United States Patent

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[54] DRIER FOR SHEET MATERIAL

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[52] **U.S. Cl.**.....**219/388,** 34/49, 34/152, 263/50

[51] **Int. Cl.**.....**F27b 9/06**

[58] **Field of Search** 263/3, 50; 34/48, 49, 152; 219/388

[56] **References Cited**

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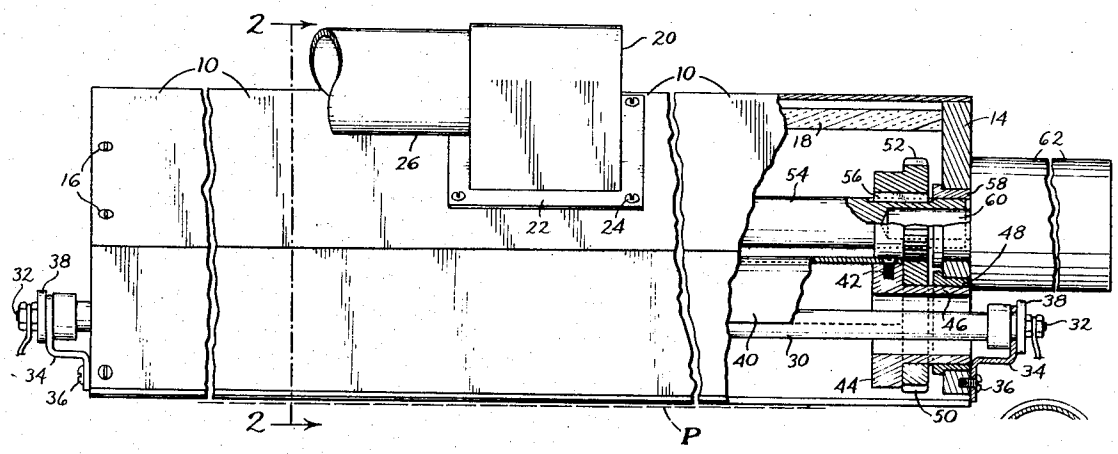
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[57] **ABSTRACT**

An elongated suction hood has an open side adapted to face continuously moving sheet material to be dried by one or more elongated electrical heaters disposed in the hood. An elongated combination reflector and shield is mounted in the hood for rotational adjustment about each heater between a reflecting position on the side of the heater opposite the open side of the hood and a shielding position interposed between the heater and open side of the hood.

4 Claims, 3 Drawing Figures



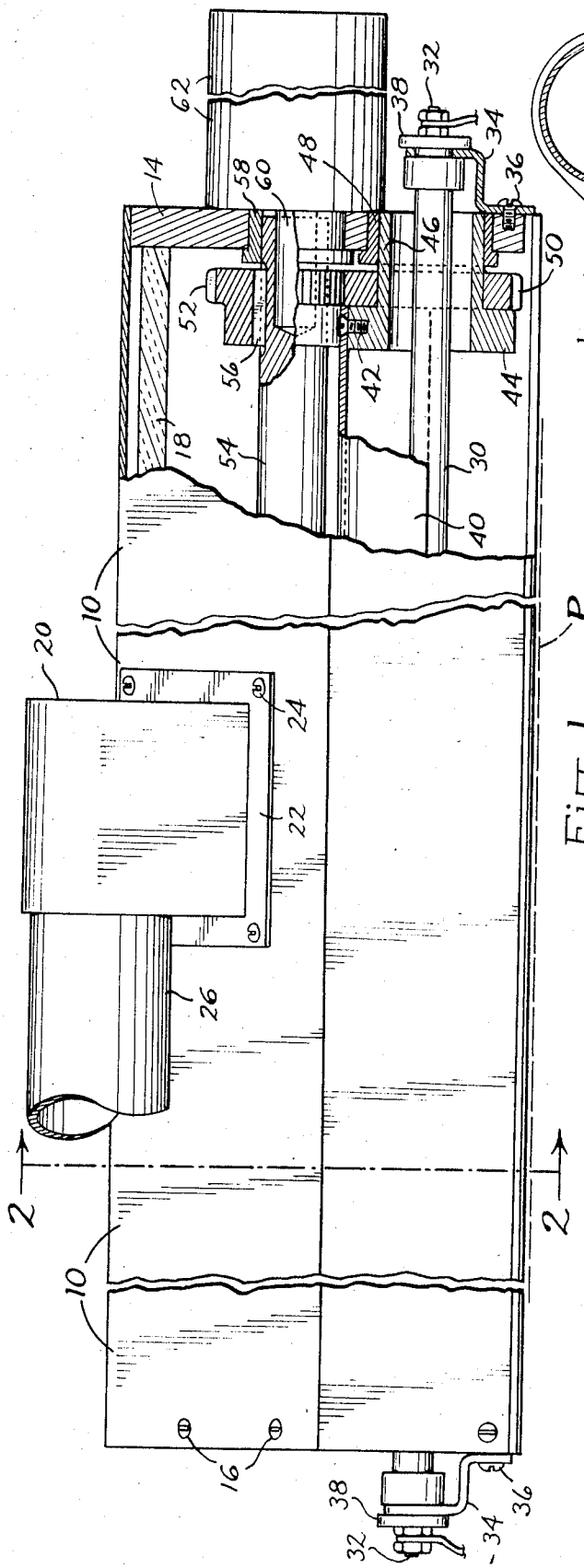


Fig. 1.

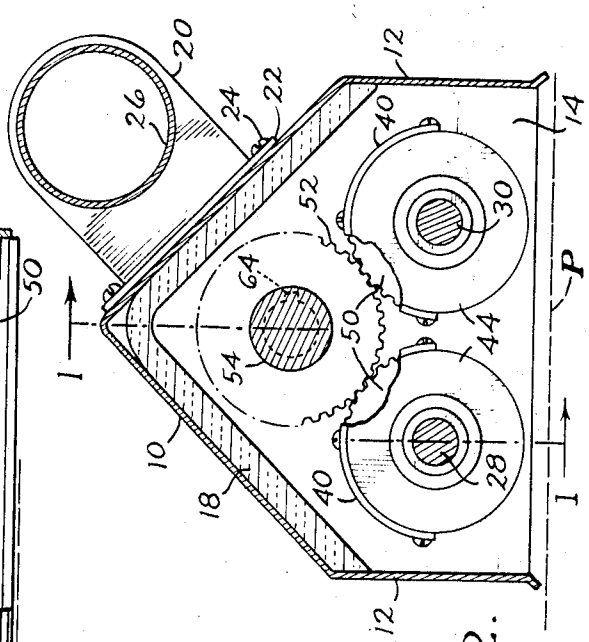


Fig. 2.

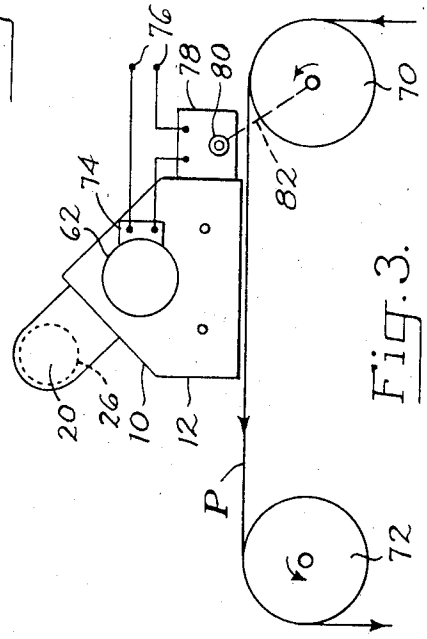


Fig. 3.

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DRIER FOR SHEET MATERIAL

BACKGROUND OF THE INVENTION

This invention relates to driers, and more particularly to a drier for drying sheet stock during continuous passage through processing apparatus.

There are many industrial applications, such as paper converting, printing, etc., in which it is necessary or desirable to dry web stock as it progresses in a continuous strip through processing apparatus. In such applications it is important to be able to control the drier to prevent burning or other damage to the web stock in the event of stoppage or slow down of movement of the latter through the processing apparatus.

Driers of the class described heretofore have provided control against burning or damage of web stock by mechanism which moves the entire heater assembly away from the web stock. Because of the size and weight of such driers, the power requirement for their movement is considerable; the movement necessarily is sufficiently slow to prevent damage to the driers; and the space required to accommodate such driers and their movement necessarily limits the types of equipment with which such driers may be used.

SUMMARY OF THE INVENTION

In its basic concept the drier of this invention utilizes a combination reflector and shield mounted on an elongated fixed housing for movement about an elongated heater between heat-reflecting and heat-shielding positions relative to sheet stock being dried.

It is by virtue of the foregoing basic concept that the principal objective of this invention is achieved; namely, to overcome the aforementioned disadvantages of prior driers.

Another important object of this invention is the provision of a drier of the class described which is of simplified construction for economical manufacture, maintenance and repair.

The foregoing and other objects and advantages of this invention will appear from the following detailed description, taken in connection with the accompanying drawing of the preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a foreshortened view in side elevation of a drier embodying the features of this invention, the right hand portion being shown in section as viewed along the line 1—1 in FIG. 2.

FIG. 2 is a transverse sectional view taken on the line 2—2 in FIG. 1.

FIG. 3 is a diagrammatic elevation showing the drier of this invention in operative association with continuously moving sheet stock and illustrating means for controlling the drier by said moving sheet stock.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The drier illustrated in the drawing includes an elongated housing in the form of a suction hood. The hood is formed by bending sheet metal along lines to provide the angled back **10** wall and spaced sidewalls **12**. The front of the hood is open and the ends are closed by end plates **14** secured to the back and sidewalls by such means as the screws **16**.

The backwall preferably is lined internally with heat insulation material **18**, such as sheet of Cerefelt secured to the inner surface of the backwall of adhesive or other suitable means.

Suction means is provided for withdrawing excessive heat from within the hood. In the embodiment illustrated, this means is provided by the hollow coupling **20**. The open inlet end of the coupling is provided by a peripheral flange **22** which was secured to the rear wall **10** of the hood by such means as the screws **24**. The inlet end of the coupling registers with correspondingly shaped openings in the rear wall and insulation material, as will be understood. The coupling includes an outlet extension **26** which is adapted to be connected to a

conduit leading to a vacuum pump or exhaust fan (not shown) by which to create a suction within the hood.

In the embodiment illustrated there is associated with the hood a pair of laterally spaced, elongated heaters **28** and **30** which extend in the longitudinal direction of the hood. A single heater, or three or more heaters, may be associated with the housing, as will be understood. The heaters may be of any conventional type, such as an electrical resistance element enclosed in a rod, etc. The heaters illustrated in the drawing are of that type, provided at their opposite ends with electrical terminals **32** for connection to a suitable source of electrical potential.

The heaters extend outward of the hood at their opposite ends, through openings provided in the end plates **14** as explained hereinafter, and are supported adjacent their outer ends by apertured brackets **34** secured to the end plates **14** as by means of screws **36**. The brackets and hood are isolated electrically from terminals **32** by insulating washers **38**.

Associated with each heater is a combination reflector and shield member **40**. In the embodiment illustrated this member is in the form of an elongated strip of metal curved arcuately to semicircular cross-sectional shape. It is spaced from and extends along the length of the heater and is secured at each of its opposite ends, as by means of screws **42**, to a flange **44** of a hollow hub **46**. The adjacent end of the heater extends freely through the hub, as shown.

Each hub is journaled for rotation in a bearing **48** mounted in the associated end plate **14**. A gear **50** is secured, as by a press fit, to each hub between the bearing **48** and flange **44**.

The gears **50** associated with the combination reflector and shield members **40** are interconnected through common drive gear **52** secured to the opposite ends of an elongated drive shaft **54** as by means of keys **56**. The opposite ends of the drive shaft are journaled in bearings **58** mounted in the end plates **14** of the hood.

It will be understood that the gears **50** associated with the combination reflector and shield members **40** may be arranged for direct interengagement and that the drive gear **52** may be arranged to engage only one of the gears **50**. Such an arrangement is convenient when three or more heater assemblies are used in a hood.

One end of the drive shaft **54** is provided with an axial bore which is exposed through the hollow bearing **58** to the outer side of the end plate **14**. This bore is arranged to receive the output shaft **60** of a drive motor **62** mounted on the outer side of the end plate. Means such as key **64** interconnects the output shaft and drive shaft for simultaneous rotation.

The drive motor may be electric, hydraulic or pneumatic. In any case, means is provided for controlling the driving of the motor to limit rotation of the gears **50** to 180° intervals. In this manner combination reflector and shield members **40** may be rotated between the heat-reflecting position illustrated in FIG. 2, wherein they are positioned on the side of the heater elements **28** and **30** opposite the open end of the housing, and a shielding position in which they are interposed between the heater elements and the open end of the housing.

A preferred form of drive motor is an air motor manufactured and sold by Ex-cell-o Corporation under the trademark Rotac. It is adjustable to oscillate through 180° of rotation.

FIG. 3 illustrates a manner of use of the drier described hereinbefore in drying paper P which is moved continuously across spaced supporting idler rolls **70**, **72** for example of a printing press. The electrical solenoid actuator **74** for the Rotac drive motor **62** is connected to the terminals **76** of an electric supply source through the electric switch **78**. The switch may be of the type which includes a rotary member **80** capable of connection through chain **82** to idler roll **70**. The switch is maintained open while the strip of paper is moved continuously at a predetermined rate of speed. However, the switch closes when the rotational speed of roll **70** is decreased below a predetermined value, either by slowdown or breakage of the paper P.

Thus, in the event of breakage or slowdown of the sheet of paper, the drive motor **62** is activated to rotate the drive shaft **54** and gears **50** to move the combination reflector and shield members **40** quickly from the reflecting position illustrated in FIG. **2**, to the shielding position previously described. In this manner the paper is shielded from damage by radiant energy from the heaters. The heat generated within the hood is carried away through the suction coupling **20**.

Although only one heater is shown in association with each combination reflector and shield member **40**, it is to be understood that two or more heaters may be so associated, if desired.

The length of the drier housing and heater elements may be varied to accommodate association with various types of processing apparatus. The cross-sectional dimension of the drier (FIG. **2**) is minimized by the component arrangement illustrated. Since the housing is maintained in a fixed position relative to processing apparatus, the drier utilizes a minimum of space and therefore may be integrated into a wide variety of printing presses and other processing apparatus, without significant modification of the latter.

It will be apparent to those skilled in the art that various changes in the size, shape, number and arrangement of parts described hereinbefore may be made without departing from the spirit of this invention.

Having now described my invention and the manner in which it may be used, I claim:

1. A drier comprising

a. an elongated housing having an open side,

b. elongated heater means in the housing projecting outward therefrom freely through an opening in at least one of the opposite ends of the housing,

c. support means on the housing releasably supporting the heater means thereon,

d. elongated combination reflector and shield means in the housing spaced from and extending parallel to the heater means,

e. driven gear means mounted rotatably on the housing independently of the heater means and having a central opening freely receiving the heater means therethrough,

f. drive means on the housing engaging the driven gear means for rotating the latter, and

g. means securing the combination reflector and shield means to the driven gear means for rotation therewith between a heat-reflecting position on the side of the heater means opposite the open side of the housing and a heat-shielding position interposed between the heater means and open side of the housing.

2. The drier of claim **1** including coupling means on the housing for communicating the interior of the latter with a source of suction.

3. The drier of claim **1** including drive gear means mounted rotatably on the housing and engaging the driven gear means, and rotary drive means on the housing engaging the drive gear means.

4. The drier of claim **1** wherein

a. the heater means comprises a plurality of spaced elongated electric heaters,

b. the driven gear means comprises a plurality of driven gears one associated with each heater means and each mounting a combination reflector and shield means, and

c. the drive means operatively engages the plurality of driven gears for simultaneous rotation of the latter.

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