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Castro et al.

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[54] TENSION FREE CLOTH DISPENSING APPARATUS

[75] Inventors: Rodolfo Castro, La Palma; William J. Newton, Lakewood; Esteban J. Toscano, Oceanside, all of Calif.

[73] Assignee: Hughes Aircraft Company, Culver City, Calif.

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[51] Int. Cl. D06c 3/00
[58] Field of Search 242/55, 75.52, 67.2, 242/67.3, 183, 62; 26/54

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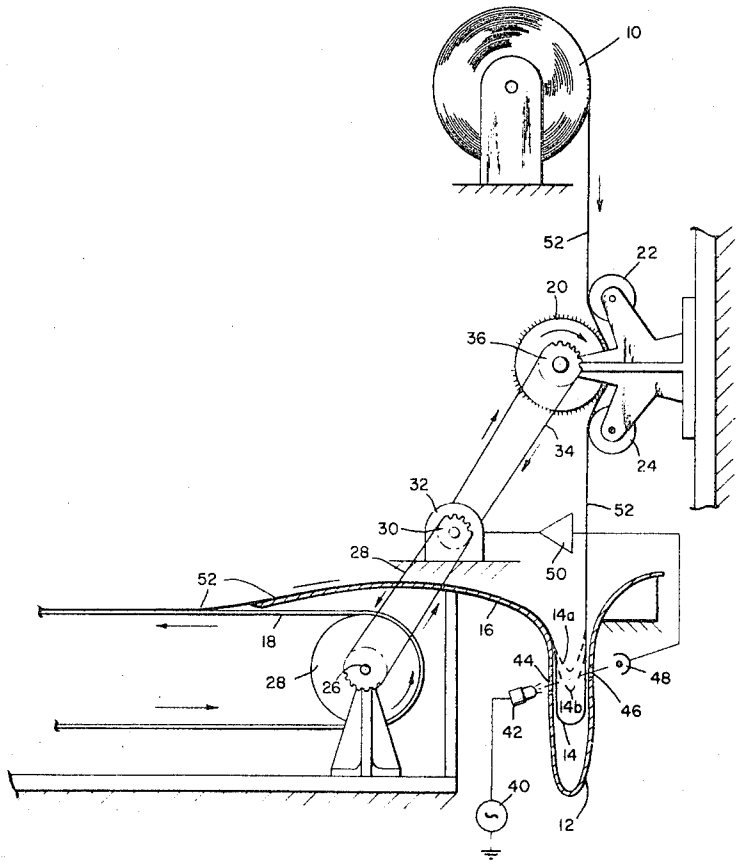
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Primary Examiner—George F. Mautz
Assistant Examiner—Edward J. McCarthy
Attorney—W. H. MacAllister, Jr.

[57] ABSTRACT

Means and method for spreading cloth on a moving support surface from a roll or bolt of cloth with a negligible amount of tension on the cloth to cause the cloth to lie flat. The cloth is rolled off the bolt into a slack loop where sensing means determine the extent of the loop and generate signals to control the dispensing of cloth off of the roll into the loop. The cloth is then pulled out of the slack loop over a smooth surface onto the surface of a belt by the mere friction between the cloth and the belt, the tension in the cloth on the belt being minimal, thereby avoiding forming of tension wrinkles in the cloth.

5 Claims, 5 Drawing Figures

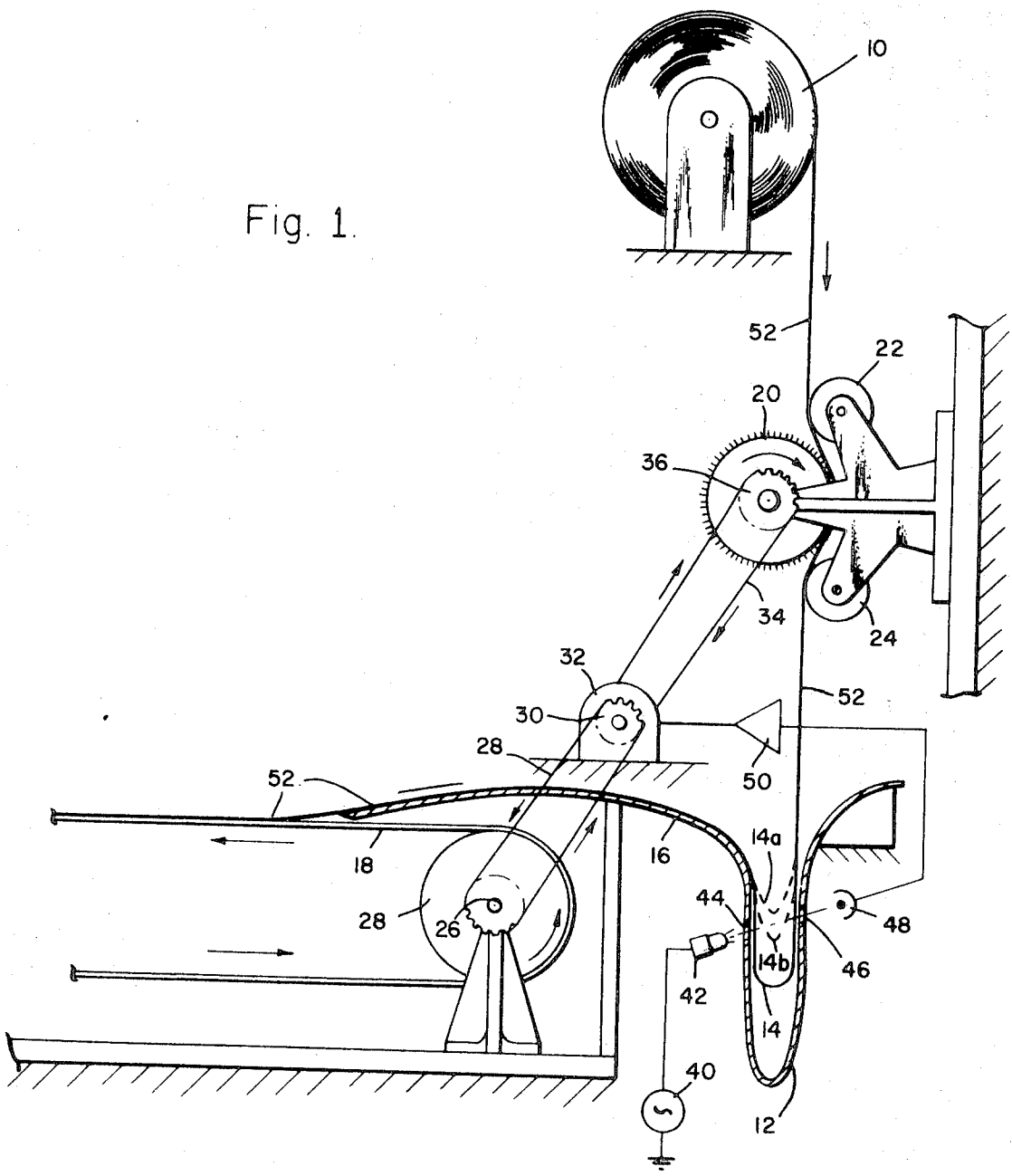


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5 Sheets-Sheet 1

Fig. 1.



Rodolfo Castro,
William S. Newton,
Esteban J. Toscano,
INVENTORS.
BY.

Ernest L Brown

Fig. 2.

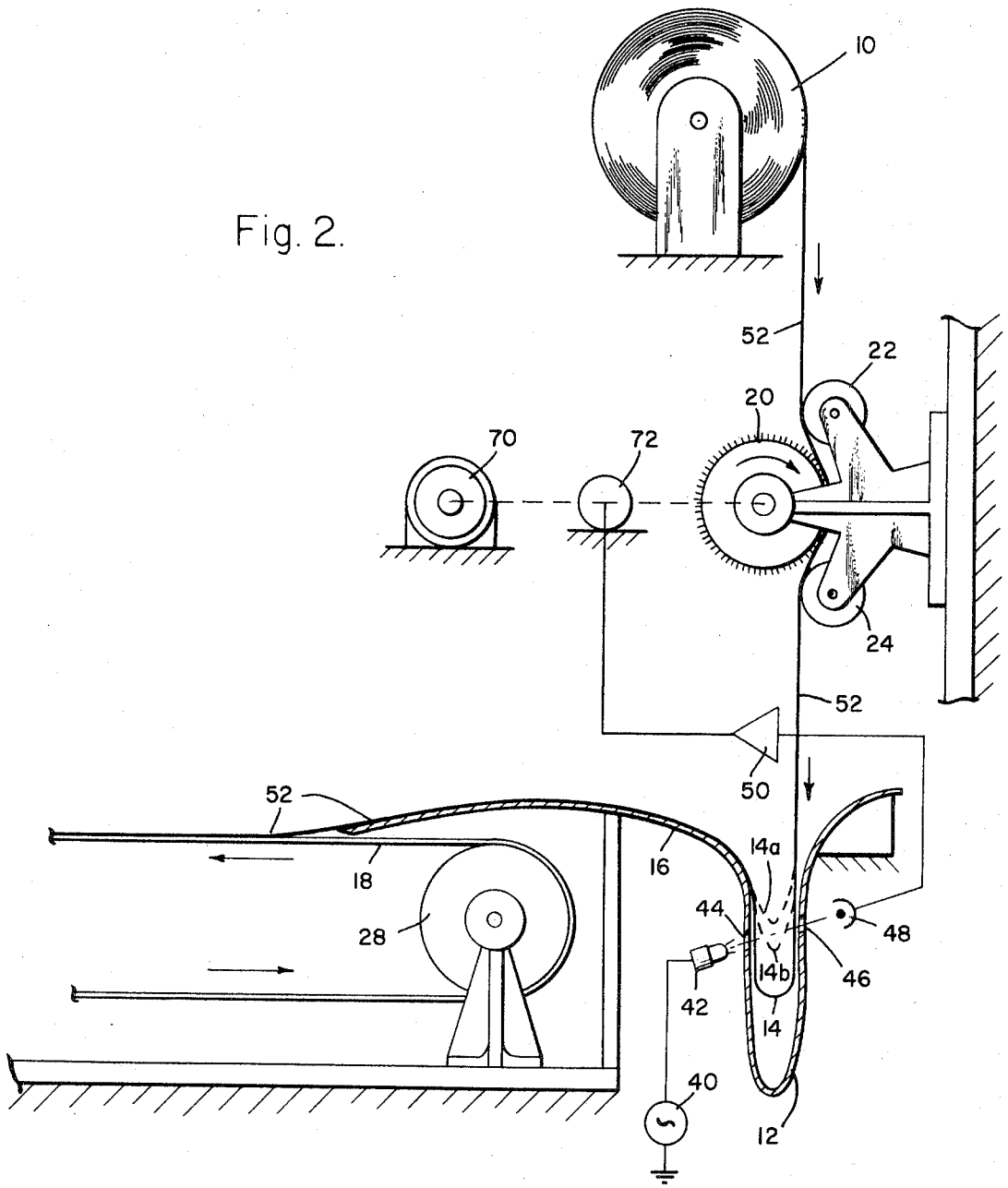


Fig. 3.

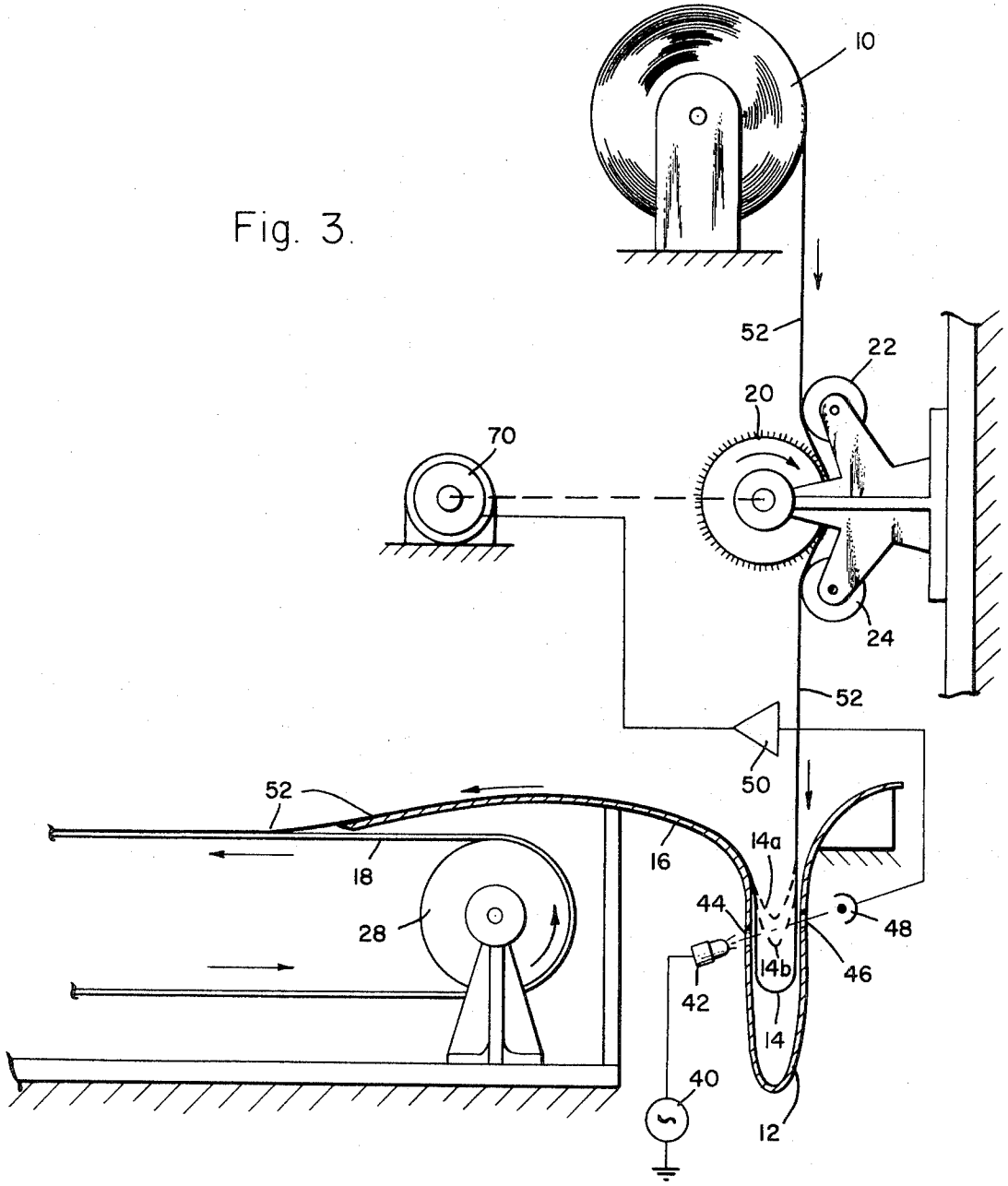


Fig. 4.

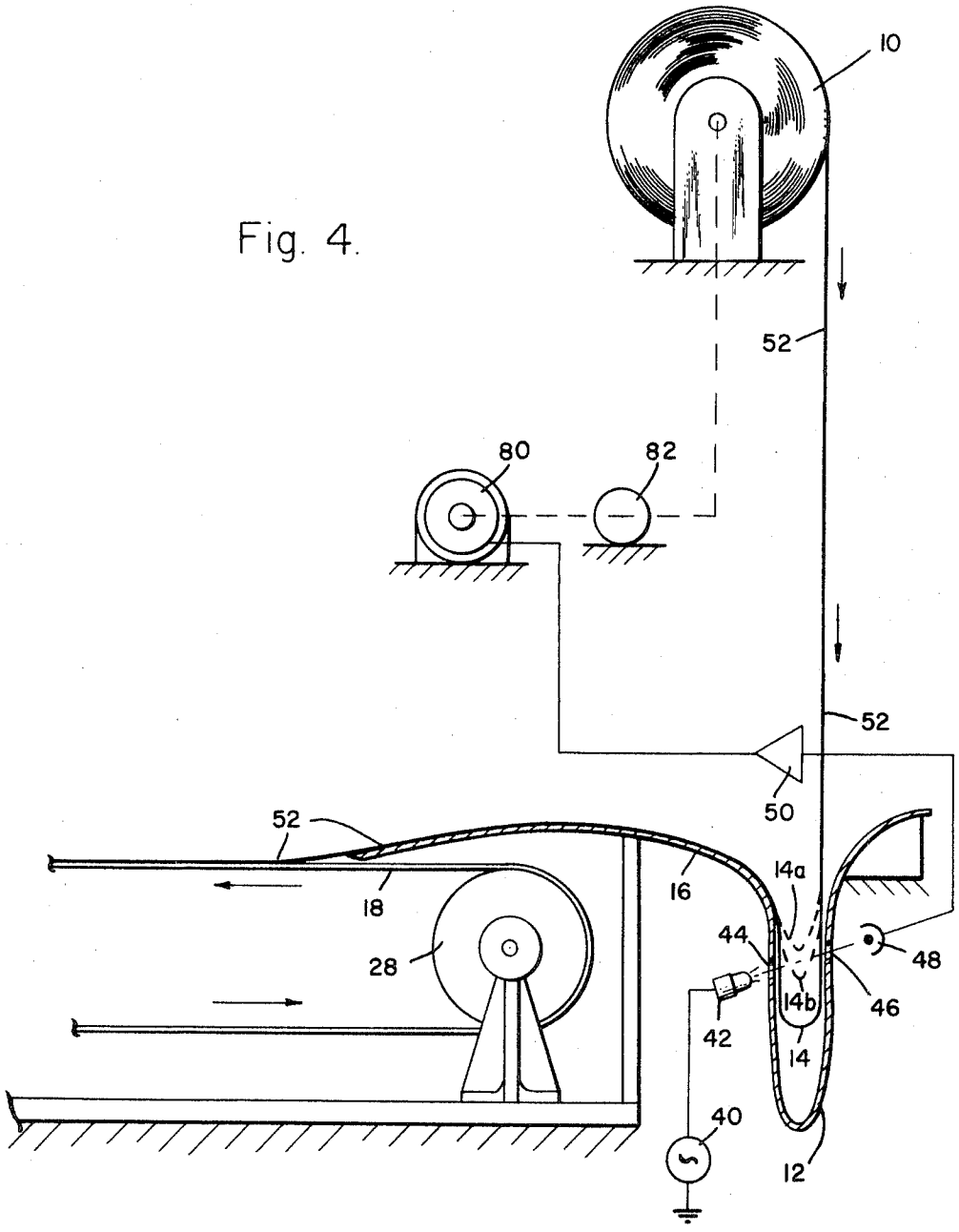
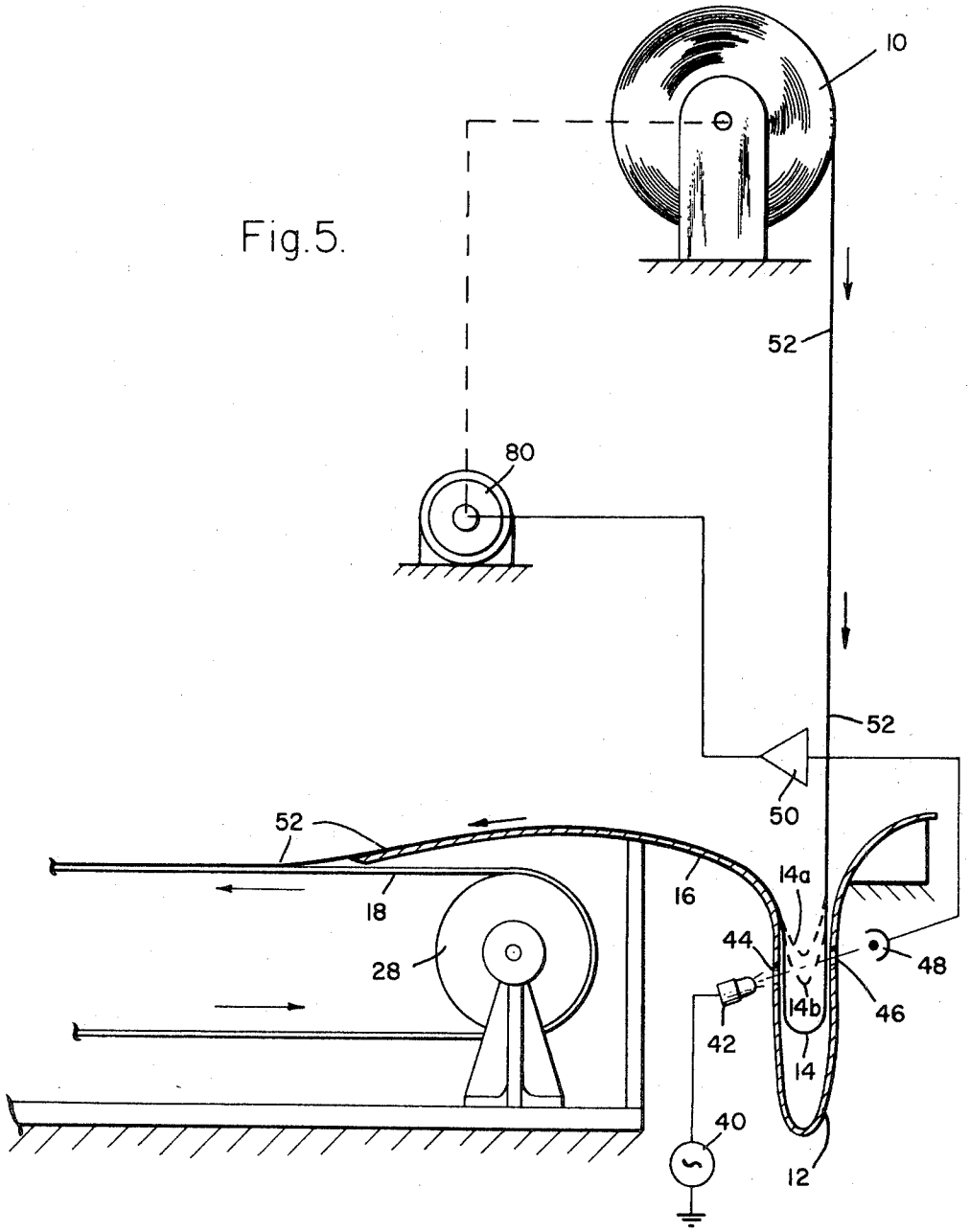


Fig.5.



TENSION FREE CLOTH DISPENSING APPARATUS

BACKGROUND OF THE INVENTION

The invention relates to apparatus and a method for spreading cloth in a system wherein programmed cutting tools, particularly programmed laser beams, are used to cut a pattern from cloth which is continuously laid down into a belt. Attempts to use a conventional spreader to spread the cloth onto the cloth or, alternatively, to cause the belt to move intermittently and to use a spreader in a conventional manner have produced wrinkles. Tension in the cloth caused by trying to pull the cloth off of the bolt causes wrinkles in the cloth which then must be smoothed before the cloth is cut.

In a conventional cutting room where cloth is cut into patterns, a predetermined length of cloth is spread onto the cutting table by a cloth spreader which supports a bolt of cloth and has a number of rollers. The spreader rides on rails along the length of the cutting table and lays down a plurality of layers of cloth as it moves.

BRIEF DESCRIPTION OF THE INVENTION

In the apparatus of this invention cloth is laid onto a belt which may be made of honeycomb or similar material and which may be moving continuously or intermittently. The bolt of cloth is suspended so that the cloth drapes into a slack loop which is positioned adjacent one end of the belt. From the slack loop the cloth extends over a highly polished slide onto the surface of the belt. Friction between the belt and the cloth pulls the cloth over the very low friction slide out of the slack loop. Sensing apparatus such as a beam of light and a photocell are used to determine when the slack loop reaches its shortest permissible loop. To that end, a beam of light is transmitted to a photocell with the loop of cloth interrupting the beam of light. When the loop reaches its predetermined short length, light strikes the photocell starting the dispensing of cloth off of the bolt, thereby lengthening the loop and interrupting the beam of light.

Preferably the dispensing speed is slightly greater than the speed with which the cloth is withdrawn from the loop, whereby the dispensing of cloth into the loop from the bolt is intermittent even when the withdrawing of the cloth from the slack loop over the smooth slide onto the belt is continuous.

To dispense cloth from the bolt into the slack loop, a soft wire wheel is preferably used to pull the cloth from the bolt. It is possible, however, merely to drive an axle attached to the axis of the bolt to dispense cloth into the slack loop. In one embodiment the soft wire wheel is driven and in another embodiment the bolt is driven.

The driven member, i.e., the bolt or the soft wire wheel is intermittently driven either from an intermittent power source or, alternatively, by a clutch connected between the driven member and a source of continuous power.

In one embodiment the driven member is driven from the same power source that drives the belt. This may be achieved, for example, by attaching it to one of the belt rollers with a clutch assembly between the belt roller and the driven member. The clutch assembly may have a reversing mechanism when such reversing mechanism is needed to drive the driven member in the correct direction.

It is therefore an object of this invention to dispense cloth off of a bolt onto a belt with a minimum of tension in the cloth which is spread on the belt.

It is another object of this invention to provide a slack loop of cloth between a bolt of cloth and a belt or table upon which the cloth is to be spread.

It is a more specific object of this invention to provide apparatus adapted to support a section of cloth with a minimum of friction therebetween and a slack loop, including means for sensing the extent of said slack loop and for controlling the dispensing of cloth into said slack loop in response to the measure sensed by said sensing means.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects will become apparent from the following description, taken in connection with the accompanying drawings, in which:

FIG. 1 is a side view, partly in section and partly schematic, of a first embodiment of this invention;

FIG. 2 is a side view, partly in section and partly schematic, of a second embodiment of this invention,

FIG. 3 is a side view, partly in section and partly schematic, of a third embodiment of this invention;

FIG. 4 is a side view, partly in section and partly schematic, of a fourth embodiment of this invention; and

FIG. 5 is a side view, partly in section and partly schematic, of a fifth embodiment of this invention.

DETAILED DESCRIPTION OF THE INVENTION

In the figures cloth is supplied in a roll or bolt **10**. The cloth is unrolled and extends from the roll **10** onto means forming a trough **12** to form a slack loop **14**. The cloth extends over the smooth shelf **16** which guides it onto a power driven belt **18**. The belt **18**, which may be of honeycomb type material, and part of which is shown, is driven by motive means which are not shown.

In the embodiments of FIGS. **1**, **2** and **3** a soft wire roller **20** is positioned between the roll **10** and the slack loop **14**. A pair of idler rollers **22** and **24** maintain the cloth in contact with the wire mesh of the powered soft wire roller **20**. The cloth travels to the left of the idler's **22** and **24**, in the figures shown, and to the right of the wire roller **20**.

In the embodiment of FIG. **1**, a sprocket **26** is attached to the belt roller **28** to be driven thereby. The sprocket **26** drives a chaim belt **28** which drives a second sprocket **30**. The sprocket **30** drives a clutch and reversing mechanism **32** which may, for example, contain an electromagnetic clutch and a reversing gear. The clutch and reversing mechanism **32** drives a third sprocket (not shown) which drives the chain **34**. The chain **34** drives the sprocket **36** which is attached to drive the brush roller **20**.

A source of voltage **40** lights a light **42**. The light **42** is positioned adjacent a hole **44** formed in the trough member **12**. A second hole **46** is aligned with the first hole and the light source **42**. A photo sensor **48**, which may be a photocell, phototube, phototransistor, or the like, is aligned with the holes **44** and **46** and with the light source **42**. The light sensor **48** is connected, preferably through an amplifier **50**, to the electromagnetic clutch of the clutch and reversing mechanism **32**.

The gear ratios and sprocket ratios, as well as the size of the brush roller **20** are preferably adjusted so that the speed of travel of the cloth against the brush roller **20** is slightly greater than the speed of travel of the

cloth which is lying upon the belt 18. In a preferred embodiment the excess speed might be on the order of 10%.

In operation of the apparatus of FIG. 1, after the cloth is inserted into the rollers and is positioned substantially as shown, movement of the belt 18 in the direction of the arrows causes the cloth, due to the friction between the cloth and the belt at 18, to be pulled over the smooth slide 16 out of the slack loop 14 until it reaches the position indicated at 14A. When the slack loop 14 reaches the position indicated at 14A, light from the light source 42 is free to pass through the holes 44 and 46 into the light sensor 48, thereby energizing the amplifier 50 and the electromagnetic clutch of the clutch and reversing mechanism 32. When the clutch and reversing mechanism 32 is energized, the brush wheel 20 is rotated, receiving rotational energy from the sprocket 26, to pull additional material off of the bolt 10 into the slack loop 14 until the slack loop 14 reaches the position designated at 14B. When the slack loop reaches the position 14B, the light beam between the light source 42 and the light sensor 48 is interrupted and energy is removed from the electromagnetic clutch in the clutch and reversing mechanism 32. When the electromagnetic clutch is de-energized, the continuing inertia of the apparatus, particularly the brush roller 20, causes the brush roller 20 to continue moving a small amount until the slack loop reaches a position, for example, as shown at 14.

The motion of the belt 18 may be continuous or intermittent. Cloth material is pulled out of the slack loop by the friction of the material on the belt 18 at 52 and, because of the highly polished surface of the shelf 16, the tension in the cloth is very very small, whereby wrinkles due to tension are eliminated.

The embodiment of FIG. 2 is the same as the embodiment of FIG. 1 except that a motor 70 is used to drive a clutch mechanism 72 which drives the brush roller 20. The clutch mechanism 72, as in the embodiment of FIG. 1, may be an electromagnetic clutch which is connected to receive signals from the amplifier 50. In the embodiment of FIG. 2, the motor 70 is driven in the proper direction to drive the brush roller 20 as shown by the arrow. The operation of FIG. 2 is substantially the same as that of FIG. 1.

The embodiment of FIG. 3 is substantially the same as the embodiment of FIG. 2 except that the clutch mechanism 72 has been eliminated and the amplifier 50 is connected directly to drive the motor 70. It is to be expected that the apparatus of FIG. 3 will have higher inertia than that of FIGS. 1 and 2, whereby after energy is removed by amplifier 50, the apparatus continues to coast producing a larger slack loop at 14 than that of FIGS. 1 and 2.

In the embodiment of FIG. 4, the wire wheel mechanism 20 has been eliminated and the spindle of the bolt 10 is driven to unwind the cloth from the bolt 10. A motor 80 drives the spindle of the bolt 10 through a clutch mechanism 82 which may be an electromagnetic clutch controlled by the output signal of amplifier 50.

The embodiment of FIG. 5 is the same as that of FIG. 4 except that the clutch 82 has been eliminated. Again it is to be expected that the apparatus of FIG. 5 will have considerably more inertia than that of the first four embodiments, whereby the slack loop at 14 will be substantially longer than that shown in the first four embodiments.

An additional embodiment or pair of embodiments could be shown where a set of sprockets such as that shown in FIG. 1 and a clutch and gear mechanism such as that shown in FIG. 1 is substituted for the motor 80 and the clutch mechanism 82.

Thus, the apparatus of this invention controls the spreading of cloth onto a support surface such as a cutting table, particularly a moving cutting table, without introducing tension wrinkles.

Although the invention has been described in detail above, it is not to be limited by that description but only by that description in combination with the appended claims.

What is claimed is:

1. Apparatus for spreading a strip of cloth from a source thereof onto a horizontal support surface with a minimum of wrinkling comprising:
   a. a frame;
   b. means for effecting relative horizontal movement between said support surface and said frame;
   c. an arcuate, smooth slide mounted on said frame, said slide having:
      1. a cloth dispensing front edge adjacent said support surface and across the width thereof,
      2. a substantially horizontally extending but slightly upwardly humped cloth de-wrinkling shelf extending from said front edge away from said support surface; and
   e. means for feeding cloth under substantially constant tension from said source to said shelf.

2. The apparatus of claim 1 characterized further in that said shelf terminates in a wall extending downwardly therefrom, there being a smooth transition between said shelf and said wall and in that said means for feeding includes means for dispensing cloth from said source into a loop adjacent said wall in response to the depth of said loop relative to said wall.

3. The apparatus of claim 1 characterized further in that said support surface is sufficiently rough in comparison to the surface of said slide to pull the cloth off said slide conjointly with the relative movement between said support surface and said frame.

4. The apparatus of claim 1 characterized further in that a wall extends vertically down from said shelf so as to create a sharp bend between said wall and said shelf for stretching said cloth, thereby aiding in de-wrinkling it.

5. The apparatus of claim 2 characterized further in that said means for dispensing is operative to stop dispensing cloth when said loop reaches a first predetermined position above the bottom of said wall and to start dispensing cloth when said loop reaches a second higher predetermined position above the bottom of said wall.

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