Sept. 12, 1967 L. BENTZMAN 3,340,618

HINGED DRYER ASSEMBLY

Filed May 17, 1965

Fig. 1.

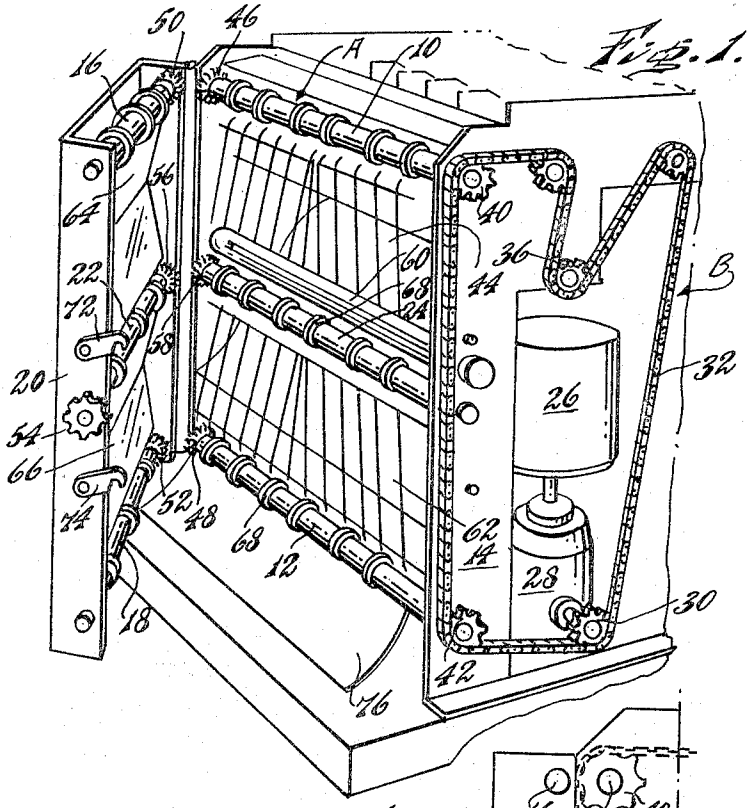


Fig. 4.

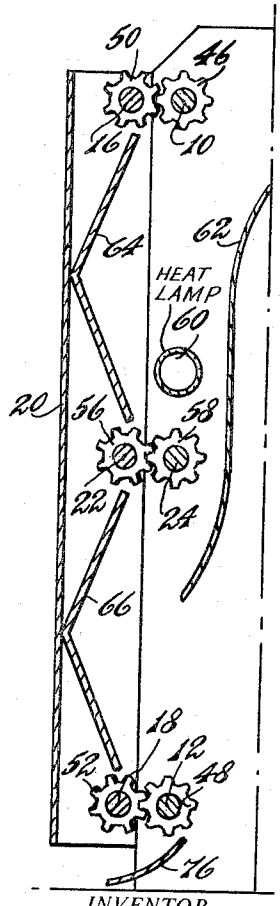


Fig. 3.

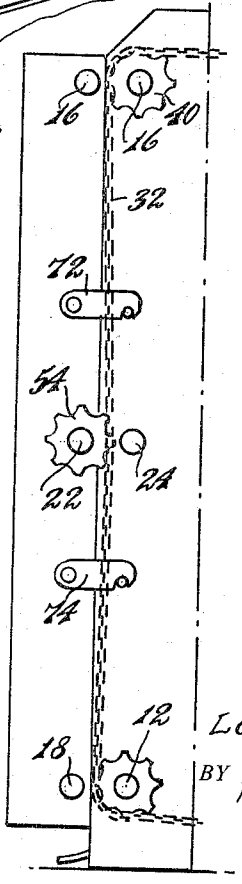


Fig. 2.

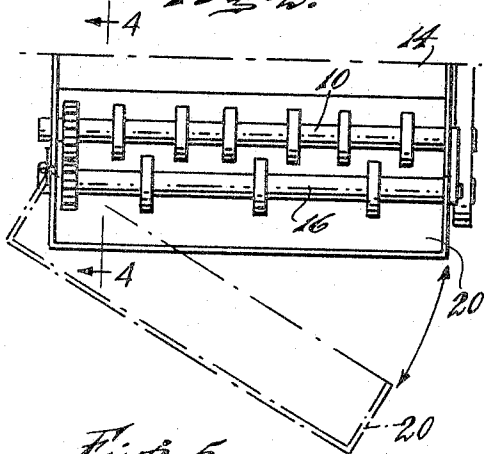
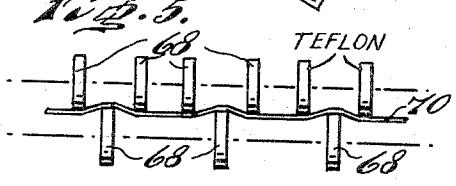


Fig. 5.



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3,340,618

HINGED DRYER ASSEMBLY

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ABSTRACT OF THE DISCLOSURE

A dryer assembly for affixing and drying a toned image upon a previously electrostatically charged copy sheet including separable pairs of driving and driven rollers, the said rollers being equipped with cooperating, thin, paper contacting rollers to urge the sheet therebetween without marring the image.

This invention relates in general to the art of electrostatic copying and is more particularly directed to a novel dryer and heater assembly that affixes the image upon the copy prior to its ejection from the copier.

The instant invention is concerned with an office type of electrostatic copy machine designed to produce a large number of copies in a relatively short period of time. In such a type of device, an electrostatic charge is first impressed upon the copy paper. An image of the material to be copied is then projected onto the charged surface in varying intensities corresponding with the light and dark shades present in the original being copied. The charged paper then feeds through a toner bath wherein toner particles are attracted to the charged paper in proportion to the intensity of the charge and thus form a visible image thereon. The copy paper is then fed through a heater and dryer assembly to both affix the toner to the paper and to completely dry the paper prior to delivery.

In feeding the copy paper through the dryer, jams sometimes occur due to misalignment, paper imperfections and mechanical failures. Such result in a great loss of time and money, and sometimes mean the difference between a commercially successful machine and one that is unacceptable. It is therefore of primary importance in designing dryer assemblies that the mechanism itself does not cause the formation of jams, and equally important, should a jam occur, the assembly must incorporate readily accessible construction features that enable even an unskilled 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 an improved dryer assembly of the type set forth.

It is another object of this invention to provide a novel dryer assembly featuring readily accessible hinge means to permit the assembly interior to be easily exposed for corrective procedures.

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

It is another object of this invention to provide a novel dryer assembly including opposed driving rollers and hinged means to easily separate the rollers.

It is another object of this invention to provide a dryer assembly including rollers on opposed shafts that are alternately driven and separably joined.

It is another object of this invention to provide a dryer assembly that may be separately opened to clear a paper jam without the necessity of disassembling a major portion of the enclosing apparatus.

It is another object of this invention to provide a novel dryer assembly including opposed, extremely thin, paper transport rollers.

It is another object of this invention to provide a novel dryer assembly that is rugged in construction, simple in operation and trouble-free upon use.

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 drawings wherein like reference characters refer to similar parts throughout the several views and in which:

FIG. 1 is a perspective view of the invention with the cover in open position to expose the internal working parts.

FIG. 2 is a top plan view thereof with the cover in closed position.

FIG. 3 is a side elevational view thereof with the cover in closed position.

FIG. 4 is a longitudinal section through the door showing the mesh of the internal gears taken along line 4—4 of FIG. 2 looking in the direction of the arrows.

FIG. 5 is a schematic sectional view showing in exaggerated detail the action of the rollers upon the paper.

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 hinged dryer assembly generally designated A forming a functioning component of an electrostatic copy machine B. A pair of horizontal upper and lower driving rollers **10**, **12** rotatively secured in the assembly stationary section **14** turn the cooperating driven rollers **16**, **18** that are rotatively secured in the assembly hinged door section **20**. Similarly, the intermediate horizontal, driving roller **22** rotatively carried in the door section **20** turns its cooperating driven roller **24** that is rotatively secured in the stationary section **14**.

As best seen in FIG. 1, an electrical motor **26** of conventional design connects to a gear train **28** and thus powers a driving gear **30**. The gear **30** drives an endless chain **32** which is maintained taut by the idler gear **36** in any well-known manner. The shafts **10**, **12** terminate without the dryer enclosure **44** in affixed gears **40**, **42** which mesh with the chain **32** and thus revolve in response to any activity of the motor **26**. The remote interior ends of the shafts **10**, **12** respectively carry the driving gears **46**, **48** which mesh with the gears **50**, **52** when the hinged door section **20** is swung to its closed position as indicated in FIGS. 2 and 3.

Similarly, the door section carries the shaft **22** which also terminates without the dryer enclosure **44** in an affixed driving gear **54** which meshes with the chain **32** when the door section is in closed position. When the door is opened to expose the assembly interior, the mesh between the gear **54** and the chain **32** is automatically broken. The remote interior terminus of the shaft **22** rotatively carries a driving gear **56** which rotates with the shaft in response to the chain power transmitted through the meshed gear **54**. The gear **56** in turn meshes with the driven gear **58** when the door assembly is pivoted to its closed position to rotatively drive the shaft **24**.

As best seen in FIG. 1, the shafts **16**, **18** and **22** each rotatively carry three equally spaced rollers **68** and the shafts **10**, **12**, **24** each carry three pairs of equally spaced rollers **68**. As indicated in FIG. 5, each pair of rollers affixed to the stationary section shafts **10**, **12**, **24** cooperate with an adjacent single roller affixed to the hinged door shafts **16**, **18**, **22** to urge the paper **70** downwardly therebetween towards the ejection guide **76**. It is a feature of this invention to construct each roller of a hard, plastic material, such as "Teflon" with the outer periphery thereof formed as thin as possible to reduce inter-

ference with the newly formed image on the paper **70** to a minimum. The radius of each roller **68** is constructed slightly greater than one-half the distance between the center lines of the cooperating pairs of driving and driven rollers **10–16**, **22–24** and **12–18**. The outer peripheral edge of each roller **68** extends slightly beyond a vertical plane midway between the respective shafts **16**, **18**, **22** and **10**, **12**, **24**. The effect of this construction is shown exaggerated in FIG. 5, wherein the paper **70** is slightly curved at the three locations where the cooperative rollers **68** coact to drive the paper downwardly. The three spaced curvatures thus imposed serve to give the paper rigidity and markedly reduce any tendency to buckle or jam within the assembly A.

A reflector **62** directs energy from a heat lamp **60** towards the paper **70** as it passes through the assembly to dry the paper and affix the toner in a conventional manner. Opposed deflectors **64**, **66** are carried upon the door **20** and act as a guide to eliminate paper jams. Door latches **72**, **74** engage upon stationary catches to easily permit both securing and opening the door **20** in the event a paper jam occurs and it is necessary to gain access to the dryer assembly interior.

It is thus seen that I have provided a unique dryer assembly featuring a novel arrangement of drives and shafts to permit easy access to the interior construction, even by unskilled operators. Further, novel rollers have been incorporated to impart rigidity to the paper to reduce the possibility of a jam. The narrow configuration of the rollers also permits the completed copy to progress through the dryer assembly without objectionable impairment.

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 scope of the invention as hereinafter claimed.

I claim:

1. In an assembly for drying and affixing an image upon the copy sheet in an electrostatic copy machine, the combination of

(A) a stationary section affixed to the said copy machine;

(B) a plurality of roller carrying shafts rotatively supported in the said stationary section,

(1) at least one of said shafts being a driven shaft, and

(2) at least one of said shafts being a driving shaft,

(a) each of said driving shafts terminating outside of the said stationary section in an affixed driving gear;

(C) a hinged section movable between an open position and a latched position,

(1) said section being hingedly connected to the said stationary section,

(2) said section forming a drying enclosure with said stationary section when in its said latched position;

(D) a plurality of roller carrying shafts rotatively supported in the said hinged section,

(1) at least one of said shafts being a driven shaft and at least one of said shafts being a driving shaft,

(a) each of said driving shafts terminating outside of the said hinged section in an affixed driving gear,

(2) the stationary section shafts and hinged section shafts being so aligned that when the hinged section is in its latched position, the driving shafts of the stationary section rotate the driven shafts of the hinged section and the driving shafts of the hinged section rotate the driven shafts of the stationary section;

(E) an endless driving chain operatively connected to a motor power supply,

(1) said chain being carried externally of the said stationary section and said hinged section,

(2) said chain engaging each said driving gear affixed to the stationary section driving shafts,

(3) said chain engaging each said driving gear affixed to the hinged section driving shafts only when the hinged section is in the said latched position,

(4) said chain turning the said driving shafts upon operation of the said motor;

(F) a plurality of thin, hard, plastic rollers spaced upon each said shaft,

(1) said rollers having extremely thin peripheral edges,

(2) the radius of each said roller being slightly greater than one-half the center distance between the center lines of adjacent stationary section and hinged section shafts,

(3) said rollers impressing spaced curvatures upon the said copy sheet as it is carried through the assembly.

2. The invention of claim **1** wherein each hinged section shaft carries no more than three rollers whereby interference with the image may be minimized.

3. The invention of claim **1** wherein each roller affixed to a hinged section shaft is medially positioned between two rollers affixed to the adjacent stationary section shaft.

4. The invention of claim **1** wherein each hinged section shaft carries the same number of rollers and each stationary section shaft carries the same number of rollers, the said rollers being vertically aligned in respective vertical planes.

References Cited

UNITED STATES PATENTS

1,010,520	12/1911	Pringle.	
1,579,994	4/1926	Atkinson et al.	34—205
2,848,931	8/1958	Troidl	34—148 X
2,992,821	7/1961	Whitney	271—80 X
3,117,030	1/1964	Jons et al.	
3,132,047	5/1964	Van Dorn	34—155 X
3,187,162	6/1965	Hojo et al.	34—41 X

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