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Morewood

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[54] **SELF-FEEDING DEVICE FOR HANDICAPPED PERSONS**

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[52] **U.S. Cl.** .....**214/1 T,** 214/1 CM, 214/DIG. 10

[51] **Int. Cl.** **A47g 21/08**

[58] **Field of Search** .....214/1 Q, 1 T, 1 CM, 214/130 R, 1 BD, DIG. 10

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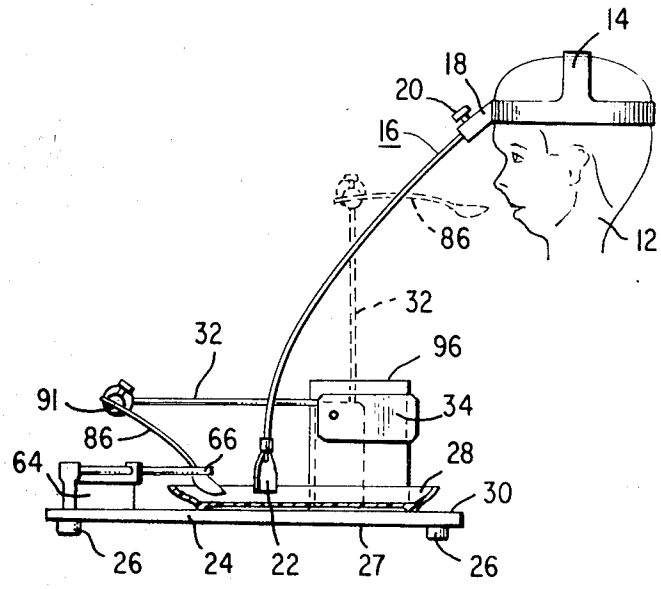
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Attorney—Arthur I. Spechler

[57] **ABSTRACT**

A self-feeding device is operated by an electric motor that is energized through a switch adapted to be activated by a wand attached to a handicapped operator who need only be able to control the motion of his head and neck. The device comprises a spoon clamped to a first shaft that is mounted for rotation adjacent one end of a tubular arm. The electric motor is coupled to a second shaft, fixed adjacent to the other end of the tubular arm, to reciprocate the arm over a 90 degree angle, between horizontal and vertical positions. Cams are provided so that each time the switch is actuated the arm rotates 90°. A link, disposed within the tubular arm, has one end coupled to the first shaft through a crank and the other end pivoted so that the spoon can be disposed within a dish at an angle of less than 180° to the horizontal, whereby food may be pushed, via the wand, from the dish onto the spoon when the arm is in a horizontal position. The spoon is automatically rotated to a substantially horizontal position when the arm is moved to a vertical position.

6 Claims, 5 Drawing Figures



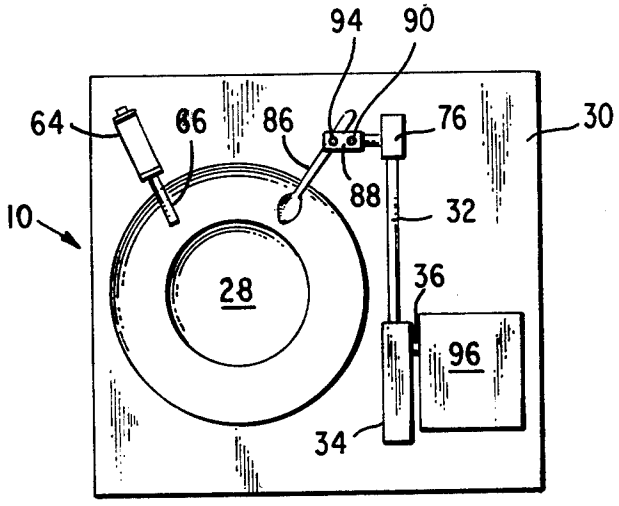


Fig. 2.

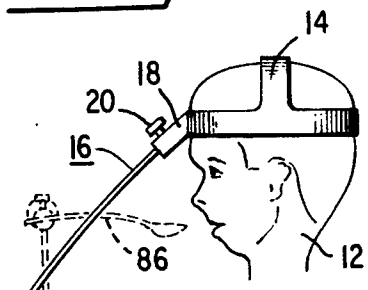
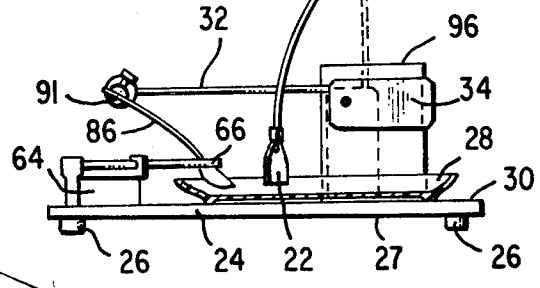


Fig. 1.



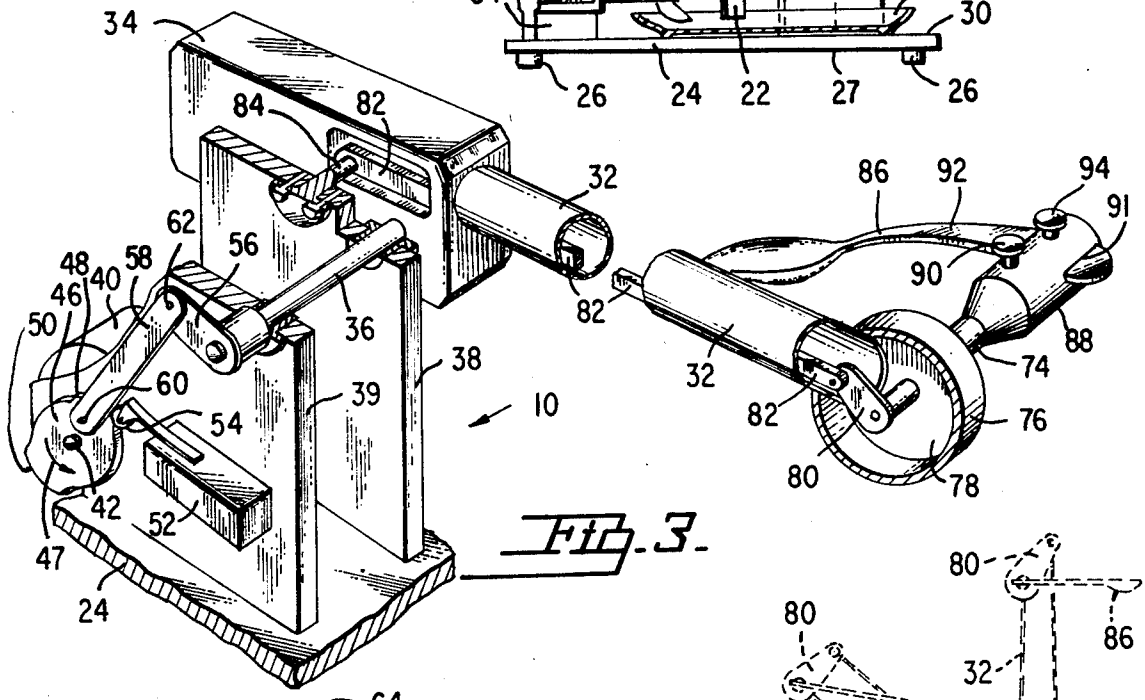


Fig. 3.

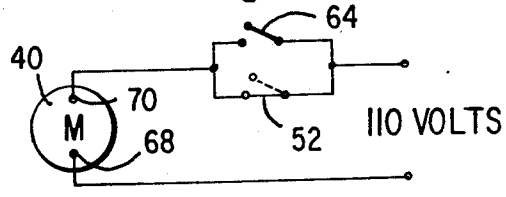


Fig. 5.

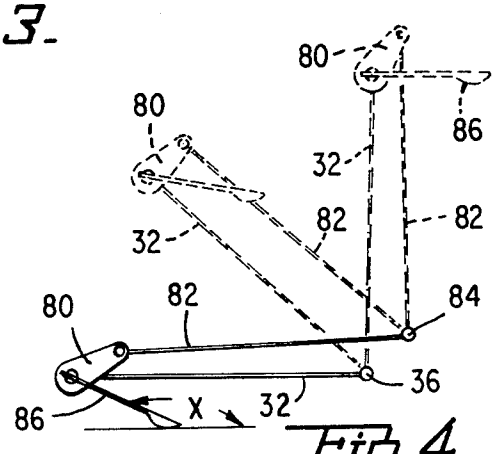


Fig. 4.

SELF-FEEDING DEVICE FOR HANDICAPPED PERSONS

BACKGROUND OF INVENTION

This invention relates generally to a self-feeding device for handicapped persons, and more particularly to a self-feeding device for a person who can move his head and neck but not his arms and feet.

It has been proposed to provide self-feeding devices for handicapped persons but many of the prior-art devices require the use of the person's legs and feet. Consequently, handicapped persons who cannot use either their feet or arms cannot use these devices. Many of the prior-art self-feeding devices are rather bulky and complex so that the handicapped person cannot conveniently eat at the same table with his family. Also, some of the moving parts of the prior-art devices present safety hazards in that the operator's hair or clothing may become caught in these parts.

It is an object of the present invention to provide a self-feeding device for persons who may be able to control only the motion of their neck and head.

Another object of the present invention is to provide a self-feeding device which will enable a person using it to eat at the same table with his family.

Still another object of the present invention is to provide a self-feeding device that utilizes conventional eating implements and dishes, which can be easily removed for washing.

A further object of the present invention is to provide a self-feeding device wherein a feeding implement may be disposed first at an angle with respect to a plate for easily loading the implement with food from the plate, in any desired sequence of the food, and then disposing the feeding implement in a horizontal position near the eater's mouth for consuming the food.

Still a further object of the present invention is to provide a self-feeding device that is relatively smaller, easier to operate, lighter in weight and more portable than many prior-art self-feeding devices.

SUMMARY OF THE INVENTION

The novel self-feeding device of the present invention is adapted to be operated by an electric motor that is energized through a switch; and the switch is adapted to be actuated by a wand attached to the body of the operator. The self-feeding device comprises a tubular arm and means, including a drive shaft, adjacent one end of the tubular arm for reciprocating the tubular arm over an angle of 90°. The tubular arm rotates through 90° each time the switch is actuated. A second shaft is rotatably mounted adjacent the other end of the tubular arm and adapted to hold a feeding implement. When the tubular arm is in a horizontal position, the feeding implement is disposed at an angle of less than 180° with respect to a dish so that food from the dish can be pushed, by the wand, onto the feeding implement. When the tubular arm is rotated to a vertical position, means are provided to cause the second shaft to rotate in a direction to increase the angle the feeding implement makes with the horizontal, whereby the operator may retrieve the food from the feeding implement easily with his mouth.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view, of the self-feeding device, a plate being shown in cross-section, and an arm of the device being shown in two extreme positions of travel, one of the positions being shown in phantom;

FIG. 2 is a plan view of the self-feeding device;

FIG. 3 is a perspective view of the self-feeding device with parts cut away to show the operation of the device;

FIG. 4 is a schematic drawing of a portion of the feeding device to illustrate the feeding implement in different positions of the arm of the device; and

FIG. 5 is a wiring diagram of the self-feeding device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1 and 2 of the drawings, there is shown a self-feeding device **10** adapted to be operated by a handicapped person **12** who does not have the use of his arms, hands and legs. The person **12**, however, can move his head and neck. A suitable headband **14**, of the type used in welder's hats, for example, is disposed securely on the head of the person **12** by any suitable means for manipulating a wand **16** for the purpose hereinafter appearing.

A tubular member **18** is fixed to the headband **14** and disposed at an angle thereto for receiving one end of the wand **16** therein. The upper end of the wand **16** is secured to the member **18** by a screw **20.** A pusher **22** of a washable material, such as "Nylon" or "Teflon" plastic material, that can function as a shovel and as a switch actuator is fastened, by any suitable means, to the other end of the wand **16** for the purpose hereinafter appearing. It will now be understood that the person **12** can manipulate the wand **16** to different parts of the device **10** by moving his head and neck appropriately.

The self-feeding device **10** comprises a baseboard **24** of generally rectangular shape adapted to rest upon a table and has a plurality of spacer feet **26** which are fixed to the lower surface **27** of the baseboard **24** to prevent the baseboard **24** from marring a table top when resting thereon. A dish, such as a plate **28,** is placed on the upper surface **30** of the baseboard **24.** Food (not shown) to be fed to the handicapped person **12** is placed on the plate **28** from where it may be transferred adjacent a handicapped person's mouth in a manner to be hereinafter explained.

Referring now to FIG. 3 of the drawing, there is shown a tubular arm **32** having one end fixed to a counter weight **34.** A main drive shaft **36** is journaled in two parallel spaced-apart walls **38** and **39** that extend upwardly from the baseboard **24.** The drive shaft **36** is rigidly fixed to the counter weight **34** adjacent one end of the arm **32.** The drive shaft **36** is disposed perpendicularly to the tubular arm **32.**

Means are provided to rotate the main drive shaft **36** about its axis and to reciprocate the tubular arm **32** over an angle of 90°. To this end, an electric motor **40** is fixed to the baseboard **24** so that its shaft **42** extends through an opening in the wall **39.** A cam member **46** is fixed to the end of the shaft **42** for rotation therewith in the direction of the arrow **47.** The cam member **46** has raised portions **48** and **50** disposed 180° apart. A normally-closed micro switch **52** is fixed to the wall **44,** by any suitable means, and has a cam follower **54** that rides on the cam member **46.** The cam follower **54** is adapted to be raised by the raised portions **48** and **50** during the rotation of the cam member **46** and thereby open the micro switch **52** when its cam follower **54** is so actuated.

A crank 56 is fixed to an end of the main drive shaft 36 and a connecting rod 58 has its ends pivotally attached to a pivot 60 fixed to the cam member 46 and a pivot 62 fixed to the crank 56. The dimensions of the crank 56, the connecting rod 58, and the pivotal connections of the connecting rod 58 to the crank 56 and to the cam member 46 are such that a 180° rotation of the cam member 46 causes the main drive shaft 36, and the tubular arm 32 fixed thereto, to rotate over an angle of 90° whereby the arm 32 moves from a horizontal position to a vertical position. Another 180° rotation of the cam member 46 in the same general direction of rotation causes the main drive shaft 36 to rotate in an opposite direction from its previous direction of rotation and causes the arm 32 to move from its extreme vertical position back to its extreme horizontal position. Thus, a 360° rotation of the cam member 46 causes the main drive shaft 36 and the tubular arm 32 fixed thereto to reciprocate a full cycle over a 90° angle.

The motor 40, which may be a synchronous motor, has reduction means for rotating its shaft 42 at a rate of about 10 rpm. Means are provided to energize the motor 40. To this end, there is provided a normally-open micro switch 64 fixed to the baseboard 24 adjacent an edge thereof (FIGS. 1 and 2). A rod 66 is pivotally connected adjacent one end thereof to the micro switch 64 in a manner whereby the normally-open micro switch 64 can be closed by depressing the rod 66 as with the pusher 22 of the wand 16.

Referring now to FIG. 5 there is shown a schematic diagram of the manner in which the normally-closed micro switch 52 and normally-open micro switch 64 are connected to the motor 40. The motor 40 has one terminal 68 connected to one output terminal of a suitable source of voltage, such as conventional 110 volt ac line, and another terminal 70 connected to the other output terminal of the voltage source through parallely connected switches 52 and 64. The wiring diagram of FIG. 5 is such that the motor 40 can be energized through either the micro switch 62 or the micro switch 54 when either one is closed.

Means are provided to receive food from the plate 28 and to deliver it to the mouth of the operator, the handicapped person. To this end, a shaft 74 (FIG. 3) capable of rotation about its axis is disposed adjacent the distal end of the tubular arm 32 and perpendicular to the tubular arm 32. The tubular arm 32 has an enlarged hollow compartment 76 fixed to its distal end, as by welding or soldering, as shown in FIG. 3. The shaft 74 is journaled for rotation in a vertical wall 78 of the compartment 76. A crank 80 is fixed to the end of the shaft 74 within the compartment 76, and a link 82, disposed mostly within the tubular arm 32, has one end pivotally affixed to the crank 80 and the other end pivotally affixed to a pivot 84 that extends from the wall 38 into a recess cavity in the counter weight 34. The distance between the pivot 84 and the axis of the main drive shaft 36 is greater than the radial length of the crank 80 for the purpose hereinafter appearing.

Means are provided to attach a feeding implement, such as a spoon 86, for example, to the shaft 74. Thus, an adjustable coupling sleeve 88 comprises a tube and a set screw 90 adjacent on end thereof for connecting the sleeve 88 to the shaft 74, and a slot 91 for holding the handle 92 of the implement 86 therein with the aid of a set screw 94.

The rotation of the spoon 86 about its axis during the travel of the tubular arm 32 from its horizontal position to the vertical position will be explained with the aid of the schematic diagram of FIG. 4. The distance between the axes of the shafts 36 and 74 and the distance between the pivot centers of the link 82 are substantially equal. The distance between the axis of the main drive shaft 36 and the pivot 84 for the link 82 is relatively greater than the radial length of the crank 80. With this structure, the spoon 86 can be adjusted by means of the set screw 90 on the sleeve 88 so that the rim of the bowl of the spoon 86 touches the inside of the plate 28, whereby the spoon 86 makes an angle x (FIG. 4) of less than 180° with the horizontal. When the tubular arm 32 is raised to its vertical position, the spoon 86 is rotated so that the angle x increases, whereby the spoon now makes an angle of about 180° with the horizontal. Thus, when the tubular arm 32 is in its horizontal position the spoon 86 is disposed in a manner whereby food can be shoveled into the bowl of the spoon by means of the pusher 22 of the wand 16. When however, the tubular arm 32 is rotated to its vertical position the bowl of the spoon 86 is in a substantially horizontal position so that the handicapped person operating the self-feeding device 10 can easily remove the food from the spoon 86.

The operation of the self-feeding device 10 by the handicapped person 12 able to move only his head and neck will now be described. Let it be assumed that the tubular arm 32 is in its horizontal position, the spoon 86 is adjusted so that the front edge of the rim of the bowl of the spoon 86 is substantially in contact with the bottom of the plate 28 and disposed at an angle thereto so that food on the plate 28 can be pushed into the bowl of the spoon 86 by manipulating the pusher 22 and the wand 16 by the head of the handicapped person 12. The cam member 46 is disposed so that its raised portion 48 opens the normally-closed micro switch 52. In order to raise the spoon 86 to substantially the level of the mouth of the operator 12, the operator presses the rod 66 with the pusher 22 of the wand 16 to close the normally-open micro switch 64. The rod 66 is depressed for a couple of seconds until the energized motor 40 rotates the cam member 46 so that the cam follower 54 no longer rides on the raised portion 48. At this point, the normally-closed micro switch 52 completes the circuit to the power source and causes the tubular arm 32 to rotate to the vertical position, shown in phantom in FIG. 1. At this point, the cam follower 54 of the normally-closed micro switch 52 rides on the raised portion 50 of the cam member 46 and disconnects the power source from the motor 40, thereby stopping the tubular arm 32 in the vertical position. After the operator 12 has removed the food from the spoon 86, he again momentarily depresses the rod 66 to actuate the normally-open micro switch 54 to rotate the cam member 46 until the cam follower 54 no longer rides on the raised portion 50. At this point, the normally-closed micro switch 52 closes and causes the main drive shaft 36 to rotate until the cam follower 54 is raised again by the raised portion 48 of the cam member 46. When this happens, the tubular arm 32 has again reciprocated to its horizontal position, and the spoon 86 is disposed at an angle to the horizontal to receive food from the plate 28. By manipulating the wand 16 with his head, the operator 12 can push food from any position on the plate 28 into the bowl of the spoon 86 in any desired sequence. It is noted that, in order to

energize the motor **40**, it is only necessary to depress the rod **66** with the wand **16** momentarily until a raised portion (**48** and **50**) of the cam member **46** moves away from the cam follower **54**. Once this happens, the normally closed micro switch **52** takes over until a raised portion (**48** or **50**) of the cam member **46** again causes the cam follower **54** to open the normally closed switch **52**. The raised portions **48** and **50** of the cam member **46** are long enough to allow the motor **40** to coast to a stop without reenergizing the switch **52**, thereby stopping the tubular arm **32** in either its horizontal position or its vertical position. Most of the moving parts of the self-feeding device **10** are enclosed by a cover **96** to prevent hair or clothing or parts of the body from being caught in the moving parts. Also, by enclosing the link **82** within the tubular member arm **32** and the crank **80** within a hollow compartment **76**, the self-feeding device **10** is rendered safe for use by handicapped persons.

While the feeding implement described herein for use with the novel self-feeding device is a spoon, it is within the contemplation of the present invention to utilize other feeding implements, such as forks, soup spoons, and the like. Also, instead of attaching the wand to the operator's head, as shown and described, it is also within the contemplation of the present invention to attach the wand to other movable parts of the operator's body.

What is claimed is:

1. A self-feeding device comprising:
- a tubular arm,
- a main drive shaft,
- means fixing said main drive shaft adjacent one end of said arm,
- means to reciprocate said main drive shaft about its axis over an angle of substantially 90°, whereby to reciprocate said arm between a substantially horizontal position to a substantially vertical position,
- a link disposed within said arm,
- a first fixed pivot,
- means connecting one end of said link to said first pivot for movement thereabout,
- a second shaft,
- means disposing said second shaft for rotation about its axis, adjacent the other end of said arm, and substantially parallel to said main drive shaft,
- a crank fixed adjacent one end of said second shaft,
- means pivotally connecting the other end of said link to said crank to rotate said second shaft when said tubular arm is reciprocated,
- a feeding implement, and
- means attaching said implement adjacent the other end of said second shaft.

2. A self-feeding device as described in claim **1**, wherein
- the distance between said first fixed pivot and said main drive shaft is greater than the radial length of said crank.

3. A self-feeding device as described in claim **2**, wherein
- said main drive shaft is perpendicular to said tubular arm, and
- said means to reciprocate said main drive shaft comprises a motor, a cam member coupled to said motor, and two switches connected in parallel with each other and each in series with said motor, one of said switches being normally closed and comprising means to be opened with every 180° rotation of said cam member.

4. A self-feeding device adapted to be operated by an electric motor that is energized through a first switch, which is actuated by a wand attached to the body of an operator, said device comprising:
- a baseboard for holding a dish,
- means mounting said first switch on said baseboard for actuation by said wand,
- a tubular arm,
- a feeding implement,
- means mounting said implement, adjacent one end of said arm, for rotation about a first axis perpendicular to said arm,
- means, coupled to said motor, for reciprocating said arm over an angle of 90° between a substantially horizontal position and a substantially vertical position, about a second axis adjacent the other end of said arm and substantially parallel to said first axis; said arm moving through about 90° each time said first switch is actuated, and
- means, including a first link within said tubular arm, to dispose said implement in contact with said dish and at an angle of less than 180° with the horizontal when said arm is in a horizontal position and to rotate said implement to dispose it at an angle closer to 180° with the horizontal when said arm is moved to its vertical position.

5. A self-feeding device as described in claim **4**, wherein
- said means mounting said implement for rotation about said first axis comprises a first shaft disposed for rotation about said first axis substantially perpendicular to said arm,
- an adjustable sleeve coupled to one end of said first shaft and having means for adjustably engaging said implement,
- said means to dispose said implement in contact with said dish comprising a first crank coupled to the other end of said first shaft, and
- means pivotally attaching said first crank to said first link.

6. A self-feeding device as described in claim **5**, wherein
- said means for reciprocating said arm over an angle of 90° comprises a main drive shaft disposed perpendicularly to said arm and adapted to rotate about said second axis,
- a counter weight fixed to said other end of said arm,
- one end of said main drive shaft fixed to said counter weight,
- a second crank fixed to the other end of said main drive shaft,
- a cam member coupled to said motor and having two raised portions disposed 180° from each other,
- a second link pivotally linking said cam member with said second crank,
- a second switch having cam follower means in contact with said cam member, and
- said first and second switches being connected in series with said motor and in parallel with each other.

* * * * *