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Dubuit

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[54] **SCREEN PRINTER WITH VARIABLE FRAME STROKE**

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** ..... **101/124,** 101/38 R, 74/110

[51] **Int. Cl.** **B41f 15/08**

[58] **Field of Search** 101/124, 127, 127.1, 101/114, 115, 126, 38, 40

[56] **References Cited**

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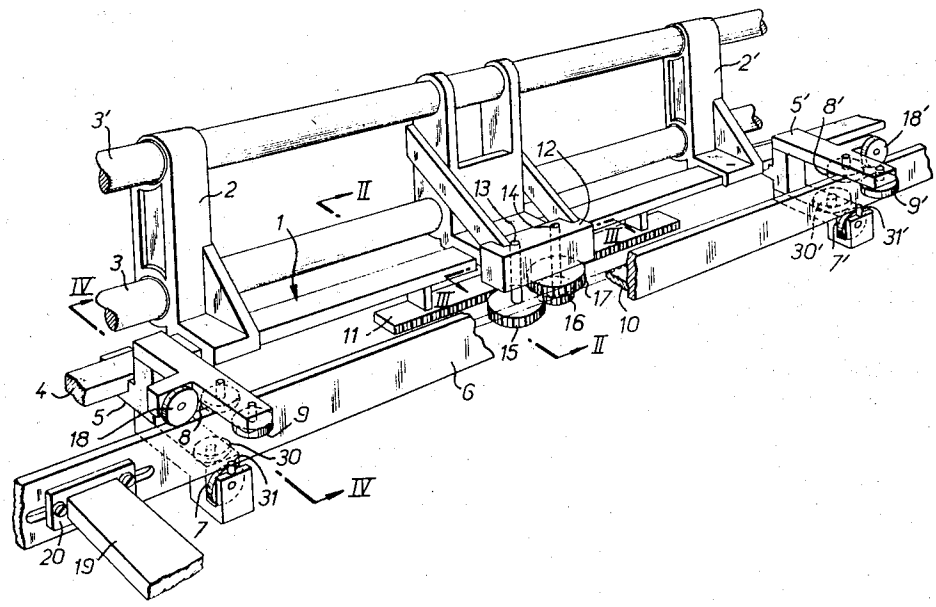
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Primary Examiner—Robert E. Pulfrey
Assistant Examiner—R. E. Suter
Attorney—Robert J. Patch

[57] **ABSTRACT**

A device enabling the preset carriage stroke of a silk-screen printing machine to effect the resultant stroke of the screen support frame according to any desired ratio. Transmission gear means effect this desired resultant stroke and comprise gear racks mounted on the carriage and a carrier bar for the screen support frame and three gear wheels mounted on two spindles on a fixed support, the single gear wheel meshing with the gear rack on the carriage, the other two gear wheels meshing with the single gear wheel and the gear rack on the carrier bar respectively.

6 Claims, 4 Drawing Figures



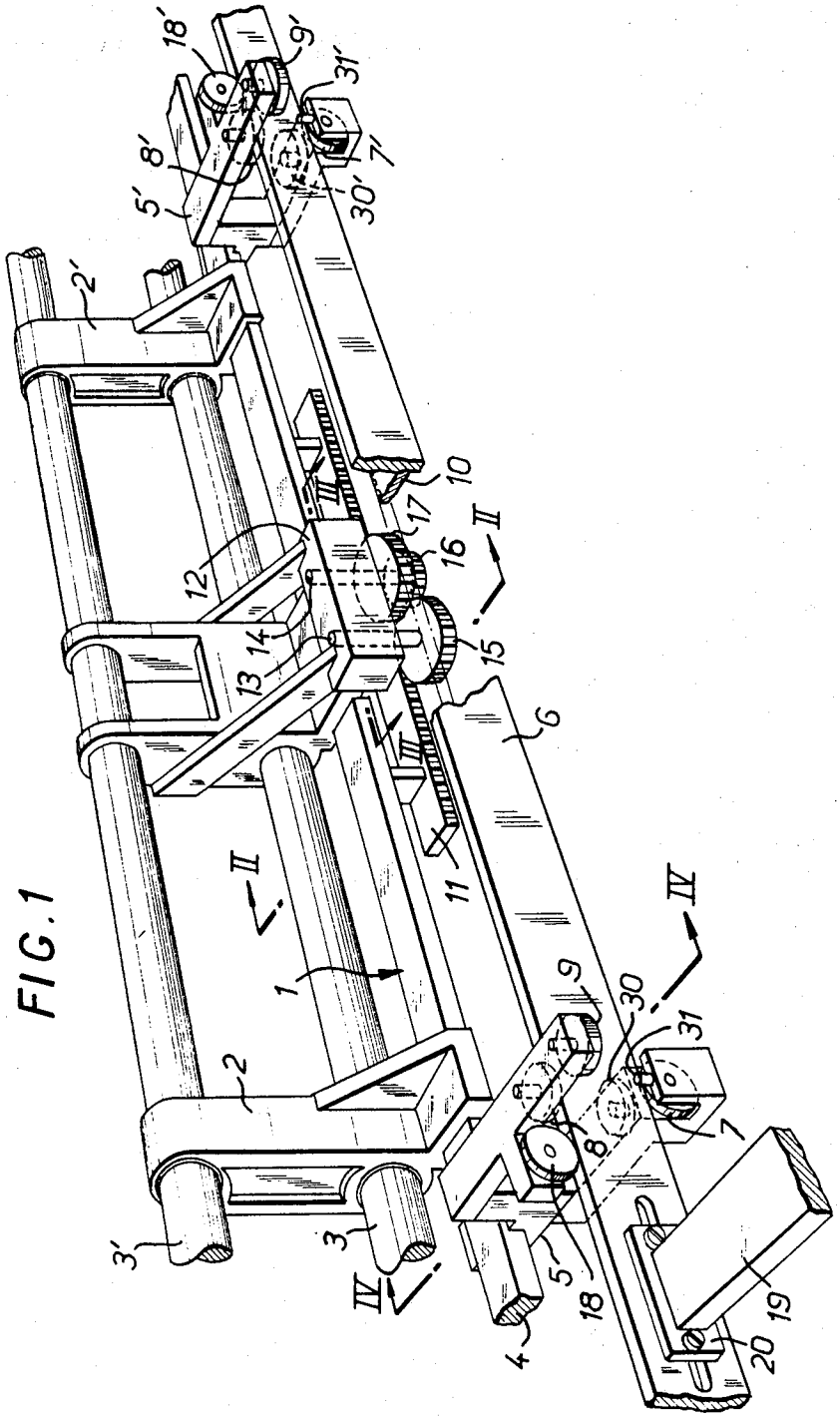

18'
9'
31'
8'
7'
5'
30'
2'
10
17
16
II
12
14
13
15
6
III
11
II
IV
1
9
30
31
2
8
7
3'
3
IV
5
18
19
4
20

FIG. 1

FIG. 4

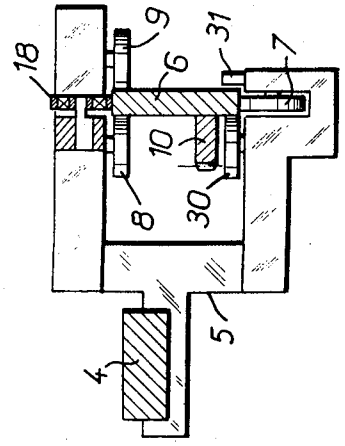


FIG. 3

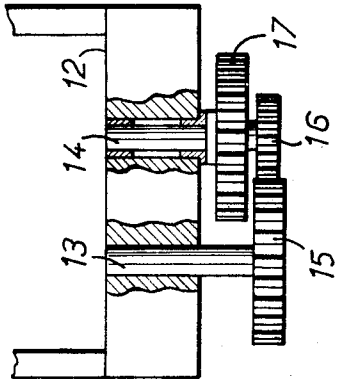
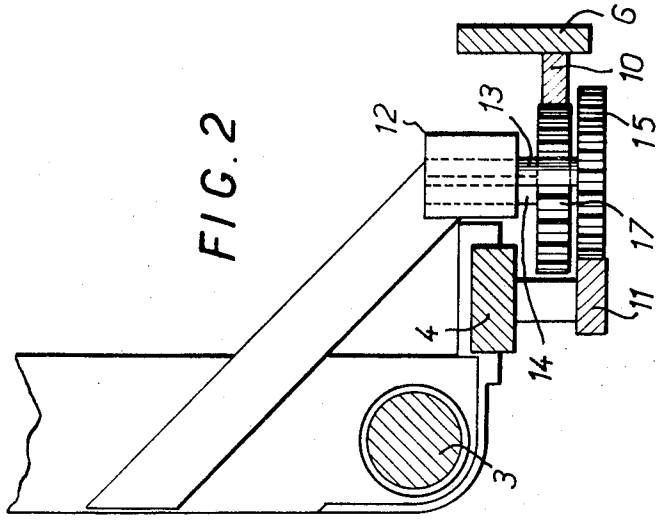


FIG. 2



SCREEN PRINTER WITH VARIABLE FRAME STROKE

BACKGROUND OF THE INVENTION

The present invention concerns a device for adjusting the stroke of the screen support frame of silk-screen printing machine.

It is known that printing machines using silk screens and a squeegee for applying ink on objects to be printed comprise mechanical means adapted to provide the screen or the squeegee with reciprocating longitudinal movement while the other of the screen or squeegee is fixed in the longitudinal direction.

In the case of printing on flat objects, the screen is fixed and the squeegee effects reciprocating movement along the surface of the screen causing the ink to pass through the screen onto the article.

In the case of printing on articles with curved surfaces in particular cylinders, the silk screen must pass tangentially to the article to be printed, the article being held so that its axis is in the horizontal position while the squeegee is maintained in a fixed position parallel to the axis of the article.

However, the maximum length of the printing surface along the plane of the silk screen is generally substantially equal to the stroke of the reciprocating movement of the mechanical element driving the screen; therefore, the possibilities of a machine of this type are limited to this stroke.

It follows that in order to print on larger three-dimensional surfaces, it is necessary to have a machine with greater dimensions. Other than being bulkier, such a machine is more expensive.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a machine capable of printing on bodies with curved surfaces, in particular cylinders having a predetermined maximum diameter comprising a device adapted to cooperate with this machine for producing the desired printed image length irrespective of the maximum path of movement of the mechanism carriage of the machine.

French Pat. No. 1,332,121 discloses a device which doubles the path of machines comprising a carriage or the like reciprocably displaceable along rolling or sliding paths or tracks.

The device according to the present invention is not only capable of doubling the path but also may produce any desired ratio such as 1.5 –2 – 3–5, in order to effect the required length of the printed image.

This device essentially comprises two cantilevered or overhanging members, preferably adjustable at two extreme positions on the carriage or the like reciprocating in a horizontal plane, cantilevered members each having a group of rollers for supporting and guiding a carrier bar for carrying the screen support arms or frame.

This group of rollers comprises a roller having a horizontal axis which carries the carrier bar and two rollers with vertical axes for horizontally guiding the carrier bar. Further, another roller having a horizontal axis fixed on the overhanging members to an eccentric spindle which enables a force to be exerted on the carrier bar in order to position it vertically.

A gear rack is fixed on the rear surface of the carrier bar with vertical teeth.

A fixed support mounted at the center of the machine comprises two vertical spindles on which gear wheels are fixed.

A gear rack also having vertical teeth is fixed on the carriage of the machine.

On one of the vertical spindles of the fixed support is mounted for rotation a first gear wheel which meshes with the gear rack on the carriage, on the other vertical spindle, a second gear wheel meshes with said first gear wheel mounted for rotation with a third gear wheel which meshes with the gear rack fixed to the carrier bar.

It is easily understood that from the ratio of the first gear wheel on the said spindle and that fixed on the other spindle as well as the diameter of the third gear wheel fixed to the second spindle, the desired multiplication of the stroke of the carrier bar for the screen support arms or frame versus the stroke of the carriage will be obtained.

STATEMENT OF INVENTION

Thus the invention comprises a device for adjusting the stroke of a screen support frame of a silk-screen printing machine for printing on articles with curved surfaces, comprising a fixed support, a carriage mounted on the fixed support for movement along the longitudinal axis of the carriage, a first gear rack mounted on the carriage and substantially parallel thereto, vertical and horizontal guiding means arranged on arms mounted on the carriage and extending substantially perpendicular to the longitudinal axis thereof, a carrier bar for supporting the screen support frame mounted on the guiding means for movement in a path of travel substantially parallel to the path of travel of the carriage, a second gear rack mounted on the carrier bar and extending substantially parallel thereof, and a housing supporting a gear train of exchangeable, replaceable gear wheels in mesh between the first and second gear racks, so that the ratio of the stroke of the carriage to the stroke of the carrier bar may be varied by changing the resultant ratio of the gear train. The guiding means comprise rollers with horizontal axes for supporting the carrier bar and the horizontal guiding means comprise rollers with vertical axes for guiding the carrier bar. The rollers with horizontal axes are eccentrically mounted for adjusting the pressure exerted on the carrier bar. The first and second spindles are supported on the housing, and the gear train comprises a first gear wheel mounted on the first spindle, and second and third gear wheels mounted on the second spindle, and the first gear wheel meshing with the first gear rack and with the second gear wheel, and the third gear wheel meshing with the second gear rack. The housing is mounted at the center of the machine on the fixed support, and the spindles are parallel to each other. The stroke of the carrier bar is greater than the stroke of the carriage. The arms bearing the guiding means are mounted at the extreme ends of the carriage, and at least one of the arms bearing the guiding means is adjustably mounted on the carriage.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is described hereinafter in greater detail with reference to the accompanying drawings in which:

FIG. 1 shows a perspective view of the device according to the invention with partial cut-away portions;

FIG. 2 shows a partial cross section of the device in FIG. 1 along the lines II—II of this Figure;

FIG. 3 shows a view in cross section taken along a line III—III of the fixed support with the gear transmission means; and

FIG. 4 shows a view in transverse section taken along the line IV—IV showing the holding of the carrier bar.

DESCRIPTION OF A PREFERRED EMBODIMENT

In a embodiment given by way of example, the device is mounted on a machine comprising a carriage **1** adapted for reciprocating movement by pneumatic or mechanical means (not illustrated). The carriage has two vertical arms **2** and **2'** slidable along cylindrical horizontal bars **3** and **3'** and carries a horizontal plate **4.** Two overhanging or cantilevered members **5** and **5'** are fixed to the plate **4** for carrying the carrier which supports the screen support arms or frame. These (overhanging or) cantilevered members **5** and **5'** respectively carry first rollers **7** and **7'** adapted to support the carrier bar **6** vertically as well as two sets of rollers **8–9, 8'–9'** which guide the carrier bar **6** horizontally. Finally, two other rollers **18** and **18'** mounted on eccentric spindles carried by cantilevered members **5,5'** enable the bar to be guided vertically.

The eccentric mounting of the rollers **18,18'** enables the adjustment of the pressure exerted on the carrier bar **6.** The rollers **8–8', 9–9'** engage the upper portions of the carrier bar **6** for lateral guiding; further rollers **30,30'** act in cooperation with strips **31,31'** at the lower portion of the carrier bar **6,** also a gear rock **10** is fixed on the rear face of the carrier bar **6** for horizontal guiding. A gear rack **11** is also fixed on the horizontal plate **4** of the carriage **1.**

A fixed support **12** is mounted at the center of the machine and carries two vertical spindles **13** and **14.**

A gear wheel **15** is mounted for rotation at the lower end of the spindle **13** and meshes with the gear wheel **16** fixed for rotation on the vertical spindle **14** a third gear wheel **17** also on the spindle **14** also meshes with the gear rack **10** on the carrier bar **6.** The carrier bar **6** carries two screen support arms **19** (only one shown) which are fixed thereto by means of two plates **20** (only one shown) which may be secured on the carrier bar **6** at various points in order to accomodate various screen lengths, in particular, by means of slot and bolting means as shown in FIG. **1.**

It is easily understood that with the ratios between the diameters of the gear wheels **15** and **16** and the diameter of the control gear wheel **17** assuming the displacement of a unit of carriage of the machine, the carrier bar may be displaced 1.5–2.5 thereby providing each required ratio. For example if the diameter of the gear wheel **15** is 60 mm, the diameter of the gear wheel **16** is **20** mm, i.e. a ratio of 3 to 1 and the diameter of the gear wheel **17** is also 20 mm, the carrier bar will be displaced three times the displacement of the carrige without the device.

It should be noted that each one of the gear wheels may be removed and replaced by other gear wheels in order to obtain any desired ratio between the stroke of the carriage **1** and the stroke of the carrier bar **6.**

It is also understood that by displacing the carriage **1** in the same direction as the carrier bar **6,** the overhang of the carrier bar **6** beyond the cantilevered members **5,5'** will be reduced.

The present application is not intended to be limited to the illustrated embodiment, but includes all modifications, alternatives and equivalents within the scope of the appended claims.

I claim:

1. A device for adjusting the stroke of a screen support frame of a silk-screen printing machine for printing on articles with curved surfaces, comprising a fixed support, a carriage mounted on the fixed support for movement along the longitudinal axis of the carrige, a first gear rack mounted on the carriage and substantially parallel thereto, vertical and horizontal guiding means arranged on arms mounted on the carriage and extending substantially perpendicular to the longitudinal axis thereof, a carrier bar for supporting the screen support frame mounted on said guiding means for movement in a path of travel substantially parallel to the path of travel of the carriage, a second gear rack mounted on the carrier bar and extending substantially parallel thereto, said fixed support supporting a gear train of exchangeable, replaceable gear wheels in mesh between the said first and second gear racks, so that the ratio of the stroke of the carriage to the stroke of the carrier bar may be varied by changing the resultant ratio of said gear train.

2. A device according to claim **1,** wherein the vertical guiding means comprise rollers with horizontal axes for supporting the carrier bar and the horizontal guiding means comprise rollers with vertical axes for guiding the carrier bar.

3. A device according to claim **2,** wherein some of said rollers with horizontal axes are eccentrically mounted for adjusting the pressure exerted on the carrier bar.

4. A device according to claim **1,** wherein first and second spindles are supported on said fixed support, and wherein said gear train comprises a first gear wheel mounted on said first spindle, and second and third gear wheels mounted on said second spindle, said first gear wheel meshing with said first gear rack and with said second gear wheel, and said third gear wheel meshing with said second gear rack.

5. A device according to claim **1,** wherein the stroke of the carrier bar is greater than the stroke of the carriage.

6. A device according to claim **1,** wherein the arms bearing the guiding means are mounted at the extreme longitudinal ends of the carriage.

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