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McGuire et al.

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[54] LABEL TRANSFER WHEEL

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[52] **U.S. Cl.** **156/539**, 156/556, 156/567, 156/568, 156/571, 219/244, 219/471

[51] **Int. Cl.**.....**B65c 9/08**, B65c 9/14, B65c 9/24

[58] **Field of Search**.....156/539, 556, 564, 566, 567, 156/568, 571, DIG. 21, DIG. 28, DIG. 30, DIG. 31, DIG. 33, DIG. 39, DIG. 40, DIG. 51; 219/244, 469, 471

[56] **References Cited**

UNITED STATES PATENTS

3,532,854	10/1970	Sheriff	219/216
3,152,943	10/1964	Eddison et al.	156/DIG. 31
3,005,565	10/1961	Doane et al.	156/571
2,492,908	12/1949	Von Hofe	156/DIG. 31
2,722,332	11/1955	Carter	156/571 X
3,026,238	3/1962	Dotzenroth	156/DIG. 31
3,159,521	12/1964	Pechmann	156/568 X
3,222,059	12/1965	Southcott	156/571 X
3,464,871	9/1969	Smith	156/571 X

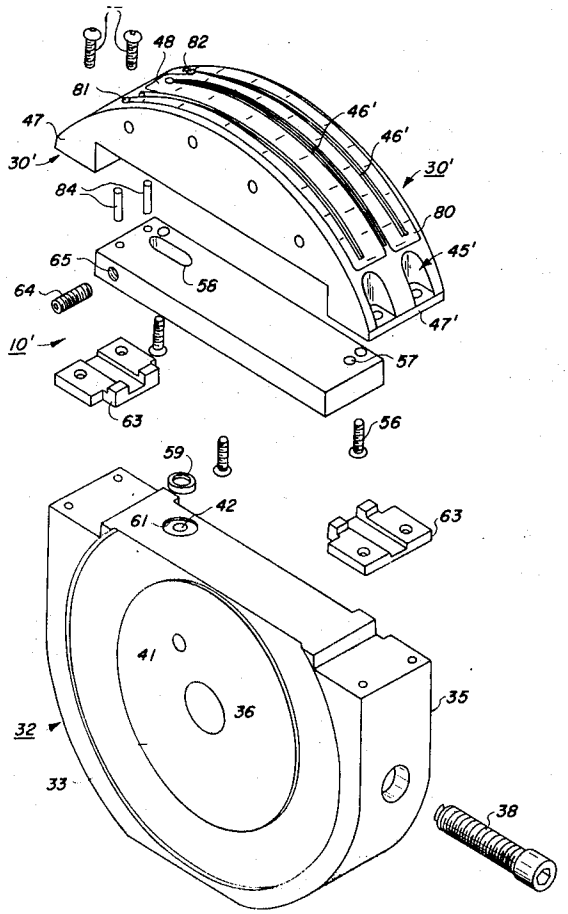
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[57] **ABSTRACT**

A transfer wheel with a radially extended land portion for transferring address-bearing labels or the address information therefrom onto articles being labeled. The transfer wheel land includes a series of thin slot-like vacuum holddown grooves extending along the periphery thereof in the plane of transfer wheel rotation. An individual vacuum admission port is provided for each holddown groove adjacent the leading end thereof, the ports being normally open to the atmosphere and serving to initially attract and attach the leading end of the labels thereto. The arrangement is such that direct communication of the supply ports with the atmosphere is first closed off by the label itself, thereby enhancing the vacuum pull-down effect within the holddown grooves to progressively cause the remainder of the label to be attached to the surface of the transfer wheel land in a sort of rolling action so that free spots or buckling of the label is avoided. As a further modification, in heat transfer applications, the surface of the land consists of a resistor type heating material alongside and between the vacuum holddown grooves to heat the label prior to transfer.

3 Claims, 6 Drawing Figures



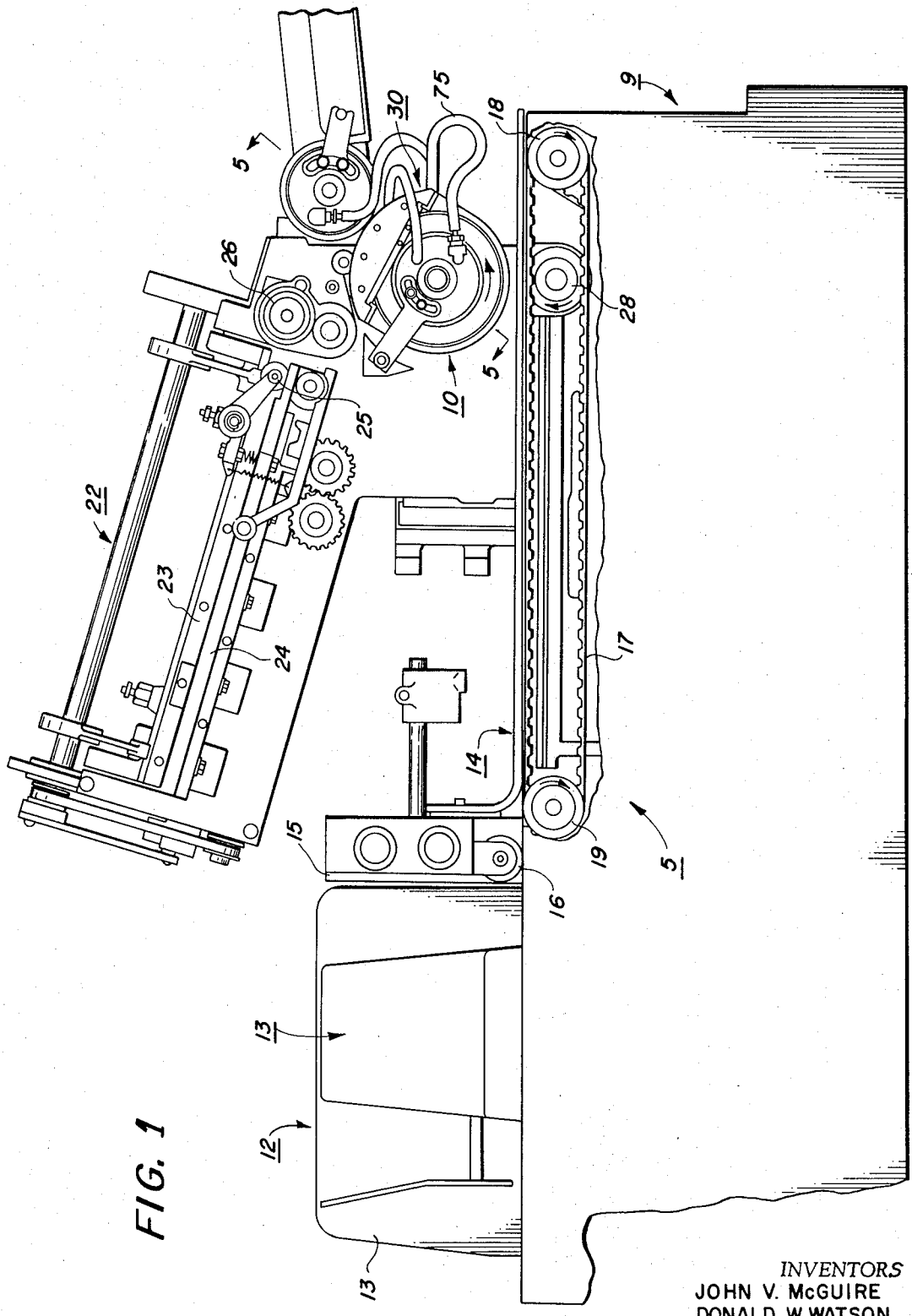


FIG. 1

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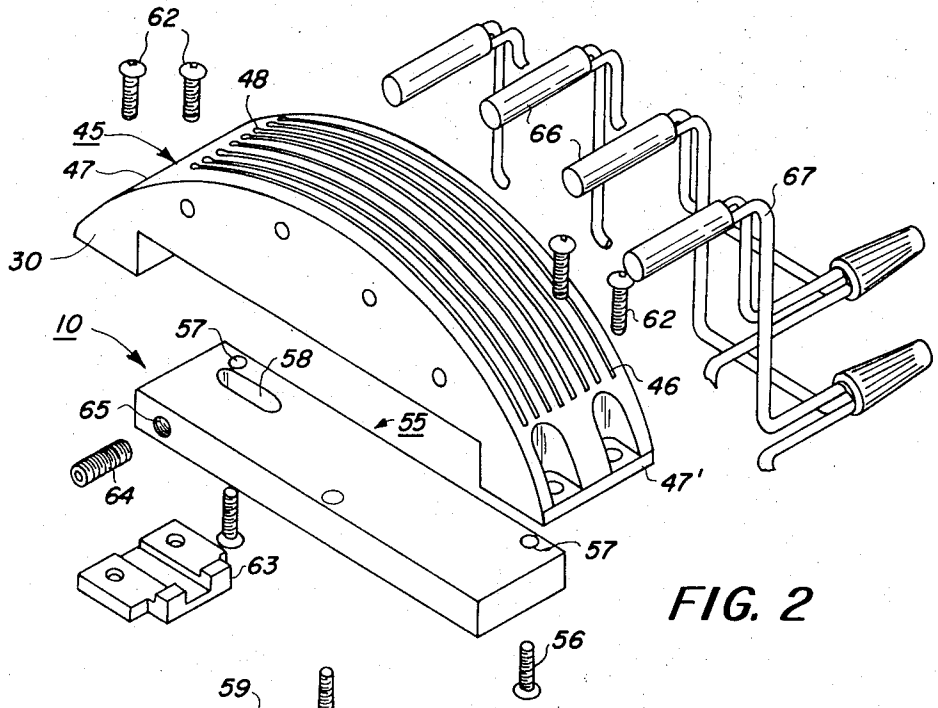
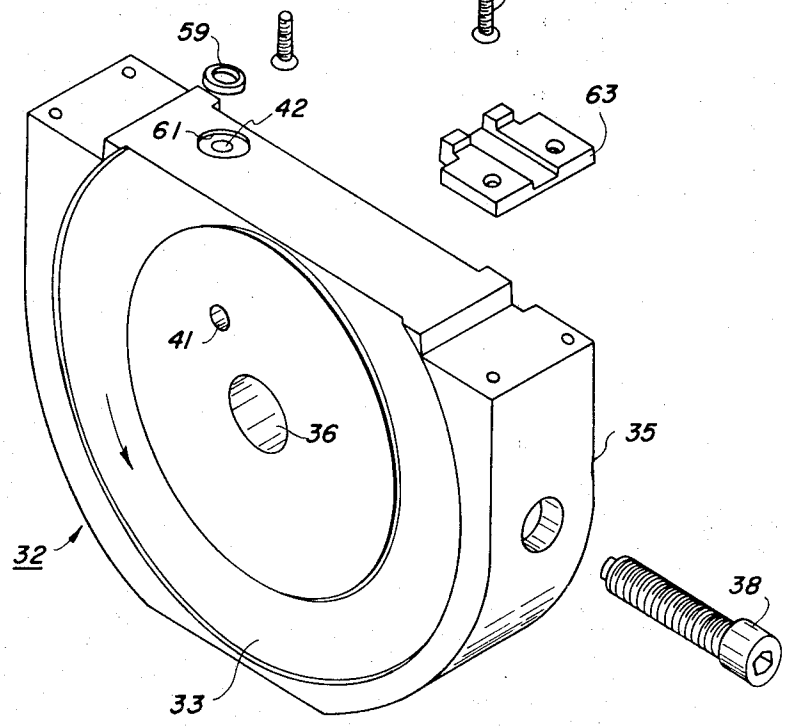

62
48
45
47
30
66
67
62
10
57
58
65
55
46
47'
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57
63
56

FIG. 2


59
42
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63
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33

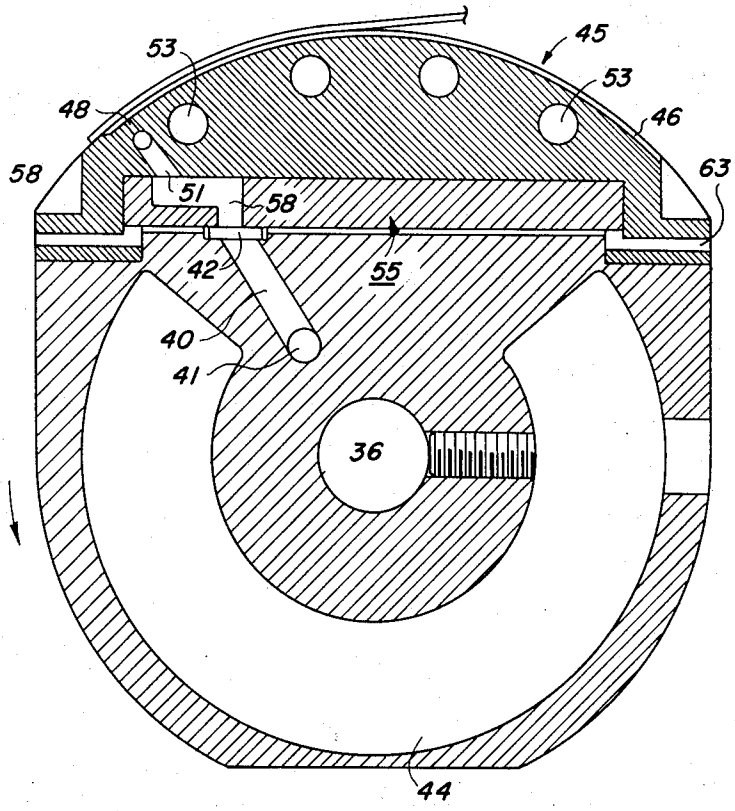


FIG. 3

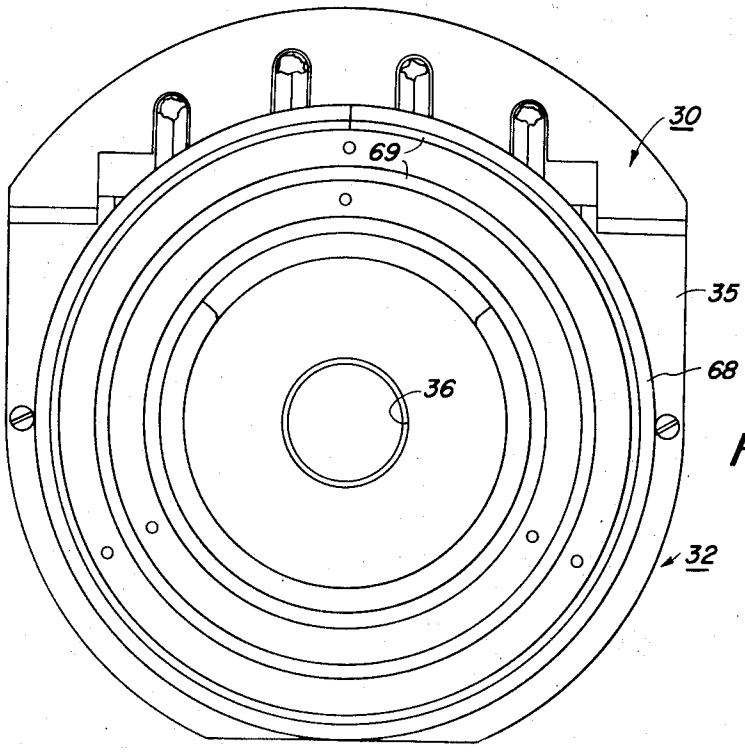


FIG. 4

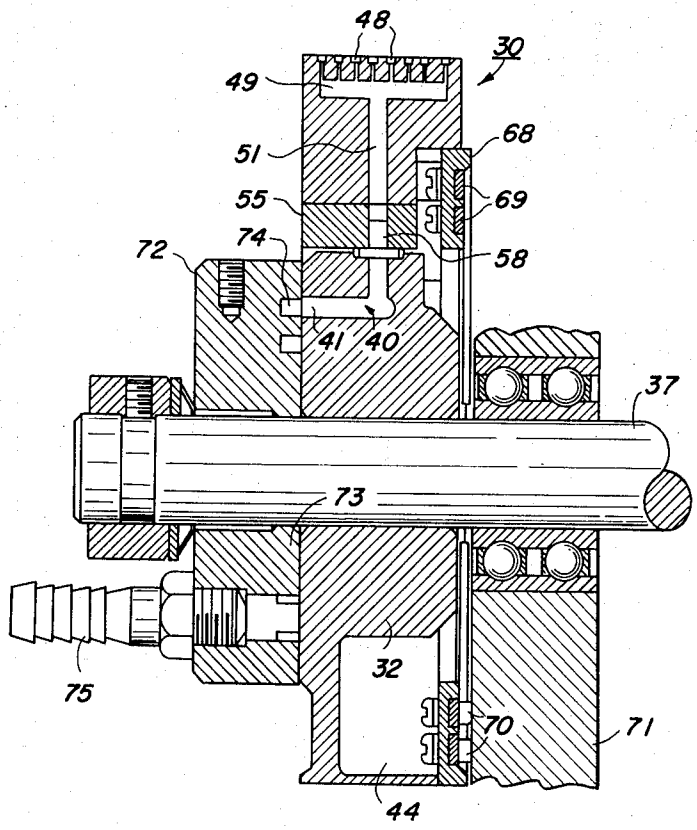


FIG. 5

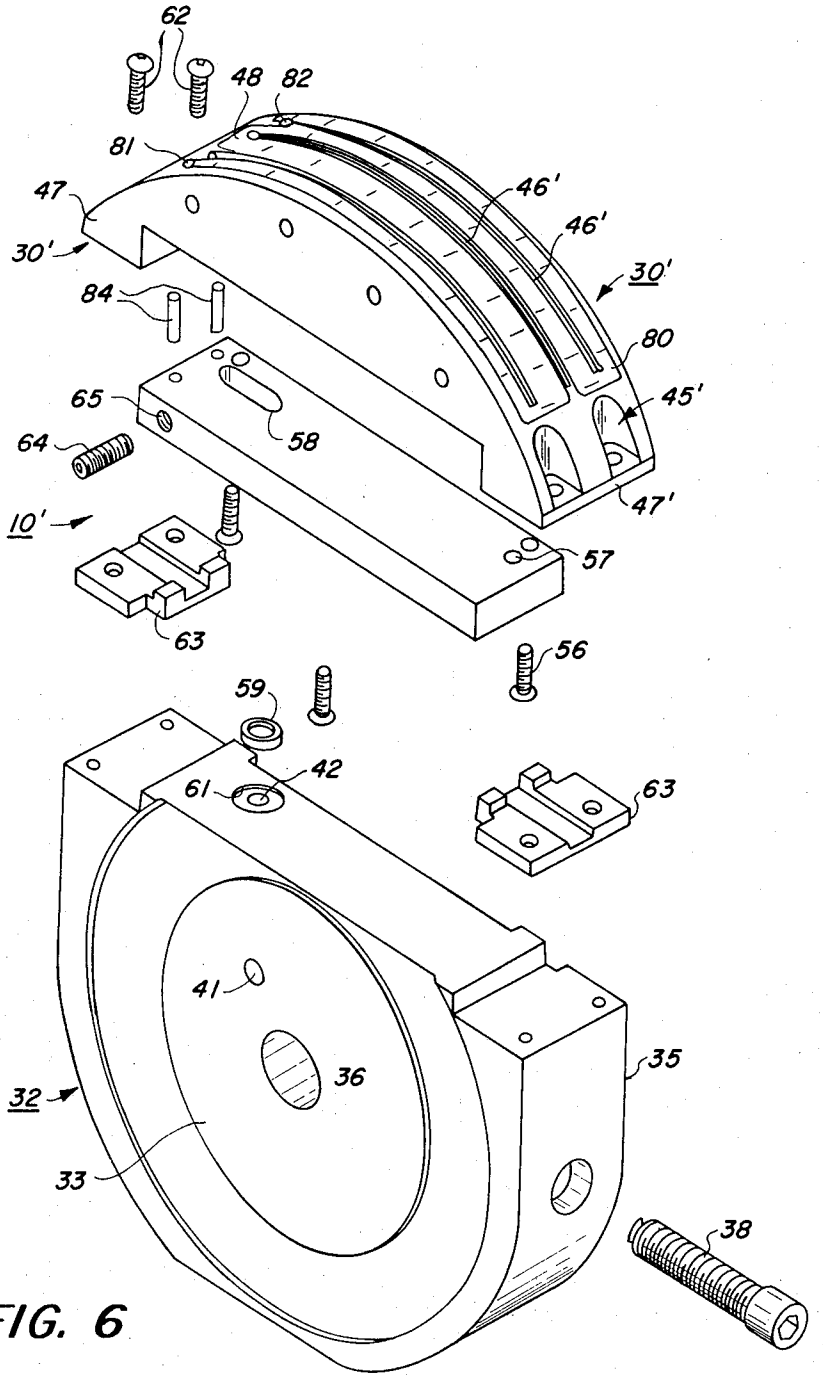

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82
81
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46'
46'
30'
30'
84
80
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45'
58
64
47'
10'
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63
56
59
42
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38

FIG. 6

LABEL TRANSFER WHEEL

The invention relates to an addressing machine label transfer wheel, and more particularly, to a transfer wheel having an improved label attaching means.

In the automatic labeling of articles such as envelopes or the like, various methods and machines are known for transferring the address bearing labels themselves or the address information therefrom to the articles. A typical method involves feeding the unaddressed articles beneath a rotating heated label transfer wheel. A surface portion of the transfer wheel is oriented to receive and temporarily hold, by means of vacuum, the previously addressed labels coated with a heat activated adhesive on the label underside. As the label transfer wheel rotates, the label is heated and brought into physical contact with the article being addressed to transfer the label from the wheel to the article.

Another method of labeling articles utilizes labels formed from a carbon paper-type material. Here, the pressure contact between the label and article in the presence of heat transfers the address information from the label to the article, the labels themselves being temporarily held on the transfer wheel until such time as the used label is past the transfer point. There, the used label is released to permit the transfer wheel to pick up the next label.

It is important in these applications, for effective transfer of the label itself or the address information therefrom, that heat be supplied to the label evenly and in sufficient quantity. For as can be understood, uneven heating of the label may cause incomplete transfer of either the label or the address information from the label to the article being addressed. If the labels, which are supported on a normally heated land or shoe portion of the transfer wheel, are not in full contact with the surface of the land throughout their length, uneven or incomplete heating of the label may result.

Many automatic addressing machines utilize a rotatable transfer wheel to bring the individual labels from the label supply into physical contact with the articles being addressed. For sustained and efficient machine operation, it is important that the transfer wheel perform this function reliably and with the assurance that the labels or the address information therefrom are properly located on the articles. To carry out this label transfer function, the transfer wheel ordinarily incorporates a vacuum holddown system designed to temporarily attach the labels to the transfer wheel. Failure or malfunction of this vacuum holddown system may jam or shutdown the machine or result in the placing of the labels or the address information in the wrong place on the articles.

It is a principal object of the present invention to provide a new and improved transfer wheel for article addressing machines.

It is a further object of the present invention to provide a label transfer wheel incorporating an improved vacuum holddown means for attaching labels to the transfer wheel.

It is an object of the present invention to provide an improved vacuum holddown system for label transfer wheels adapted to provide more effective contact between the label and the transfer wheel surface.

It is an object of the present invention to provide a label transfer wheel for heat transfer applications in which the transfer wheel label supporting surface is comprised of an electrical resistor heating material so that direct heating of the labels is effected.

This invention relates to a heat transfer wheel comprising a disc-like member adapted to be rotatably mounted and having at least one radially projecting land portion for temporarily supporting individual ones of the labels thereon while the member turns and the land moves from a label receiving position to a label discharge position, the transfer wheel land having at least two relatively narrow vacuum holddown grooves in the surface thereof and extending therealong in the plane of the transfer wheel, the length of the grooves being sufficient to enable individual labels to be vacuum attached thereto throughout substantially their entire length; means for communicating the grooves with a vacuum source; and label heating means disposed on the surface of the land to provide direct heating of the labels attached thereto preparatory to label transfer.

Other objects and advantages will be apparent from the ensuing description and drawings in which:

FIG. 1 is a side view of an article addressing machine incorporating the improved label transfer wheel of the present invention;

FIG. 2 is an exploded view of the label transfer wheel of the present invention;

FIG. 3 is an enlarged vertical section view of the label transfer wheel shown in FIG. 1;

FIG. 4 is an enlarged elevational view of the label transfer wheel shown in FIG. 1 showing the inside surface thereof;

FIG. 5 is a horizontal sectional view of the label transfer wheel taken along lines 5—5 of FIG. 1; and

FIG. 6 is an exploded view showing a second embodiment of the label transfer wheel of the present invention.

Referring to FIG. 1 of the drawings, there is shown an exemplary automatic addressing machine 5 incorporating the improved label transfer wheel 10 of the instant invention. Addressing machine 5 includes a housing or cover 9, parts of which have been broken away in FIG. 1 to show the construction of certain operating components therewithin. Addressing machine 5 has an article supply magazine 12 within which articles to be labeled are stacked, the walls 13 thereof being adjustable to accommodate articles of varying sizes. Article conveyor 14 is employed to move articles discharged in seriatim from magazine 12, under gate 15 and pinch roller 16, past label transfer wheel 10 where the labels or the address information therefrom is transferred to the articles. The article conveyor 14 comprises one or more endless belts 17, supported by drive and idler rollers 18, 19 respectively. Roller 18 is driven by suitable motor means (not shown) in the direction shown by the solid line arrow in FIG. 1.

Labels are supplied to head 22 of addressing machine 5 from a suitable source, normally in the form of an uncut sheet (not shown) having multiple label rows. Labeling head 22 includes suitable means (not shown) to advance the label sheet forward as required to guillotine knife 23 which serves to cut the label supply sheet transversely into strips of several labels

each. The strips rest in a downwardly inclined chute-like member 24 and are advanced therealong in the direction of transfer wheel 10 by intermittently driven pinch roll pair 25 to knife and anvil pair 26.

Knife and anvil pair 26 cooperate to cut the strip into individual labels which are discharged therefrom onto land 30 of transfer wheel 10 as land 30 comes opposite the knife and anvil pair 26 during rotation of wheel 10. From there, wheel 10, which rotates in the direction shown by the solid line arrow of FIG. 1, carries the label into physical contact with the articles being labeled as the articles move therebelow on conveyor 14. It is understood that the several label supply components of labeling head 22 aforedescribed are operated in timed relationship with one another and with transfer wheel 10 and article transport 14 to assure the requisite supply of labels to transfer wheel 10 as required.

To assure the requisite pressure contact between the labels on land 30 of transfer wheel 10 with the articles on transport 14, there is provided opposite transfer wheel 10, a support roller 28 for transport belt 17. Roller 28 is rotated in the direction shown by the solid line arrow in FIG. 1 from the addressing machine motor (not shown).

As will be understood by those skilled in the art, the labels may be physically attached to the articles being labeled through the use of a suitable adhesive. Normally, the adhesive is applied to the underside of the label just prior to the time the label is brought into physical contact with the articles on transport 14 by transfer wheel 10. Alternately, the label information only may be transferred through a combination of heat and pressure generated between land 30 of transfer wheel 10 and pressure roller 28. In this application, the label information is printed on a special label paper such as a carbon type paper and heating means provided in land 30 for this purpose. In this latter application, the used labels may be dispensed with or collected for possible reuse in an adhesive type application.

Referring now to FIGS. 1–5 of the drawings, heat transfer wheel 10 includes two major sections, land 30 and base 32. One face 33 of base 32 cooperates with vacuum distributor 72 to provide vacuum to land 30 while the opposite face 35 cooperates with brushes 70 to provide current to heating elements 66. Base 32 includes an aperture 36 therethrough for positioning wheel 10 on support shaft 37 of labeling head 22. Set screw 38 is provided for releasably locking base 32 onto shaft 37.

A pneumatic passage 40 is provided in base 32, inlet 41 thereto in face 33 of base 32 being arranged to communicate with vacuum distributor 72 for a predetermined interval as base 32 rotates. The opposite end 42 of passage 40 opens to the substantially planar support surface for manifold plate 55. Opposite face 35 of base 32 has an arcuate recess 44 therewithin for retaining the electrical wiring leading from commutator rings 69 to heating elements 66 in land 30. Recess 44 is best seen in FIG. 3.

Land 30 comprises a circular segment formed from a suitable thermally conductive rigid material such as aluminum, the curved exterior surface 45 thereof serving as a support for the labels. The radius of curvature of surface 45 is chosen to provide the requisite circumferential length for the size labels being handled while provided the necessary transfer wheel dimension to enable wheel 10 to carry the labels from the discharge of knife and anvil pair 26 into transfer contact with the articles being labeled on transport 14.

The exterior surface 45 of land 30 has a plurality of parallel closely spaced vacuum holddown grooves or slots 46 therein. Grooves 46, which are relatively shallow and narrow, extend from a point spaced slightly downstream of the forward end 47 of land 30 across the length of land 30 to the terminal end 47′ thereof. Vacuum supply ports 48 open to the surface 45 of land 30 at the leading end of grooves 46. Ports 48 open to a vacuum supply chamber 49 in land 30, the outlet 51 of which opens into the lower face of land 30 opposite end 42 of vacuum supply passage 40 in base 32. Apertures 53, parallel to the axis of rotation of the heat transfer wheel 10, are also provided for the reception of heating rods 66.

Positioned intermediate base 32 and land 30 is a manifold plate 55 and various insulating elements. The manifold plate 55 is rigidly secured to land 30 as by screws 56 which extend through apertures 57 into mating apertures in land 30. A passage 58 through manifold plate 55 communicates vacuum passage 40 with outlet 51 of vacuum supply chamber 49 in land 30. An insulating rubber washer 59 is preferably provided to connect passage 40 of the base 32 with the passage 58 through manifold plate 55. For this construction, a suitable recess 61 is provided in the mounting surface of base 32 to accommodate washer 59.

Land 30 is rigidly secured to the base 32 to form an integral heat transfer wheel 10 as by screws 62. Suitable thermal insulators 63 are preferably provided between land 30 and base 32.

Vacuum control valve in the form of set screw 64 is adjustably positioned in threaded aperture 65. Aperture 65 opens into vacuum passage 58 of manifold plate 55. As will be understood, movement of screw valve 64 into or out of aperture 65 varies the restrictive effect of screw valve 64 on the movement of air therethrough. By this means the degree of vacuum available to supply ports 48 and holddown grooves 46 may be increased or decreased as required.

In the arrangement shown in FIGS. 2–5 of the drawings, heat is supplied to the land 30 by rod-like heating elements 66 in land 30 which fit in the apertures 53. Heating elements 66 are arranged so that the thermal energy generated thereby radiates outwardly towards the surface of land 30 in a manner such that it is overlapped and supplemented by the thermal energy of the next adjacent heating rod element to provide even heating of surface 45 of land 30.

Power is supplied to the heating elements 66 through electrical leads 67 held within the recess 44 of base 32. Recess 44 with leads 67 therein is covered by an annularly shaped plate 68 fabricated from a material which is both thermally and electrically insulating such as fiberboard. Commutator rings 69 on plate 68 cooperate with power supply brushes 70 to provide electrical energy to heating elements 66.

The heat transfer wheel 10 is mounted on shaft 37 of labeling head 22 for rotation therewith. Shaft 37 in turn is journaled in frame member 71 of labeling head 22. Face 35 of wheel 10 is normally inboard with commu-

tator rings **69** thereof in contact with power supply brushes **70** on frame member **71**.

Vacuum distributor **72** is journaled on shaft **37** on the outboard side of label transfer wheel **10**, the interior face **73** thereof being in sealing contact with face **33** of transfer wheel **10**. Face **73** of distributor **72** has an arcuate vacuum distributing recess **74** therein, the radial distance of recess **74** from shaft **37** being substantially equal to the radial distance of vacuum passage inlet **41** from shaft **37**. Hose **75** communicates vacuum distributing recess **74** in distributor **72** with a suitable source of vacuum.

It is understood that the position and arcuate extent of vacuum distributing recess **74** is chosen to communicate land **30** with vacuum when land **30** comes adjacent the discharge point of knife and anvil pair **26**, the vacuum being sustained until the label carried by land **30** is physically transferred to the article on transport **14** being labeled or, in the case where the address information only is transferred, until some discharge point downstream of the transfer point.

In operation, as transfer wheel **10** turns in the direction shown by the solid line arrow in FIG. **1**, land **30** thereof comes opposite the discharge side of knife and anvil pair **26** once during each revolution of wheel **10**. As land **30** nears knife and anvil pair **26**, vacuum distributor **72** communicates, via recess **74** and interconnecting passages **40**, **58** and **49** vacuum holddown ports **48** with the vacuum source. As the peripheral surface **45** of land **30** brushes against the portion of the label discharging from between knife and anvil pair **26**, the relatively large vacuum holddown force generated by the open ports **48** causes the leading edge portion of the label to become attached thereto.

With attachment of the label onto the surface **45** of land **30** opposite ports **48**, the direct communication of ports **48** with the atmosphere is closed off with the result that the vacuum force in holddown grooves **46** correspondingly increases, particularly in the area immediately in front of the label. The relatively high vacuum force now available in grooves **46** draws the label down in progressive fashion into contact with surface **45** of land **30** as the transfer wheel **10** turns. It is understood that the progressive closure of the vacuum holddown grooves **46** by the label drives the vacuum high point therealong ahead of the label thereby enhancing the pulldown effect of the vacuum on the label.

By this arrangement, labels are progressively and tightly affixed to the surface of land **30** so that the possibility of unattached label portions or buckling or creasing of the label during transfer is avoided or at least greatly reduced. In heat transfer applications, the improved contact between the labels and the surface of the transfer wheel land **30** facilitates uniform heating of the labels before transfer thereof.

In the arrangement shown in FIG. **6** wherein like numerals designate like parts, the transfer wheel land **30'** thereshown is itself formed from a suitable thermal and electrical insulating material. A film-like coating of electrically conductive resistor material **80** is provided on the surface **45'** of land **30'** along the sides of and between vacuum holddown grooves **46'**. Resistor film **80** is continuous and uninterrupted from lead **81** to lead **82** to provide a complete electrical circuit. As will be understood, the passage of current through resistor film **80** generates heat which in turn heats the label held thereon by vacuum holddown grooves **46'**.

Resistor film leads **81**, **82** are connected through wires **84** with commutator rings **69** and the source of electrical energy.

In operation of the FIG. **6** arrangement, the individual labels are attached to the surface **45'** of land **30'** in the manner explained heretofore as the land comes opposite the discharge side of knife and anvil pair **26**. The labels are carried by transfer wheel **10'** into contact with the articles being labeled passing below wheel **10** on transport **14**, where the label itself or the address information therefrom is transferred to the articles. During the interval while the label rests on land **30'** of transfer wheel **10**, contact between the film resistor **80** and the label heats the label to enable or facilitate the transfer operation aforedescribed. Due to the direct contact of the labels with the heat source, in this case resistor film **80**, rapid and uniform heating of the label is assured.

While the invention has been described with reference to the structure disclosed, it is not confined to the details set forth; but is intended to cover such modifications or changes as may come within the scope of the following claims.

What is claimed is:

1. A label heat transfer wheel comprising:

a disc-like member adapted to be rotatably mounted and having at least one radially projecting land portion for temporarily supporting individual ones of said labels thereon while said member turns and said land moves from a label receiving position to a label discharge position,

said transfer wheel land having at least two relatively narrow vacuum holddown grooves in the surface thereof and extending therealong in the plane of said transfer wheel, the length of said grooves being sufficient to enable individual labels to be vacuum attached thereto throughout substantially their entire length,

means for communicating said grooves with a vacuum source, and label heating means disposed on the surface of said land to provide direct heating of the labels attached thereto preparatory to label transfer, said label heating means comprising an electrically conductive material which functions as a resistor type heater means on passage of electric current therethrough.

2. The transfer wheel according to claim **1** in which the remainder of said land comprises an electrically insulating material.

3. The transfer wheel according to claim **1** in which said heating means comprises at least one strip-like electrical resistor heater on the periphery of said land and extending therealong in a direction paralleling said grooves, and means to electrically insulate said heater from said land.

* * * * *