

[54] **DRIVING MECHANISM FOR ROLLER TRANSPORTING DEVICES**

[75] Inventor: **Conrad E. Lee, Mound, Minn.**

[73] Assignee: **Pako Corporation, Minneapolis, Minn.**

[22] Filed: **Feb. 1, 1972**

[21] Appl. No.: **222,544**

[52] U.S. Cl. **226/188, 226/189**

[51] Int. Cl. **B65h 17/20**

[58] Field of Search **226/188, 189; 74/68**

[56] **References Cited**

UNITED STATES PATENTS

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3,028,064	4/1962	Thurlings	226/188 X
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Primary Examiner—Allen N. Knowles

Assistant Examiner—Gene A. Church

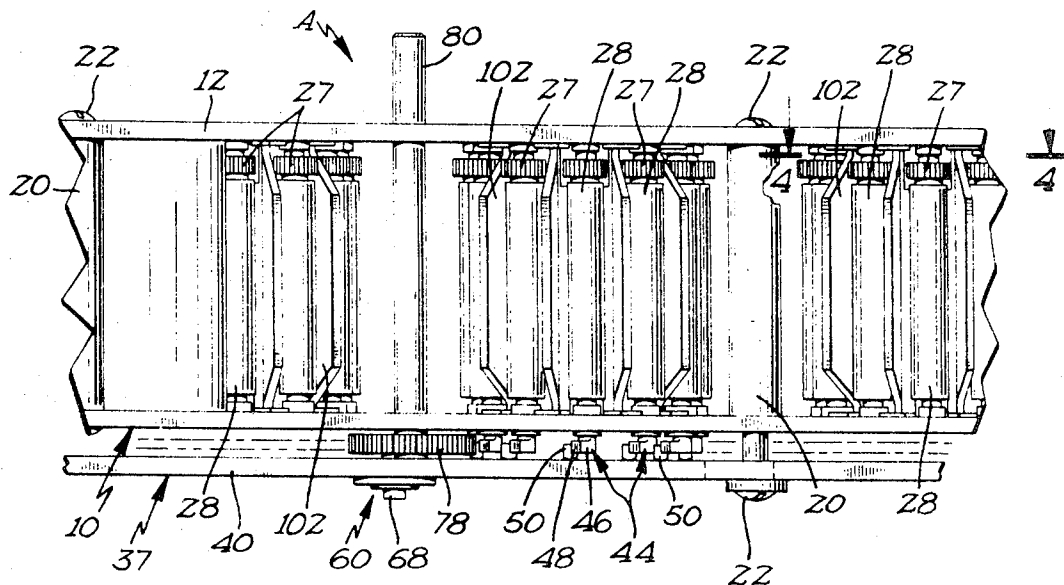
Attorney—Wicks & Nemer

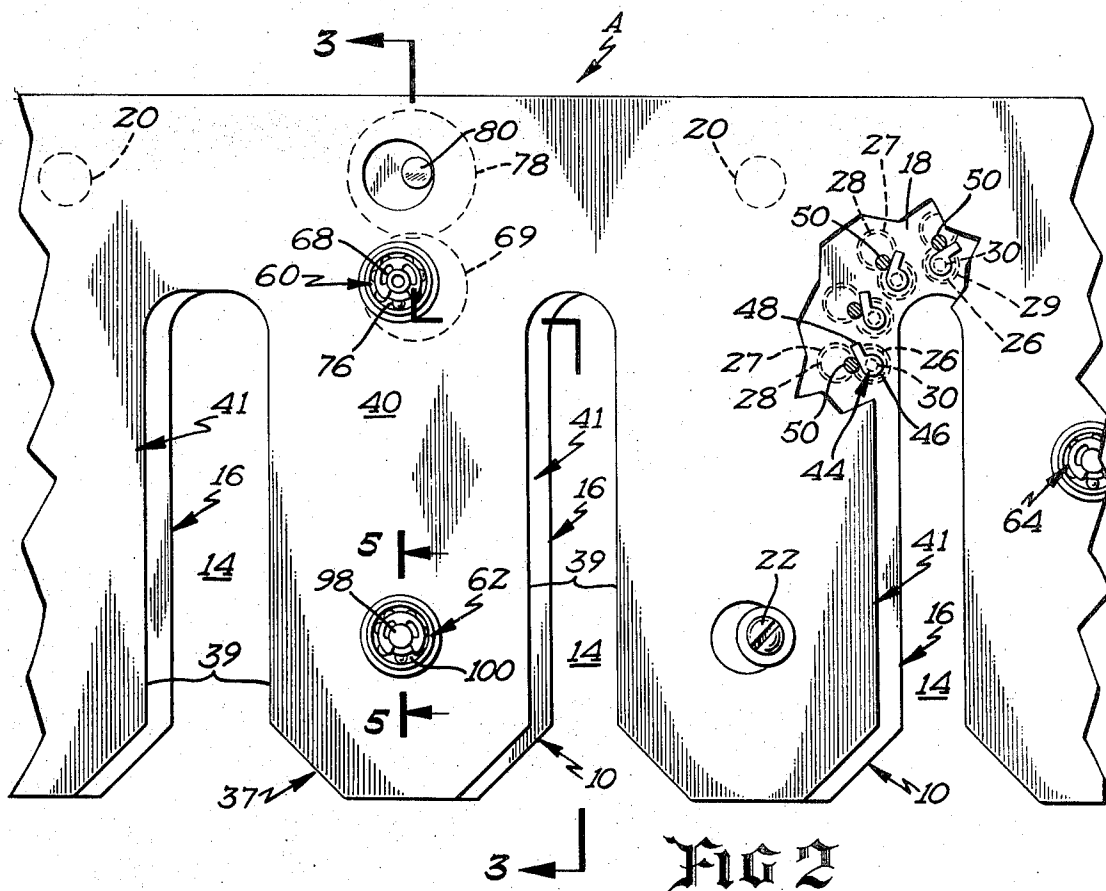
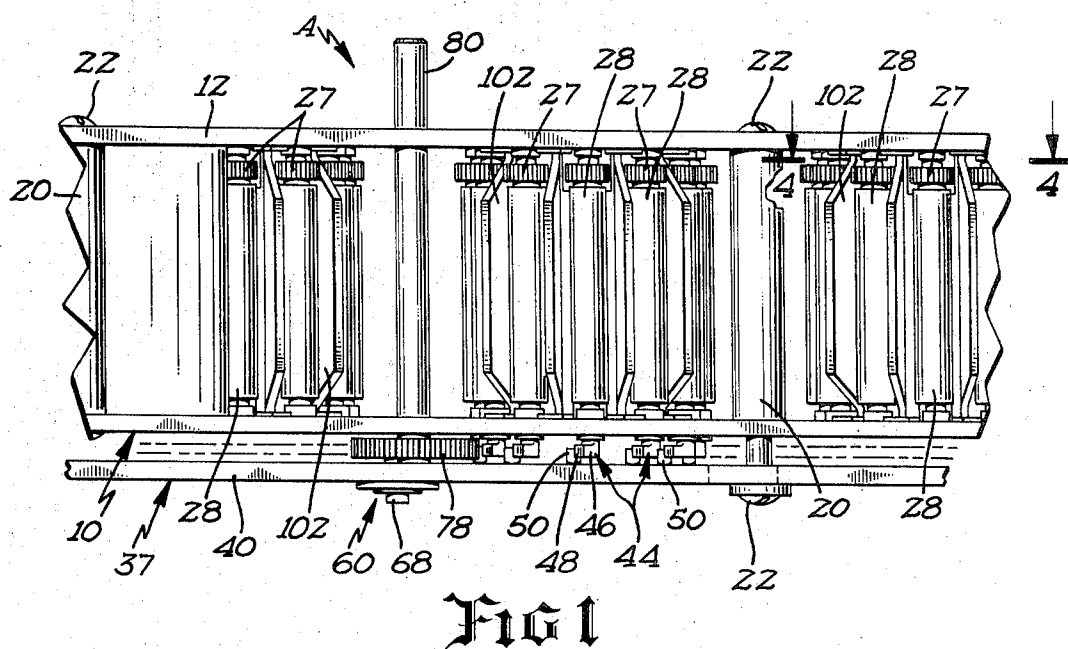
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ABSTRACT

A driving mechanism for roller transporting devices in which spaced pairs of substantially contacting rollers transport material therebetween, said mechanism including a plate actuated for movement in the plane thereof to cause each point of said plate to rotate in a circle of the same diameter and about parallel axes with members on said plate cooperating with cranks on one end of one roller of each pair of rollers to effect rotation of said rollers together with intermeshing spur gears on the rollers at the other ends thereof rotating the other rollers of each pair.

4 Claims, 6 Drawing Figures





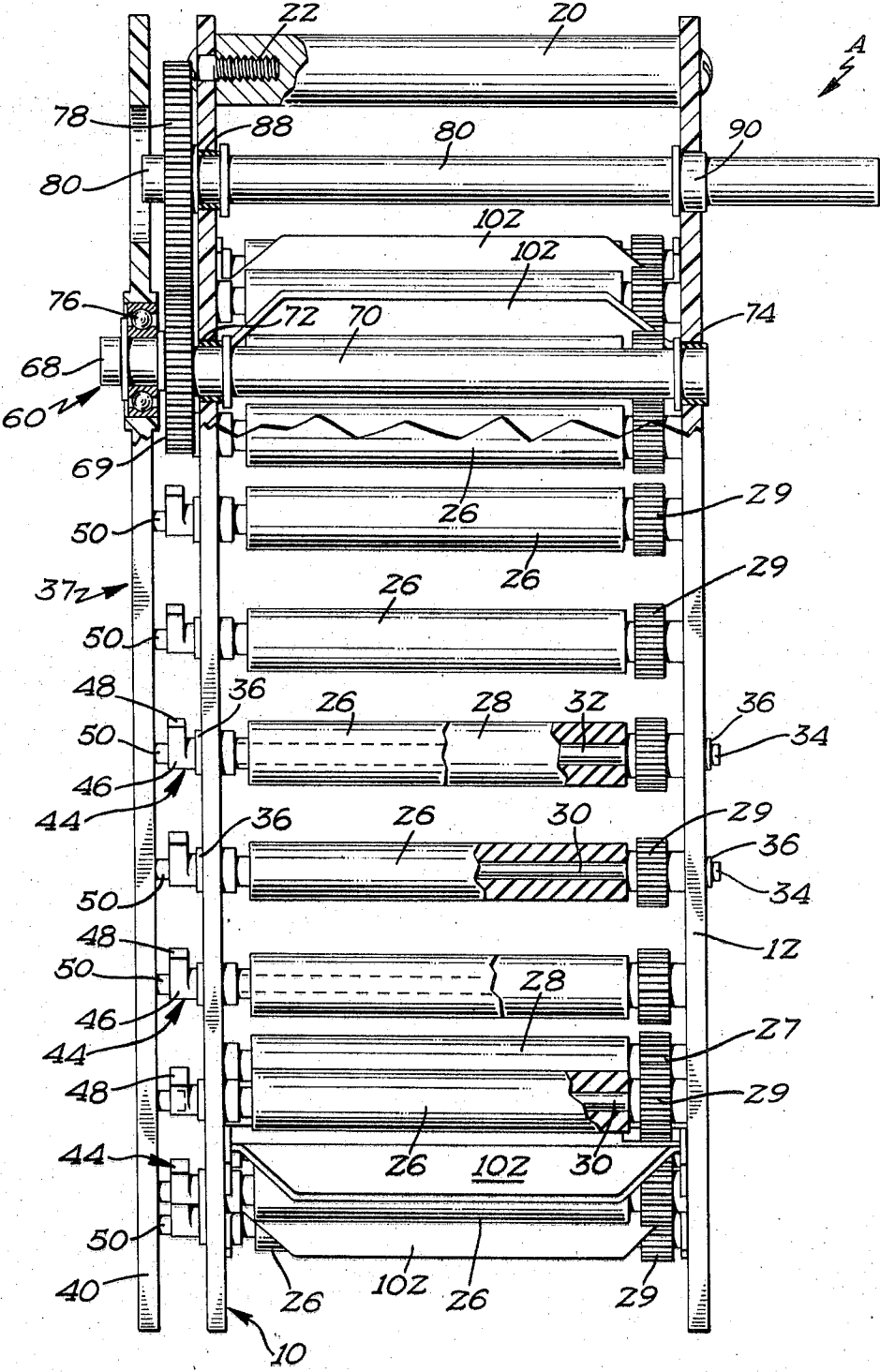


FIG 3

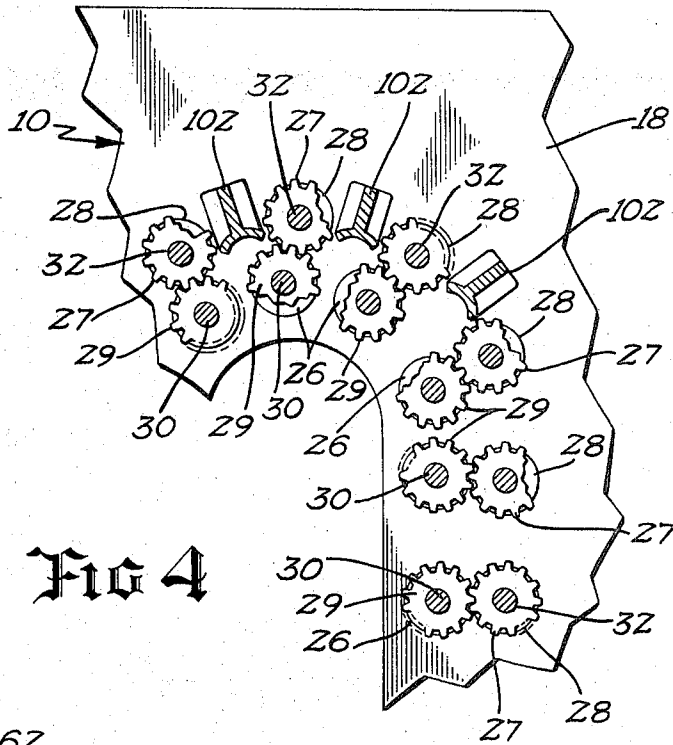


FIG 4

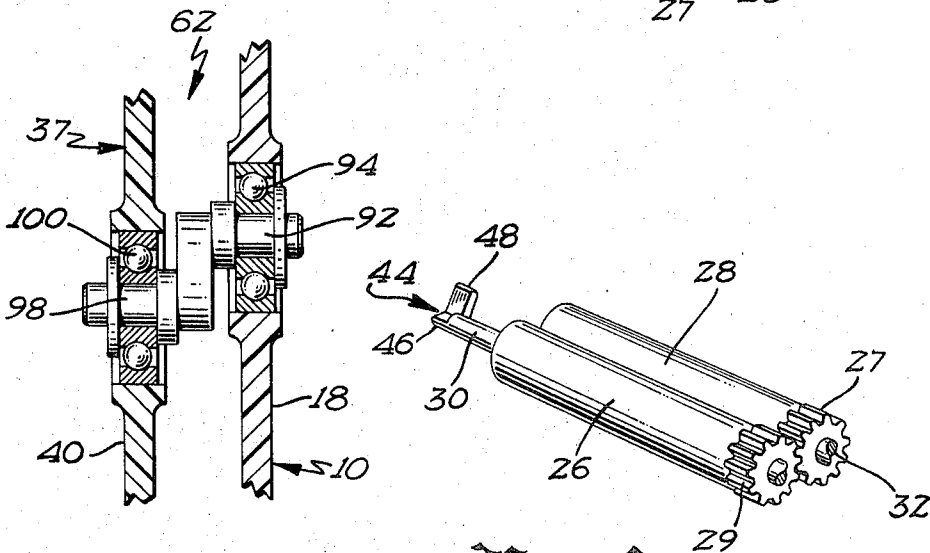


FIG 5

FIG 6

DRIVING MECHANISM FOR ROLLER TRANSPORTING DEVICES

RELATED PATENTS

This application is related to U.S. patent No. 3,608,807 for DRIVING MECHANISM FOR A ROLLER TRANSPORTING DEVICE.

SUMMARY

The invention relates to a device for driving pairs of rollers for transporting sheet material wherein a single driving plate is actuated for movement in the plane thereof to cause each point of the plate to rotate in a circle of the same diameter and about parallel axes, the plate having members thereon in engagement with cranks on one end of one roller of each pair of rollers. A spur gear on the other ends of the rollers engage which rotates the roller not rotated by the crank. With the driving plate tolerances relative to bearing mounts for the rollers need not be close and drive gears with close tolerances are not required. With the present invention a single drive plate causes all of the pairs of rollers to rotate.

In the drawings forming part of this application.

FIG. 1 is a top plan view of a roller transporting device illustrating an embodiment of the invention.

FIG. 2 is a side elevational view of a portion of one side of the invention with portions broken away to show normally hidden parts of the invention.

FIG. 3 is a sectional view on the line 3—3 of FIG. 2 with portions broken away to further show the internal construction of the invention.

FIG. 4 is a sectional view taken on line 4—4 of FIG. 1.

FIG. 5 is a detailed sectional view of one of the floating cranks supporting the driving plate.

FIG. 6 is a perspective view of one pair of rollers removed from the device.

The transporting device shown is an improvement in that illustrated in U.S. Pat. No. 3,608,807.

The device illustrated comprises two spaced stationary plates 10 and 12 each of which is formed with slots 14 to provide depending sections 16 connected to top sections 18 for insertion into separate tanks not shown. These plates are connected together by means of spacer rods 20 which have screwed into the ends thereof screws 22 which pass through said plates and hold the parts together.

Between the sections 16 and 18 are pairs of rollers 26 and 28 each of which has a spindle 30 extending throughout the length of the same and beyond the ends of the rollers. The ends 32 and 34 of these spindles are journaled in bearings 36 formed on the bearing plates 10 and 12.

The rollers 28 as viewed in FIG. 2 travel in a clockwise direction while the rollers 26 travel in a counter-clockwise direction, as will be seen hereinafter. These pairs of rollers have proximity which cause transporting of sheet material therebetween.

Opposite and outwardly from the bearing plate 10 is a collective driving means 37 which includes a driving plate 40 formed with slots 39 to provide depending sections 41 in alignment with sections 16. The rollers 26 have mounted thereon cranks 44 which are disposed between the bearing plate 10 and the drive plate 40 and which include bosses 46 attached to the ends 34 of the

spindles 30 of said rollers. Issuing outwardly from and forming part of the cranks 44 are the bosses 46 formed with the crank arms 48 which are engaged by crank pins 50 extending inwardly from plate 40 toward the plate 10 and secured to the plate 40, there being one crank pin for each crank on the rollers 26. The rollers 28 are the outer of each pair while the roller 26 is the inner roller thereof.

The driving plate 40 is supported and driven by eccentric means in the form of a driven crank 60 and floating cranks such as 62 and 64. The driven crank 60, FIG. 3 in particular, comprises a crank pin 68 which is secured to a spur gear 69 mounted on a shaft 70 journaled in bearings 72 and 74 carried by the bearing plates 10 and 12, respectively. The crank pin 68 is journaled in a ball bearing 76 carried by the driving plate 40. The spur gear 69 is driven by a spur gear 78 mounted on another shaft 80. The shaft 80 is journaled in bearings 88 and 90 carried by the bearing plates 10 and 12 and is driven from any suitable source of power. As the driving plate 40 is driven in its orbital path the pins 50 thereon actuate the crank arms of the crank pins and thereby rotate the rollers 26.

The floating cranks 62 and 64 are identical and one is best shown in FIG. 5 and comprises a crank shaft 92 which is journaled in a ball bearing 94 carried by the bearing plate 10. Issuing outwardly from the shaft 92 is a crank arm 96 and which carries a crank pin 98. This crank pin is journaled in a ball bearing 100 carried by the plate 40.

Each outer roller 28 has a spur gear 27 mounted on the spindle end thereof which engages with a spur gear 29 mounted on the spindle end of each inner roller 26. Each of the inner rollers 26 is driven by the crank arm thereof by means of a pin 50 of the driving plate 40 as heretofore described. Thus, as roller 26 is driven the spur gear thereof drives the spur gear of roller 28 and thereby the roller 28.

To guide the sheet material transported where the same passes around curves, guides 102 are employed and which are disposed between the rollers 28 and secured to the bearing plates 10 and 12.

When the mechanism is to be used with a photographic film developer, suitable tanks for chemicals are provided and into which the sections 16 with attached parts are inserted, such an operation shown in U.S. Pat. No. 3,608,807.

The operation of the invention is the same as disclosed in U.S. Pat. No. 3,608,807 dated Sept. 28, 1971.

I claim:

1. In a device for transporting sheet material comprising a plurality of rotary elongated members arranged in pairs and adapted to convey the material between the rotary members of one pair then successively between the rotary members of other pairs and finally discharging the material from still another pair of roller members and the combination of a driving mechanism for driving said roller members comprising:
 - a. collective driving means for simultaneously driving one of each of said pairs of roller members, including a single plate driven by
 - b. eccentric means so that each point thereof travels in a circle of the same diameter and about parallel axes,
 - c. means for driving said eccentric means,
 - d. said roller members rotatably mounted in bearing means,

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- e. cranks carried by said roller members which are engaged by
- f. fixed parts on said plate for rotating said roller members
- g. individual driving means including intermeshing spur gears, one gear on each of the rollers of each pair for rotating the roller member not driven by the collective driving means. 5
- 2. The device of claim 1 in which the fixed parts are of said single plate are pins. 10
- 3. The device of claim 2 in which the collective driving means and the individual driving means are spaced axially from one another.
- 4. In a device for transporting sheet material comprising: 15
- a. at least one pair of rollers,

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- b. each of said rollers having a spindle on each end and a
- c. spur gear on one end,
- d. the spindle on one of said rollers opposite to said spur gear having a crank extending therefrom,
- e. bearing means for rotatably mounting said rollers on said spindles,
- f. a single plate,
- g. eccentric means for driving said plate in a rotary and rectilinear motion,
- h. means for driving said eccentric means,
- i. said plate having a pin thereon for engaging said crank of said roller to rotate the same and also rotate said second mentioned roller through said spur gears.

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