Aug. 11, 1970 K. H. PETERSEN ET AL 3,523,687

INVERTER FOR SHEETS AND CARDS

Filed May 9, 1968 2 Sheets-Sheet 1

FIG. 2

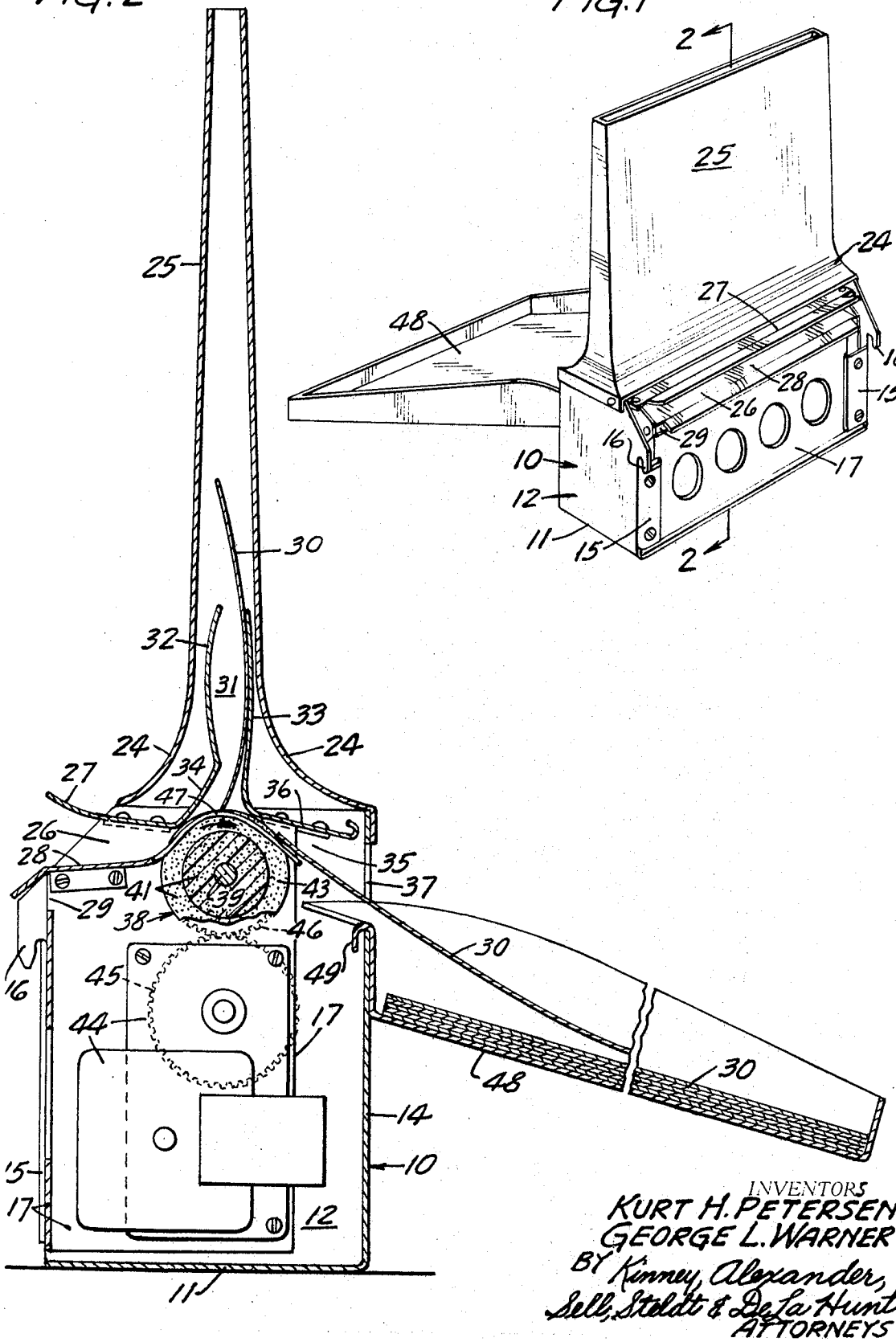

FIG. 1

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Filed May 9, 1968 2 Sheets-Sheet 2

FIG. 3

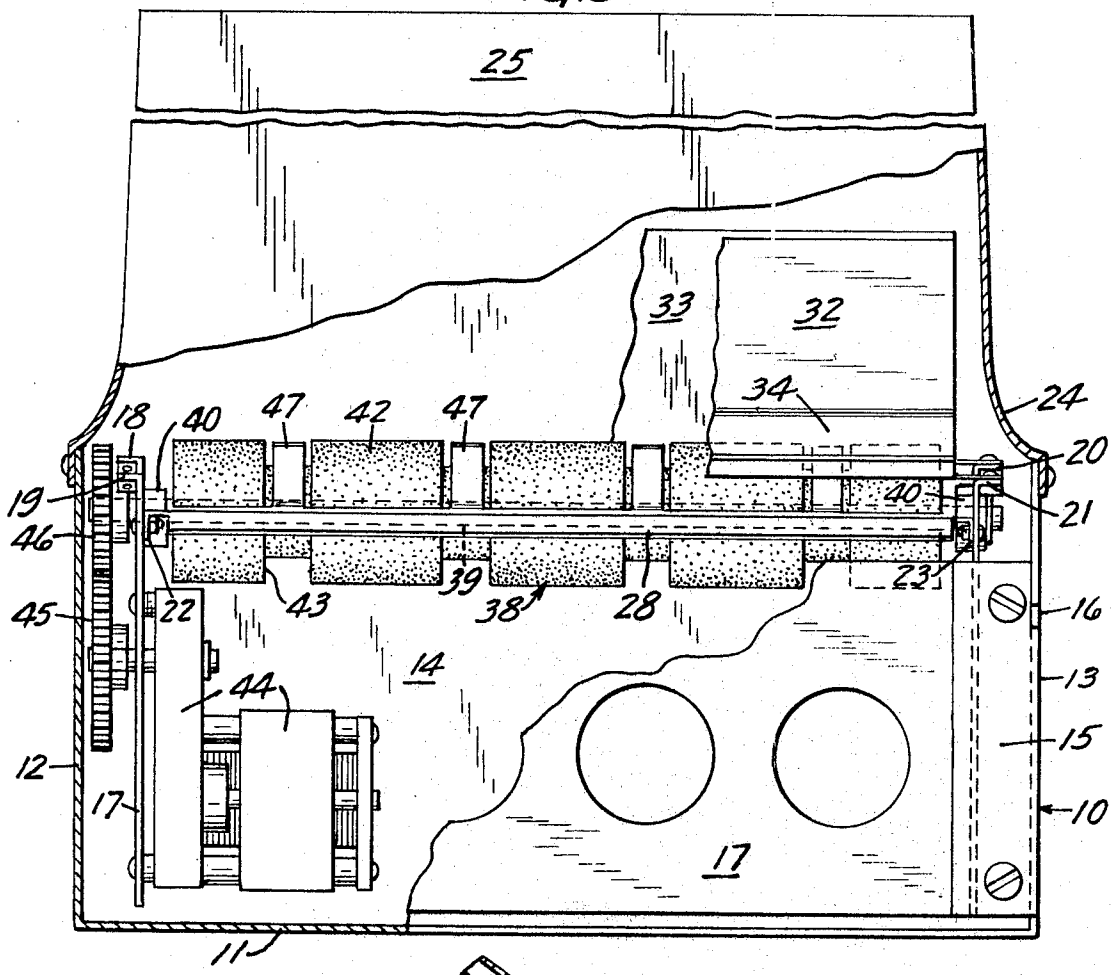
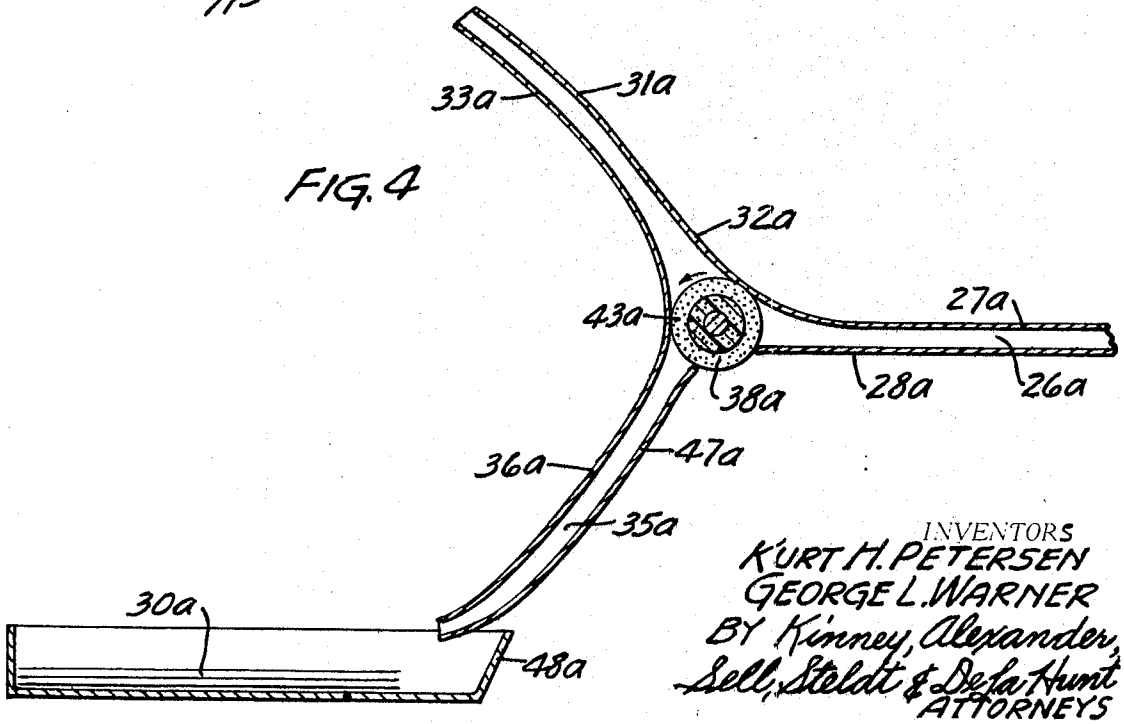


FIG. 4



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United States Patent Office 3,523,687 Patented Aug. 11, 1970

3,523,687

INVERTER FOR SHEETS AND CARDS

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Filed May 9, 1968, Ser. No. 727,786
Int. Cl. B65h 29/20, 29/34
U.S. Cl. 271—71 12 Claims

ABSTRACT OF THE DISCLOSURE

This invention is directed to a device for inverting each of a series of sheets or cards so that their printed or treated surfaces will be in proper orientation with each other after they have been printed or processed by photocopiers, key punch systems, card sorters, printing presses, processing machinery etc. Inversion is carried out by moving the sheets or cards through a series of angular races by means of a drive roller. After entering the device through an input race, the sheet or card is moved into an intermediate race which disposes it in a first position at an angle with respect to its plane of entry. In this position the direction of movement is reversed and the sheet or card is moved into a delivery race oriented at an angle from the intermediate race sufficient to invert the sheet approximately 180° from its position on entry.

SUMMARY OF THE INVENTION

The purpose of this invention is to provide a device for inverting sheets of material after one or both surfaces of the sheet have been affixed with indicia, images, designs, chemical coatings etc. The device is especially adaptable for inverting sheets of paper or cards, after they have been processed by photocopiers, office duplicators, key punch equipment, printing presses and imprinters. Usually the papers or cards are printed or otherwise applied with a continuum of indicia so that indicia printed on the various pages is sequentially related. The pages of books, letters, office memoranda, multiple page reports, serial documents and other similar text materials are an example. After printing, a proper sequential orientation between all of the pages must be maintained so that indicia printed on each page is in proper relation with related indicia on the other pages for reading, collating, filing, storing, binding, etc.

In many photocopiers and printing devices the several pages of a printed sequence are delivered from the printer onto a stack with the first page of the sequence face down at the top of the stack or face up at the bottom of the stack. Consecutive sheets are stacked in the same inverse order below or above the first page. Manual inversion of the stack per se will not correct the inverse orientation. Each sheet in the stack must be individually inverted to attain proper consecutive orientation between the pages.

Some prior art devices have been devised to reverse the position of articles or items delivered from hoppers or similar supply sources. Some of these devices employ the concept of driving the individual article along an enclosed track looped or curved upon itself at an angle sufficient to invert the position of the article after it has passed through the track. For example, see FIG. 20; Ingenious Mechanisms for Designers and Inventors, vol. 3, p. 469. Other devices such as the conveyance means of Copping et al. U.S. 3,368,701 have employed a series of rollers to form a semi-circular path through which individual flat items are delivered and inverted for the purpose of placing each item into a viewing position.

Moving sheets or cards through a looped track or around a semi-circular path formed by rollers would not result in a satisfactory device for inverting printed sheets produced by office photocopiers, duplicators, key punch devices or high-speed industrial printing presses. A looped track sufficient to invert sheets in letter size or larger would occupy a considerable amount of space. Also the sheets would tend to jam in the track if delivered into the system at high speed. A series of rollers to define a semicircle would be too bulky and complicated for adoption as an inverter in conjunction with the operation of photocopiers, duplicators, key punch devices, etc.

The system to which this invention is directed is compact and efficient. It inverts sheets by moving them by means of a single rotating roller through a series of angularly interconnected guides, pathways or races outlined by baffles or reticulated grids. In the description below the interconnected guideways or pathways to guide the sheets will generally be referred to as races or raceways.

Inversion is accomplished by first moving the sheets into a first or input raceway which may be directly connected to the photocopier or printer. The sheets are then driven into a second or intermediate raceway to orient them at an angle to their plane of entry into the system. Inversion is completed by reversing their direction of movement in the intermediate race and turning the sheets through a further angle as they pass into a third or delivery raceway or through the delivery raceway into a storage bin. The magnitude per se of each angle through which the sheets are turned is not critical, the only requirement being that after passing through the two angles the sheets have been overturned approximately 180° from their plane of entry.

Inasmuch as complicated driving means are eliminated and the three raceways are compact in size and space, the device can easily be adapted for use in conjunction with office photocopiers, duplicators, collators, key punch equipment and small high speed printing presses. The same principle of inversion may be utilized in conjunction with larger industrial equipment to provide an inverter suitable for inverting sheets delivered from high speed printing presses, imprinting equipment or process machinery for applying various types of coatings to individual sheets.

DESCRIPTION OF THE DRAWINGS

Understanding of the invention will be facilitated by referring to the accompanying drawings in which like numerals refer to like parts in the several views and in which:

FIG. 1 is a perspective views of an inverter suitable for use in conjunction with photocopiers and the like;

FIG. 2 is a sectional view taken along the lines and in the direction of the arrows 2—2 of FIG. 1;

FIG. 3 is a front elevational view of the inverter with the cover, housing, frame and raceways partially broken away to show the mounting of the drive roller and the means to rotate same; and

FIG. 4 is a schematic sectional view of a modification of the inverter shown in FIGS. 1–3.

DETAILED DESCRIPTION

While the embodiment shown in the drawings and described below is adaptable primarily for use in conjunction with photocopy machines, it is to be understood that the principle of the invention may be utilized to invert printed and imprinted sheets, cards, etc., in conjunction with key punch system, office duplicators, collators, printing presses or imprinting equipment of all kinds whenever the delivered sheets must be inverted to maintain a proper sequential orientation between consecutive pages. Also the device can be used in conjunction with processes for coating the surfaces of plates or sheets with a chemical layer such as photosensitive surfaces of lithographic plates.

Relative to photocopiers, many of these devices provide feeding equipment which automatically feeds sets of original copies from which duplications will be made in the copier. In utilizing the copier, the operator usually loads the originals in image or face down orientation. When photocopying a consecutive series, the first copy of the series is generally placed at the bottom of the stack and the last copy at the top. The last original copy will then be the first to be fed into the machine for exposure. If loaded in this manner the photocopies or images reproduced from the originals will be delivered from the copier in correct sequence; that is in a face up orientation with the last copy at the bottom of the stack and the first copy at the top. However, insofar as the original copies are concerned, each copy will be delivered image face down into the discharge bin with the last copy of the series delivered first. After all originals have been exposed they will be oriented face down in the bin with the first page or copy at the top of the stack. In order to attain readable orientation between the pages, each sheet in the stack must be individually inverted.

Conversely, when manually feeding original copies, the first page of a consecutive series is usually exposed first. Since the photocopies reproduced from the originals are generally delivered image side up, the first photocopy in the sequence will usually be oriented face up at the bottom of the stack below all consecutive pages or copies. Manual inversion of the stack per se after all photocopies have been made will not result in placing the sheets in proper sequential orientation. Each page must be individually inverted to place the sheets of the stack into a readable order.

Similar problems often occur in delivery from other types of printing presses and imprinting equipment. The problem is particularly burdensome when it is desired to deliver sheets directly from the printer into a collator. To attain proper sequential orientation between pages it is necessary to invert each individual sheet after delivery from the printer.

The embodiment of the invention shown in FIGS. 1–3 of the drawings may be placed directly within the delivery system of a photocopier. Attachment between the delivery tray or bin and the delivery system of the copier is preferred. The copier's delivery system usually comprises a web, belt or series of rollers over which either the originals or photocopies are moved for delivery from the copier.

The illustrated embodiment comprises a housing of metal, plastic, or other suitable material generally designated by the numeral **10** in FIGS. 1–3. The housing forms an enclosure by means of bottom panel **11**, side panels **12** and **13**, rear panel **14** and a partial front panel **15**. Side panels **12** and **13** may have depending hooks **16** to secure the inverter within the delivery pathway of the photocopier. A frame **17** is designed to fit substantially coextensively inside housing **10** and suitably secured to front panel **15** and in spaced relation to side panels **12** and **13**.

Frame **17** supports a series of baffles which form the three races or raceways for guiding the sheets through inversion. As seen in FIGS. 2 and 3 the baffles are supported on frame **17** by means of right angled support members **18–21** formed integral with the frame and right angled members **22–23** formed integral with the lower baffle and secured directly to the frame. The baffles may be secured to the support members and frame by any suitable means although bolts are preferred so that the device can be easily disassembled. Frame **17** also supports a drive roller for moving the printed sheets through the races and the means for rotating the roller.

A cover **24** is suitably secured over housing **10** and has an elongated open-ended duct **25** to assist in guiding the printed sheets as they are driven into and out of one of the races which is enclosed in the duct.

The baffles which comprises a series of angulated plates form the three interconnected races or raceways. As seen in FIGS. 1 and 2 a first or input raceway **26** is formed by

an upper input baffle **27** secured to right angled supports **19** and **21** and a spaced lower input baffle **28**. Baffle **28** is secured to frame **17** by right angled members **22** and **23**. Raceway **26** formed by baffles **27** and **28** is disposed adjacent the delivery web or rollers of the photocopier. The race extends through an input opening **29** which is formed by truncating the common juncture of frame **17** and cover **24**. Individual sheets **30** comprising photocopies or originals are moved by the force of the delivery system of the copier over the surface of baffle **28** with the image oriented face up in event the delivery system is ejecting photocopies or face down in the event originals are being ejected. In the event the delivery system of the photocopier or other device is inadequate to drive sheets **30** along the surface of baffle **28**, an additional drive roller may be mounted on the baffle adjacent input opening **29** to insure adequate delivery into the inverter.

A second or intermediate raceway **31** to orient sheets **30** at an angle to their plane of entry is connected to raceway **26**. Although the intermediate raceway is oriented substantially normal to the other two races in the device shown in FIGS. 1–3, normal orientation to the other races is not essential. It is sufficient if raceway **31** together with the third or delivery raceway are angularly oriented with respect to each other to form interconnected races to overturn or invert the sheets appoximately 180° as the sheets pass through the two races. It is preferred that the intermediate race be disposed at an angle of inclination with respect to the input race sufficient to keep the sheets from moving out of contact with the roller. After being driven completely into the intermediate race, the lagging or trailing end of each sheet must retain contact with the roller so that the sheet may be driven in an opposite direction of travel through the delivery race to complete inversion.

The intermediate raceway **31** comprises a pair of intermediate baffles **32** and **33**. Baffle **32** is an integral extension of the upper input baffle **27** and is disposed at right angles to the latter by means of an angulated section **34** as best seen in FIGS. 2 and 3. Baffles **32** and **33** are vertically disposed within cover **24** in parallel spaced relation to each other to provide a properly spaced raceway for guiding sheets **30**. As seen in FIG. 2 the baffles are disposed in biconvex relationship to properly orient the sheets **30** as they enter and leave raceway **31**. The intermediate baffles are encased within open ended duct **25** which acts as an additional guide to prevent sheets of varying lengths from curling or jamming over the top of the baffles.

A third or delivery raceway **35** may be joined to the intermediate race **31** at the proper angle to substantially complete inversion as the sheets enter the delivery race. Conversely inversion may be completed after entry into the delivery raceway by shaping it so that the sheets are turned through the second angle as they pass through the race after entry. In the embodiment shown in FIGS. 1–3 the delivery raceway **35** is oriented at a right angle from the intermediate race by curving the lower extension of baffle **33** substantially 90° to form an upper delivery baffle member **36** integrally formed with baffle **33**. Delivery baffle member **36** forms the upper guide for the delivery raceway **35** and is secured to frame **17** by bolting it to supports **18** and **20**. Delivery raceway **35** extends to and terminates in a discharge opening **37** formed by recessing panel **14** along its juncture with cover **24**. After inversion sheets **30** are ejected from the device through opening **37**.

Individual sheets **30** are driven through the three raceways by a roller generally designated **38** and best seen in FIGS. 2 and 3. Roller **38** comprises a shaft **39** which is journaled for rotation to a pair of bearings **40** mounted on opposite sides of frame **17**. The roller has a concentric layer **41** suitably secured to shaft **39** to provide a surface for frictional driving engagement with sheets **30**. In the preferred embodiment, layer **41** consists of a com-

pressible material such as polyurethane foam, a suitable vinyl or rubber material to provide both a driving surface and a surface that will compress or yield when the sheets are driven into and out of the intermediate race **31** which is disposed immediately above the roller. The layer **41** is corrugated to form an alternate series of ridges or lands **42** disposed adjacent grooves **43**, the surface of the lands being used as the frictional driving surface of the roller. The roller **38** is disposed at the juncture of the three raceways **26**, **31** and **35**. In this position it serves both as a driving and guiding structure.

In the embodiment shown in the drawings, the driving surface of lands **42** is in direct contact with the angulated section **34** of inverting baffle **32** and with the angular juncture of upper delivery baffle member **36** with baffle **33**. The surface of the rollers will compress slightly on contact with the sheets to allow the sheets to pass between the roller and baffles. The baffles act as a backing to allow the driving surface of the lands to make firm contact with the sheets.

Direct contact between the roller surface and baffles **32** and **36** is not essential. If the roller surface comprises material having minimal wear resistance, the roller can be mounted so that the driving surface of the lands is spaced a minute distance from baffles **32** and **36** and still provide adequate driving means for moving the sheets through the inverter.

Roller **38** may be rotated by any appropriate means such as a power take off from the copier or other type of device with which the inverter is used. Rotation is in the direction of the arrow of FIG. 2 to drive the sheets into the intermediate raceway **31** from input raceway **26** and subsequently into and through delivery raceway **35**.

A preferred embodiment is to provide a separate AC motor **44** with appropriate gearing. The motor, suitably connected to a power source is mounted on frame **17** within housing **10** and disposed below roller **38** (as seen in FIGS. 2 and 3). Motor **44** is connected to a drive gear **45** which in turn rotates spur gear **46** integral with shaft **39**.

The preferred rate of rotation in conjunction with inverting sheets from photocopiers has been found to be about 200 r.p.m. The rate of rotation will of course vary depending upon the characteristics of the sheets inverted, rate of delivery into the inverter, etc. The device will invert sheets delivered in rapid succession, the only limitation being that the leading edge of each sheet moved across input baffle **28** must be spaced from the trailing edge of the preceding sheet so that the leading edge of the trailing sheet is individually brought into contact with the roller.

As best seen in FIGS. 2 and 3 a series of serrations or fingers **47** extend from lower input baffle **28** and are partially convoluted around grooves **43** adjacent each land **42** of the roller. Fingers **47** and angulated section **34** form a restriction in the entrance to the intermediate raceway **31** so that the leading edge of the sheets will be correctly oriented and firmly contacted by the roller for entry. The fingers also form a guide to assist in the discharge of inverted sheets. As seen in FIGS. 2 and 3, fingers **47** disposed in grooves **43** are spaced below upper delivery baffle member **36**. Along with the surfaces of lands **42** of the roller, the fingers define the lower guide or baffle of the delivery raceway **35**. Inverted sheets will be driven by the roller and guided by baffle member **36** and fingers **47** out the discharge opening **37** into a discharge bin **48** secured to panel **14** by hooks **49**.

The baffles are preferably smooth-surfaced and may be made from various materials such as plastic or metal. Sheet metal is preferable as the various angular configurations can easily be obtained by stamping or bending the metal.

The device may be used to invert either the original copies used to make photocopies or the photocopies per se as they are delivered from the inverter. Inasmuch as the original copies are generally delivered from the photocopier in image face down orientation they will be delivered to the inverter in this position. Conversely, photocopies made from originals are usually delivered face up. They will therefore enter the inverter in image face up orientation. In either case image surface orientation will be reversed after the sheet has passed through the inverter and thus the inversion will correct improper orientation between pages of originals or photocopies sequentially delivered from the photocopier.

In operation sheets **30** will be individually delivered from the copier into input raceway **26** with the image facing up or down. The delivery system of the copier will move the sheets across the upper surface of lower input baffle **28** until the leading edge of the sheet contacts roller **38**. Contact with the roller begins to orient the sheet to a position approximately at a right angle to its plane of entry by moving the leading edge through the restriction formed by roller **38** and fingers **47** with the angulated section **34**. After passing through the restriction, the leading edge enters intermediate raceway **31** and contacts the inner surface of intermediate baffle **33**. The concave contour of the inner surface of baffle **33** tends to curve the sheet against the natural curl it would take after passing between the roller and the restriction so that the sheet will be properly oriented in a substantially vertical position in raceway **31**. Continued rotation of the roller moves the entire sheet into raceway **31** so that sheet **30** is now completely disposed between intermediate baffles **32** and **33** at an angle substantially normal to its plane of entry into the device. Duct **25** assists the inverting baffles to orient the sheet.

As soon as the trailing edge of sheet **30** reaches a position immediately above roller **38** the continued rotation of the roller surface grips the edge and carries it in a substantially lateral direction into contact with the juncture of baffles **33** and **36**. In this position the direction of sheet travel is immediately reversed by rotation of the roller. The lateral movement plus the reversed direction of travel tends to curl the sheet against the concaved inner surface of inverting baffle **32** placing it in proper orientation for movement of the sheet out of the intermediate race. Roller contact with the trailing edge of the sheet (which now forms its leading edge) moves the sheets into the delivery raceway **35** where it is turned through the second angle necessary to attain inversion. In the described embodiment the sheets **30** are turned through the second angle as they are driven by the roller along the surface of the right angled juncture of upper delivery baffle **36** with baffle **33** into the delivery raceway **35**. The sheet is now on a plane substantially at right angles to its position when in intermediate raceway **31** and has been inverted substantially 180° from its position upon entry into the inverter. Thus if the image is delivered to the inverter in image up position it will be inverted to image down position and vice versa.

Delivery is accomplished by driving the sheets by means of the roller initially along the surface of upper delivery baffle member **36**. The distal ends of fingers **47** assist in orienting each sheet as it passes through delivery raceway **35** and discharge opening **37** into bin **48**. The fingers also assist in orienting sheets in the event the sheets fail to properly move around the right angled turn formed at the juncture of baffles **33** and **36**. If sheets **30** are composed of stiff material their edges may press into the compressible layer **41** until striking the fingers as the sheets are moved out of the intermediate raceway. The fingers will thus complete orientation by guiding the edge of the sheet into raceway **35**.

In some situations it may be preferred to utilize an inverter modified somewhat from the device shown in FIGS. 1–3. This is particularly true if the inverter is to be used to invert large stock or sheets from printing presses or other processing devices. The modification may however be used for any of the applications discussed

above and is particularly adaptable for inverting a large number of photocopies for delivery into collators.

The modified inverter as shown in FIG. 4 is similar in operation to the inverter in FIGS. 1–3 except that the three angulated raceways are outlined by a combination of baffle plates and reticulated grids, the latter formed by metal tubing or heavy wire. Further, the intermediate race may be oriented with respect to the input race either at an obtuse or right angle and the delivery raceway extends below the plane of the roller for discharging sheets. Inversion of the sheets **30***a* is completed by moving the sheets into substantially horizontal orientation as they pass over the curved end of the delivery raceway above discharge bin **48***a*. Also it is preferred to eliminate fingers **47**.

The input raceway **26***a* comprises an upper reticulated grid **27***a* disposed in spaced relation above a lower plate or baffle **28***a* which is truncated adjacent roller **38***a*. Grid **27***a* is integrally joined at an obtuse angle adjacent the roller to one of the grids, **32***a*, forming the intermediate raceway **31***a*. The intermediate raceway is also formed by grid **33***a* spaced parallel from grid **32***a* a sufficient distance to outline the intermediate race. Grids **32***a* and **33***a* are reticulated and curved in the direction of the delivery end of the inverter. The curvature allows large sheets to curl along the natural curve they will take after being driven into the intermediate raceway **31***a* by roller **38***a*.

Grid **33***a* is integrally joined at a substantially right angle to an upper delivery grid member **36***a*. The delivery raceway **35***a* is formed by a plate or baffle **47***a*, disposed in parallel spaced relation to a grid member **36***a*. One end of plate **47***a* is disposed adjacent roller **38***a* and the opposite end disposed over the discharge bin **48***a*. The end of the plate disposed over the discharge bin is curved to complete the inversion of the sheets and discharge them on a plane substantially parallel to the plane of the input raceway.

The grids forming the angled juncture of grid **27***a* with **32***a* and grid **33***a* with grid member **36***a* are disposed parallel with and in spaced relation to grooves **43***a* of the roller. In this position the tube or wire of the grid is disposed a minute distance within the groove **43***a*. As the sheets pass between the roller and grid the grid tends to press the sheet firmly against the driving surface of the lands of the roller disposed adjacent each groove **43***a*.

The modification of FIG. 4 may be mounted in a suitable housing or frame or attached directly to the printing press, collator or other printing device with which it is used. If necessary an input roller may be mounted along the input raceway **26***a* to insure adequate delivery of the sheets into the inverter.

In a slight modification of FIGS. 1–3, the angulated section **34** of baffle and the right angled juncture between intermediate baffle **33** and upper delivery baffle member **36** may have a series of embossed ribs formed on their surfaces forming the raceways. Similar to the tubes or grid of the above modification, the ribs extend parallel to the direction of sheet travel. The baffles are positioned so that they are not in direct contact with roller **31** but in sufficiently close spaced relation so that the embossed ribs extend a minute distance within grooves **43**. Similar to the tubes or wires, the ribs serve to press the sheets into firm frictional engagement with the surfaces of lands **42**.

In event the roller is rotated at high speeds or the angle of inclination of the intermediate race with respect to the horizontal plane of the input race is not sufficient to retain the trailing edge of the sheets in contact with the roller by gravity, the sheets may travel into the intermediate race to a position out of contact with the roller. In such event stops adjustable to the varying lengths of the sheets may be suitably secured along duct **25** or the raceway **31***a* to maintain the trailing edge of the sheets in driving contact with the roller.

What is claimed:

1. An inverter for inverting sheets delivered from a machine for affixing material to at least one surface thereof, the inverter comprising in combination,

(a) a grooved roller for driving said sheets through said inverter;

(b) a first raceway for directing sheets delivered therein from said machine in a first direction toward and along a chordal plane of said roller for bringing the leading edge of said sheet into contact with said roller;

(c) a second raceway for receiving said sheets as they are driven past said roller in said first direction, the second raceway disposed at an angle with respect to said plane sufficient to retain said sheets therein with their trailing edge in contact with said roller; and

(d) a third raceway having an upper member disposed in spaced relation with the grooves of said roller for directing said sheets away from said roller in a direction opposite said first direction with the trail-edge foremost through a pathway formed by said third raceway angularly oriented with respect to said second raceway to dispose sheets passing therethrough in a position inverted substantially 180° from their position of delivery into said first raceway.

2. The inverter of claim **1** in which said first and second raceways comprise adjacent baffles in spaced apart relationship and said third raceway comprises an upper baffle member disposed in spaced relation from serrated fingers convoluted partially around the grooves of said roller for driving said sheets.

3. The inverter of claim **1** in which said second raceway comprises a pair of reticulated grids in curved parallel spaced relationship with each other.

4. The inverter of claim **1** in which the first and third raceways each comprise a plate and reticulated grids disposed in spaced apart parallel relationships with each other.

5. An inverter for inverting sheets from a first to second faced position as the sheets are delivered in sequence from a machine for affixing images to the sheets, the inversion placing the pages of the sheets in serial relationship with each other, the device comprising

(a) an input raceway forming a pathway to guide the sheets into the device in said first faced position as they are sequentially delivered from said machine;

(b) an intermediate raceway disposed substantially normal to said input raceway and having one end opening into and joining the input raceway to form a pathway for the transportation of sheets from the input to intermediate raceway;

(c) a delivery raceway having one end opening into and joining the intermediate raceway adjacent its juncture with the input raceway and disposed to form a pathway for guiding sheets moved therein from the intermediate raceway through a substantially right angle from their position in the intermediate raceway, the end opposite the juncture with the intermediate raceway terminating in a position to allow said sheets to be ejected from said inverting device;

(d) grooved roller means disposed adjacent the junctures of said raceways rotated for contacting the leading edge of said sheets and driving the sheets in a first direction from the sheets first faced position in the input raceway into the intermediate raceway to position the sheets substantially normal to their first faced position in the input raceway, the roller means upon continued rotation moving the trailing edge of said sheets when positioned in the intermediate raceway to a position adjacent the juncture of the intermediate and delivery raceway for entry into the delivery raceway and driving the sheets in a direction opposite said first direction through the substantially right angled pathway formed by the

delivery raceway and out of the delivery raceway to orient said sheets into said second faced position inverted substantially 180° with respect to said first faced position; and

(e) bin means positioned adjacent the ejecting end of the delivery raceway to hold a plurality of sheets as they are ejected out of said delivery raceway in said second faced position and in the order of their delivery into the inverter.

6. The inverting device of claim **5** in which the intermediate raceway comprises a pair of adjacent baffles in biconvex spaced apart relationship.

7. The inverting device of claim **5** in which said raceways comprise a combination of reticulated grids and plates disposed in spaced apart relationship with each other, the reticulated grids at the junctures of said raceways disposed in spaced relationship to the grooves of said grooved roller.

8. The inverting device of claim **5** in which stop means to limit movement of said sheets are positioned in said intermediate raceway.

9. An inverting device for inverting printed sheets from a first to a second faced position after the sheets are sequentially delivered from a photocopy machine into the inverter, the inverter comprising:

(a) a housing with spaced openings on opposing sides defining an input opening for allowing the printed sheets to be delivered from the photocopier into the device and a delivery opening for allowing the printed sheets to be ejected out of the device;

(b) a cover over said housing, the upper portion of the cover elongated to define an open ended duct;

(c) a frame mounted substantially coextensive with the interior of said housing;

(d) angulated interconnected raceways mounted coextensively over the upper end of said frame, defining a horizontal delivery race substantially on the same in the housing to guide sheets delivered into the inverter by the photocopier in said first faced position, a horizontal delivery race substantially on the same plane as the input race adjacent the delivery opening of the housing and an intermediate race interconnected at right angles to the input and delivery race and extending into the open ended duct formed by said cover in a direction normal to the plane of the input and delivery races;

(e) a grooved rotating roller journaled to the frame and having a compressible driving surface, the roller disposed adjacent the interconnction of the intermediate race with the input and delivery races and rotated so that sheets delivered into the device by the photocopier in said first faced position along the input race will contact said roller and be driven through a first right angle from the sheet's position in the input race into said intermediate race and open ended duct in a first direction and upon continued rotation of the roller be driven in a second direction through a second right angle from the sheets position in said inverting race and duct into said delivery race thereby inverting the sheet from its first faced position along the input race substantially 180° into said second faced position, said roller driving the sheets with sufficient force to deliver them out of said raceway through the delivery opening of said housing;

(f) a bin secured to said housing to hold a plurality of sheets in stacked orientation as they are ejected from the device in said second faced position and in the sequence of delivery from the photocopier and

(g) means mounted in the housing to drive said roller.

10. The angulated interconnected raceways of claim **9** wherein said raceways comprises a lower baffle extending from the input opening of said housing substantially coextensive over the upper end of said frame and housing, the baffle having a series of fingers partially convoluted about the grooves in said roller for guiding sheets driven into the compressible surface of said roller as they are moved into and out of said intermediate race; a pair of upper baffles disposed in spaced relation above the lower baffle, one of the upper baffles extending into said housing from the input opening, the other extending into said housing from the delivery opening to form respectively said input and delivery races with the lower baffle, each of the upper baffles having a substantially right angled section adjacent said grooved roller, the right angled sections extending from said roller in spaced apart relationship to form a pair of biconvex baffles to define the intermediate race, the inner surfaces of the biconvex baffles forming concave surfaces adapted to orient the sheets for movement into and out of said intermediate race in said first and second directions.

11. The angulated interconected raceways of claim **10** in which the right angled sections of the upper baffles adjacent said roller are in contact with the surface of said roller.

12. The angulated interconnected raceways of claim **10** in which the right angled sections of the upper baffles adjacent said roller have a series of ribs extending from their surfaces and disposed in spaced relationship to the grooves of said roller.

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EDWARD A. SROKA, Primary Examiner

U.S. Cl. X.R.

271—80

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,523,687 Dated August 11, 1970

Inventor(s) KURT H. PETERSEN and GEORGE L. WARNER

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Col. 2, line 48: "views" should be --view--.

Col. 2, line 65: "system" should be --systems--.

Col. 7, line 54: "section 34 of baffle and" should be --section 34 of baffle 32 and--.

Col. 9, line 37, claim 9: "a horizontal delivery race substantially on the same" should be --a horizontal input race adjacent the input opening--.

SIGNED AND SEALED DEC 1 - 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
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Commissioner of Patents

FORM PO-1050 (10-69)

USCOMM-DC 60376-P69
* U.S. GOVERNMENT PRINTING OFFICE : 1969 O—366-334