guide ramp **46** and will eventually drop therefrom to some suitable receiver, as, for example, a moving conveyor shown schematically as **50** in FIG. **1**. In order to assure proper gravitational flow along the guide ramp **46**, that corner of the device **10** designated Y in FIG. **1** may be angularly lowered somewhat.

It will thus be understood that the device **10** of the present invention is capable of operating upon and transferring a variety of articles A having different sizes and shapes. The maximum size of the article would, of course, be the size of the pocket **24**, but so long as the size of the article did not exceed the pocket size, even very small articles could be transferred by the present invention. Also, the thickness or depth of articles A can vary somewhat, yet the present invention will operate satisfactorily. For example, flat saucers or dinner dishes having a rather shallow depth will only cause the ejecting member **28** to be depressed slightly. On the other hand, as shown in FIG. **2**, rather deep dishes could also be handled by the present invention, and the deeper dishes would simply depress the ejecting member **28** somewhat further.

After reading the foregoing detailed description, it will be apparent that the objects set forth at the outset of the specification have been successfully achieved by the present invention.

I claim:

**1**. An article transfer device comprising:

a rotatable means having at least one article receiving pocket therein;

a member mounted within said pocket for supporting an article which is introduced into said pocket;

means for introducing an article into said pocket for support by said member;

a plate at least partially overlying said rotatable means;

biasing means normally urging said member toward said plate; and

said device thus being operative to receive an article upon said member and to sandwich said article between said plate and said member as said rotatable means rotates, said article being ejected from said pocket by said member and said biasing means when said pocket rotates to a position where said plate no longer overlies said article.

**2**. An article transfer device as defined in claim **1** wherein said rotatable means is a wheel having an upper and a lower surface and wherein said pocket is formed at the periphery of said wheel.

**3**. An article transfer device as defined in claim **2** wherein said pocket is recessed from said upper surface axially of the axis of rotation of said wheel, thus leaving a web portion of said wheel extending beneath said pocket.

**4**. An article transfer device as defined in claim **3** wherein said biasing means is interposed between and reacts against said web portion and the underside of said member.

**5**. An article transfer device as defined in claim **4** wherein said biasing means includes a plurality of pins having one end attached to the underside of said member and having the other end projecting through said web portion and terminating in an enlarged head which abuts against said wheel lower surface at the underside of said web portion, and a compression spring surrounding each of said pins.

**6**. An article transfer device as defined in claim **1** wherein said plate has a cutaway portion which exposes said pocket as said rotatable means rotates.

**7**. An article transfer device as defined in claim **1** wherein said means for introducing an article into said pocket includes an upstanding chute means mounted on said plate and adapted to contain a plurality of stacked articles.

**8**. An article transfer device as defined in claim **7** wherein said plate has an opening therein beneath said chute means, said opening being aligned with said pocket at one position of rotation of said rotatable means so that an article from said chute means can gravitationally drop through said opening and into said pocket.

**9**. An article transfer device as defined in claim **1** further including a guide ramp adjacent said rotatable means for receiving and directing an article ejected from said pocket.

**10**. An article transfer device as defined in claim **9** wherein said device is disposed at an angle with respect to horizontal and wherein said guide ramp is at the lower most portion of said device whereby an article ejected from said pocket will gravitationally feed into said guide ramp.