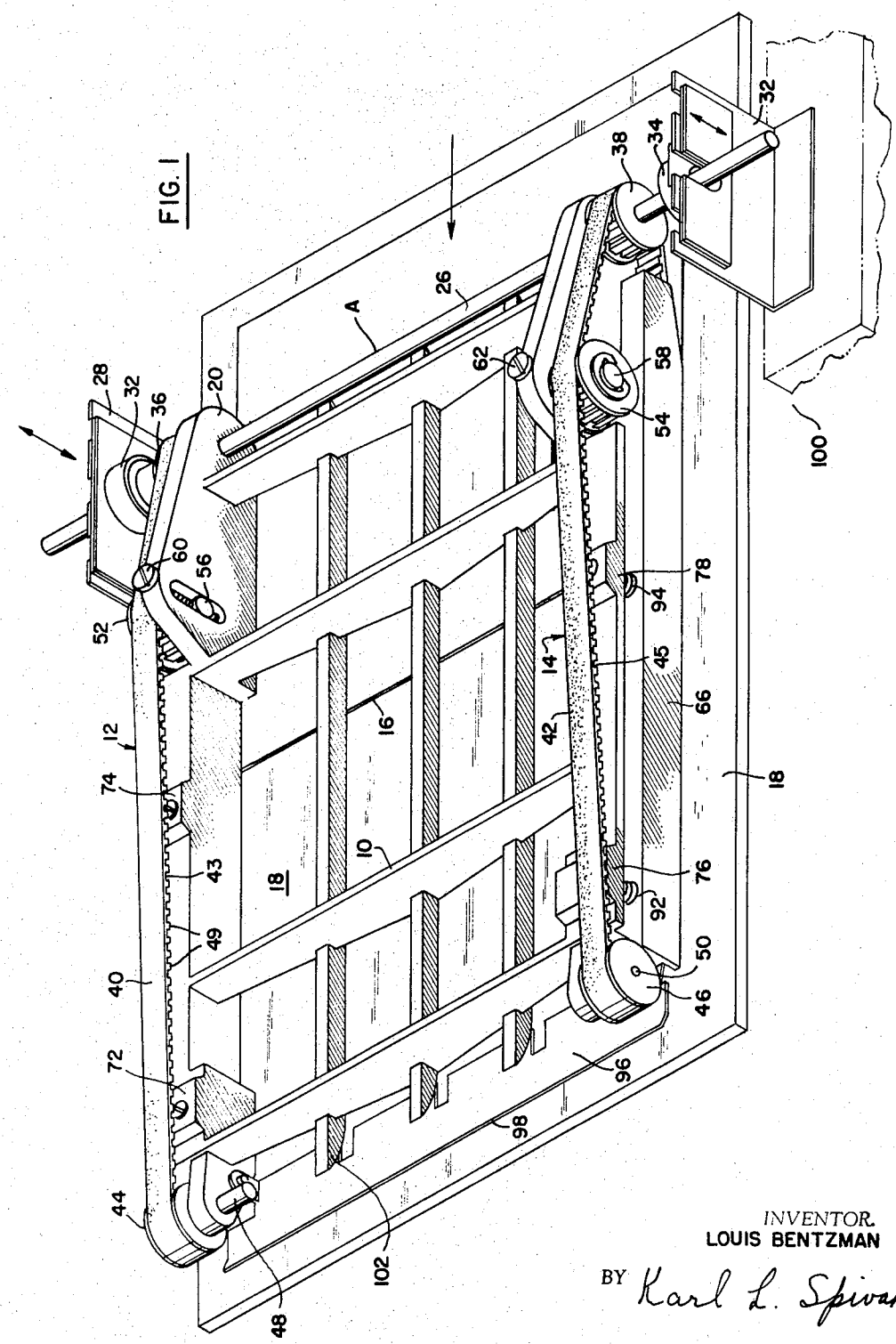
Sept. 12, 1967 L. BENTZMAN 3,341,194

PAPER TRANSPORT ASSEMBLY

Filed May 17, 1965 3 Sheets-Sheet 1

FIG. 1



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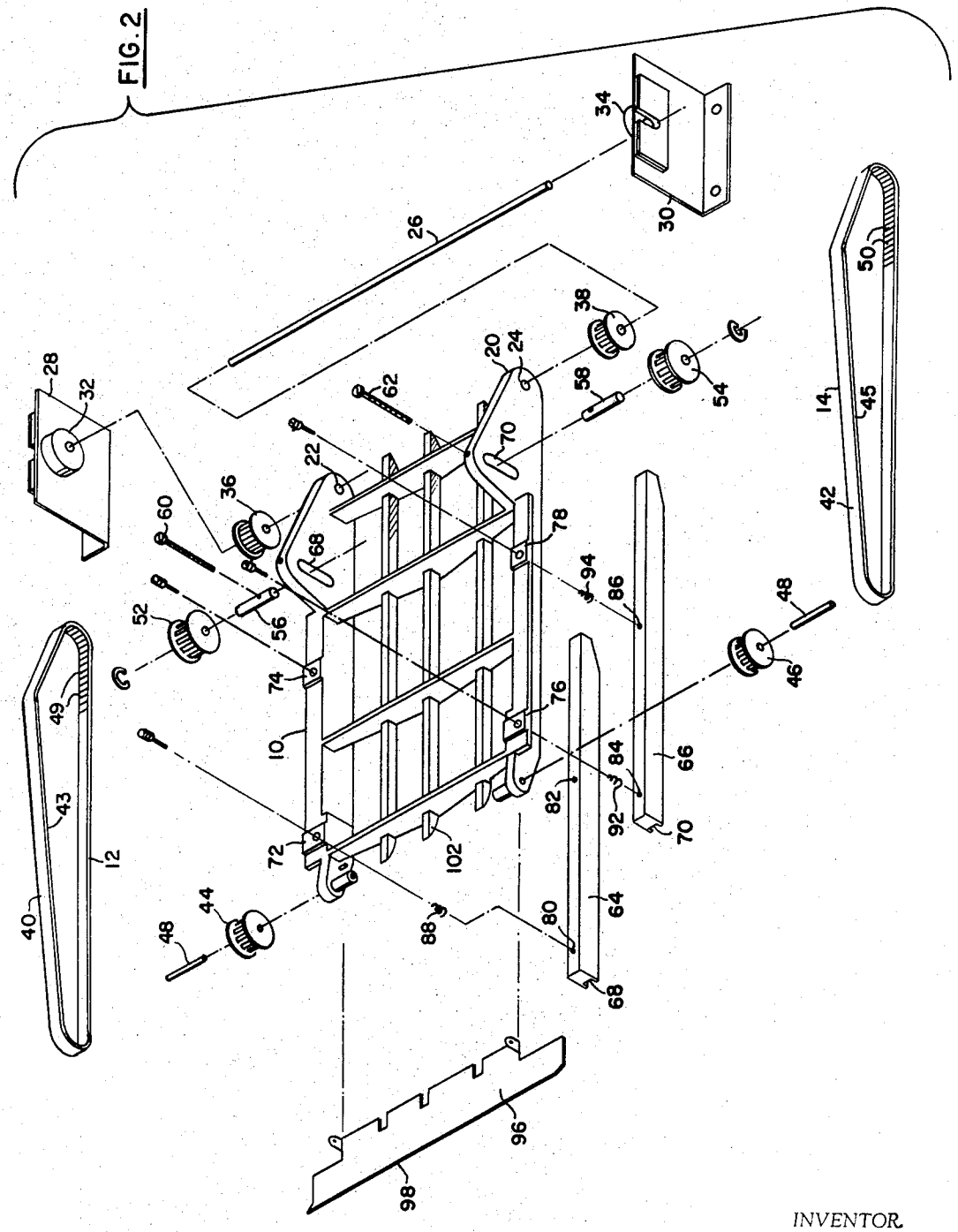
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PAPER TRANSPORT ASSEMBLY

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FIG. 2



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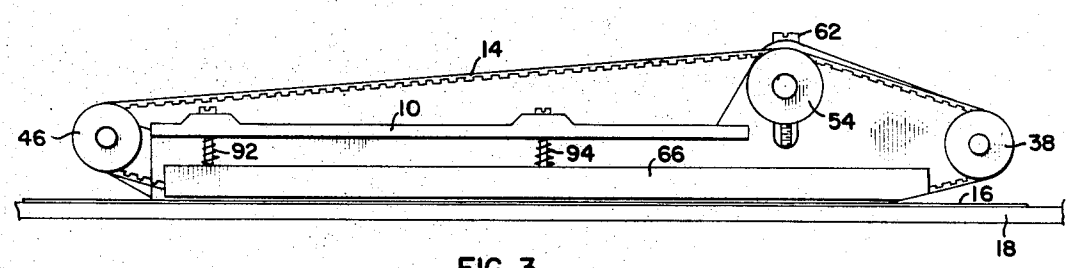


FIG. 3

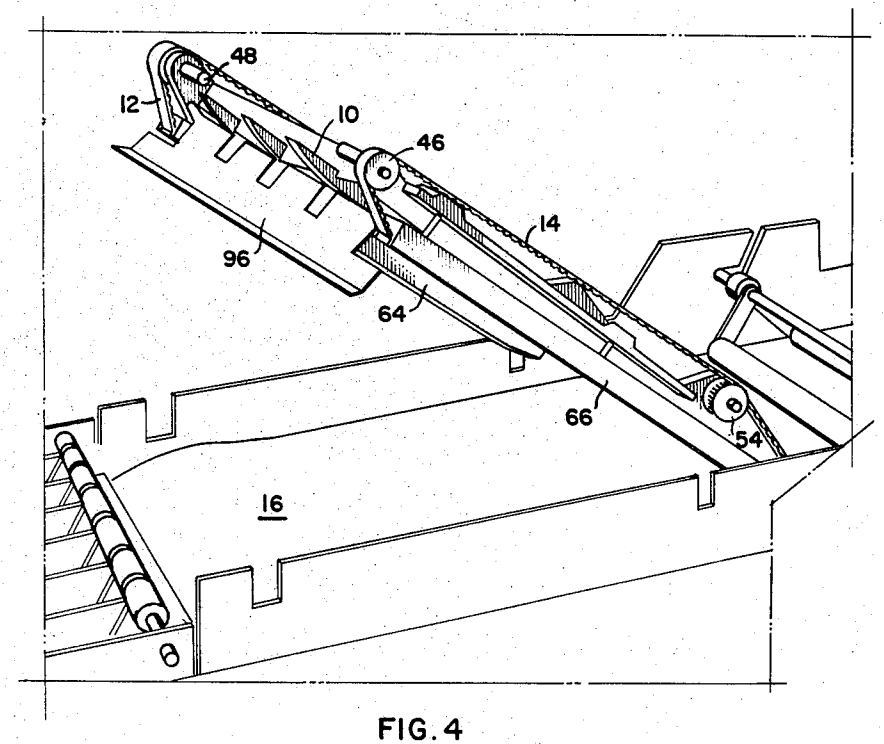


FIG. 4

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3,341,194

PAPER TRANSPORT ASSEMBLY

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Filed May 17, 1965, Ser. No. 456,081
7 Claims. (Cl. 271—45)

This invention relates in general to the broad field of photo copying and electrostatic copying and is more particularly directed to the art of freely moving paper through a copying machine in response to the reproduction demands.

Modern office copying machines require large paper supplies to satisfy the output requirement. Some copiers now in use are charged with paper stock that has already been cut to size and have the sized copy paper fed by the sheet or in multiples thereof. Others feed sheets in varying lengths. It is with both types of machines that the instant invention finds its utility.

In feeding papers, film and similar rolled materials through operating mechanisms, jams sometimes occur due to breakage, paper imperfections or mechanical failures. Such jams vary in seriousness and as a general rule, it can be stated that the size of the jam is a direct function of the operating speed of the machine. That is, as the speed of travel of the paper through a machine increases, the size of the jammed material similarly grows immediately upon the occurrence of a malfunction. It is therefore of primary importance in designing paper handling facilities that the mechanism itself will not cause the formation of jams, and equally important, should a breakage occur, the facilities must incorporate readily accessible construction features that enable an operator to easily get to the source of the trouble and to quickly take the necessary remedial action.

It is therefore an object of this invention to provide improved paper transporting facilities of the type set forth.

It is another object of this invention to provide a novel paper transport assembly featuring readily accessible hinge means to permit the assembly to be easily pivoted away from the paper for corrective procedures.

It is another object of this invention to provide a novel paper transport assembly of relatively simple construction to permit an unskilled operator to quickly take all required steps to clear a paper jam.

It is another object of this invention to provide a novel paper transport assembly incorporating a pair of flexible drive belts and sufficient adjustable means to accurately balance the pressure from front to rear along the belts.

It is a further object of this invention to provide a novel paper transport assembly incorporating a pair of flexible drive belts and sufficient adjustable means to accurately balance the feed pressure between the belts.

It is a further object of this invention to provide a novel paper transport assembly including a pair of flexible drive belts and unique pressure equalizing shoes in contact with the said belts.

It is a further object of this invention to provide a novel paper transport assembly including a pair of spaced driving belts and pressure balancing shoes in contact with the said belts wherein the shoes are adjustably secured to the assembly through appropriately spaced spring pivots.

It is a further object of this invention to provide a novel paper transport assembly wherein the weight of the assembly itself is utilized in freely moving a length of paper across a transparent surface.

It is a further object of this invention to provide a novel paper transport assembly that is rugged in construction, readily accessible when in use and trouble free in operation.

Other objects and a fuller understanding of the invention will be had by referring to the following description and claims of a preferred embodiment thereof, taken in conjunction with the accompanying drawing wherein like reference characters refer to similar parts throughout the several views and in which:

FIG. 1 is a top perspective view of a paper transport assembly in accordance with the instant invention.

FIG. 2 is an exploded view of the assembly.

FIG. 3 is a side elevational view thereof.

FIG. 4 is a perspective view thereof with the assembly in raised position.

Although specific terms are used in the following description for the sake of clarity, these terms are intended to refer only to the particular structure of my invention selected for illustration in the drawings and are not intended to define or limit the scope of the invention.

Referring now to the drawings, I show a paper transport assembly, generally designated A, including a relatively heavy frame **10** which rotatively carries a pair of outwardly spaced belts **12, 14**. As seen in FIG. 1, the assembly A transports the copy **16** over the plane of a transparent support **18** which is an integral, functioning part of the overall enclosing copy machine. The belts **12, 14** may be of any resilient material possessing a high coefficient of friction such as rubber that is suitable for the purpose of moving the copy **16** over the surface of the transparent support **18**. The frame **10** is preferably fabricated of a material of sufficient body and density to supply the weight required to provide gripping contact between the belts **12, 14** and the copy paper **16**.

The receiving end **20** of the frame **10** is drilled with aligned holes **22, 24** and rotatively carries the combined drive and pivot shaft **26** therein in bearings of any suitable, long wearing construction. External supports **28, 30** and bearings **32, 34** rotatively secure the shaft **26** to the photo machine construction **100**, and as best seen in FIG. 4, readily permit the assembly A to be pivoted upwardly about the supports, thereby furnishing easy access to the copy materials **16** in the event a paper jam should occur. The shaft **26** is turned by an external source of power (not shown) in any well-known manner and rotates the attached belt drive gears **36, 38** which are pinned or otherwise secured thereon. The supports **28, 30** vertically adjust and are provided with suitable adjustment nuts to permit the distance between shaft **26** and the transport surface **18** to be varied as necessary to assure that the assemly A is maintained parallel with the surface **18**. In this manner, equal pressure upon the paper **16** may be maintained.

Belts **12, 14** are fabricated of endless design with the respective outer surface **40, 42** constructed flat and of sufficient width to furnish a slip-free frictional contact with the paper **16**. The belt inner surfaces **43, 45** are molded to form continuous internal teeth **49** of dimensions suitable to mesh with the drive gears **36, 38**. It will be understood that the shaft **26** drives both gears **36, 38** at the same rotative speed and the driving belts **12, 14**, therefore also travel at the same velocity to evenly move the paper **16** across the transparent surface **18** without binding, swerving, wrinkling or otherwise jamming.

Each belt **12, 14** forwardly rotates about the respective idler gears **44, 46** which freely turn upon the shafts **48, 50**. The shafts **48, 50** are journalled in the frame **10** and are aligned with the respective idler gears and drive gears to assure that the belts **12, 14** operate in truly parallel planes. Right and left take-up gears **52, 54** rotate about the shafts **56, 58** which are each vertically adjustable in the frame **10** by means of adjusting screws **60, 62**. The gears **52, 54** mesh with the belt teeth **49** and are aligned in the respective vertical planes passing through gears **44, 52** and **46, 54**. Belt tension may be readily varied by adjust-

ing the height of gears **52**, **54** in response to turning the adjusting screws **60**, **62**.

A pair of spaced nylon shoes **64**, **66** adjustably mount to the frame **10** and respectively bear against the inner surfaces **43**, **45** of the belts **12**, **14**. Each shoe **64**, **66** is machined to provide a shallow, bottom, longitudinal slot **68**, **70** to slidingly seat upon each belt and thereby provide a longitudinal guide. The depth of each slot must be less than the cross sectional height of the belt, to thereby permit contact below the shoes between the belts **12**, **14** and the copy paper **16**.

Each shoe **64**, **66** connects to the frame **10** at two spring pivot points, namely a forward pivot point **72**, **76** and an intermediate pivot point **74**, **78** respectively. Each pivot point is similarly constructed with a vertical spring cap **80**, **82**, **84**, **86** adjustably secured to the frame **12** and having a depending section slidably engaged in vertical holes in the shoes **64**, **66** to permit unrestricted vertical movement therein. Compression springs **88**, **90**, **92**, **94** act about the spring caps and bear between the frame **10** and the top of the shoes **64**, **66**. Floating the shoes from the frame in this manner permits transferring the weight of the frame to the belts to equalize the bearing along the entire belt surface that is in contact with the shoes. Also, by locating the pivot points as indicated, the shoes can pivot about the intermediate pivot points **74**, **78** and transfer the pressure to the edges of the fixed end of the transport frame and thus assure positive paper engagement.

The adjustable springs permit balancing the pressure from front to rear and from side to side so that the feed pressure is equal at all contact points. Spacing the pivot points near the front and near the center of the shoes as shown in the drawings, assures transferring the pressure to the edges of the fixed end of the transport frame to facilitate paper engagement and transport.

A sheet metal shield freely hinges to the frame **12** at its paper discharge end **102** and is balanced to continuously urge its leading edge **98** downwardly against the copy paper **16**. This shield performs the double function of discouraging the trailing edge of the copy paper from curling as it leaves the transport assembly A and also prevents light from other sources within the machine from striking the transport surface **18**.

Although I have described my invention with a certain degree of particularity, it is understood that the present disclosure has been made only by way of example and that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. In a paper transport assembly designed to move paper across a flat surface, the combination of

a weighted frame;

a driving shaft rotating within said frame,

said frame having pivotal motion about the said shaft;

driving means spaced from the said frame,

said means being rotated by the said shaft;

a pair of spaced paper contacting means in engagement with the said driving means,

said paper contacting means being urged into frictional contact with the paper by the weight of the said frame;

and adjustable means carried by the frame to balance the pressure along the area of contact between the paper contacting means and the paper, said adjustable means including a pair of longitudinal shoes in contact with portions of the interior of the said paper contacting means.

2. The invention of claim **1** and a relatively thin, flat shield hingedly connected to one end of the said frame and arranged transversely thereto, said shield being continuously pivoted downwardly about the said hinged connections.

3. The invention of claim **1** wherein the said shoes are each provided with a bottom, longitudinal groove to receive the said paper contacting means.

4. The invention of claim **1** wherein the said shoes are each provided with a bottom, longitudinal groove to receive the said paper contacting means, said groove having a height less than the thickness of the said paper contacting means, whereby the said means extend below the said shoes and frictionally engage the said paper.

5. The invention of claim **1** wherein said adjustable means are suspended from the frame by a pair of vertically adjustable spaced pivots.

6. The invention of claim **1** wherein said adjustable means are suspended from the frame by a pair of vertically adjustable spaced pivots, and wherein a compression spring rides upon each of the pivots and biases the said adjustable means away from the said frame.

7. In a paper transport assembly designed to move paper across a flat surface, the combination of

a weighted frame;

a driving shaft rotatively suspended in the said frame at one end thereof,

said frame having pivotal motion about the said shaft;

a pair of driving gears outwardly spaced from the said frame,

said gears being rotatively secured to the said shaft;

a pair of spaced, parallel, endless belts in rotative engagement with the said driving gears,

said belts being urged into frictional contact with the said paper by weight of the said frame acting about the said shaft;

said belts being provided with a plurality of continuous, internal teeth in driving engagement with the said driving gears;

and a pair of elongated shoes adjustably suspended from the said frame,

said shoes each provided with a bottom, longitudinal groove to receive one of said belts therein, each said groove having a height less than the thickness of the said belts,

said shoes each being suspended from the said frame by a pair of adjustable, spaced pivots, and compression springs carried by the pivots and biasing the shoes from the frame,

whereby the pressure of the frame weight is equally distributed along the portion of the belts in contact with the said paper and whereby the entire assembly may be pivoted about the said shaft to clear paper jammed between the said flat surface and the said frame.

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