United States Patent [19]

Wasil

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[54] **METHOD OF MANUFACTURING A HYDROPHILIC DAMPENING ROLL**

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[52] **U.S. Cl.**..... **51/289,** 101/348, 101/148

[51] **Int. Cl.**..... **B24b 1/00,** B41f 1/46

[58] **Field of Search**..... 51/289 R, 323; 101/348, 101/148

[56] **References Cited**

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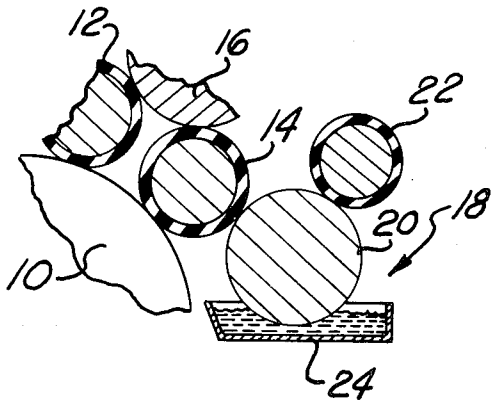
Primary Examiner—Al Lawrence Smith

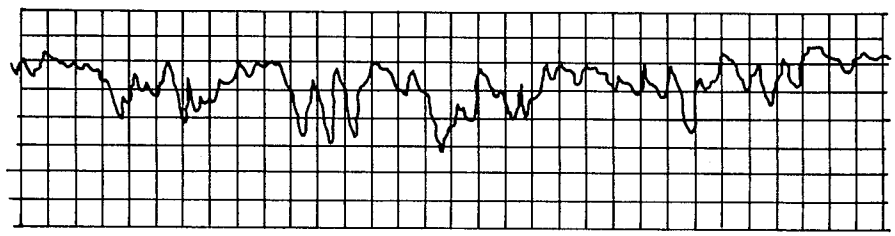
Assistant Examiner—Marc R. Davidson

[57] **ABSTRACT**

Method of manufacturing a hydrophilic roll in which a hard metal is ground during manufacturing to provide a polished finish, the finish measured to determine the number of peaks and valleys and grinding continued with a finer grinding wheel until the peaks and valleys which exceed 5 micro-inches from a center line for the peaks and valleys are less than ten per inch of length and those which deviate more than 2.5 micro-inch from the center line number less than 100 per inch. The roll is then treated to render it hydrophilic.

1 Claim, 4 Drawing Figures





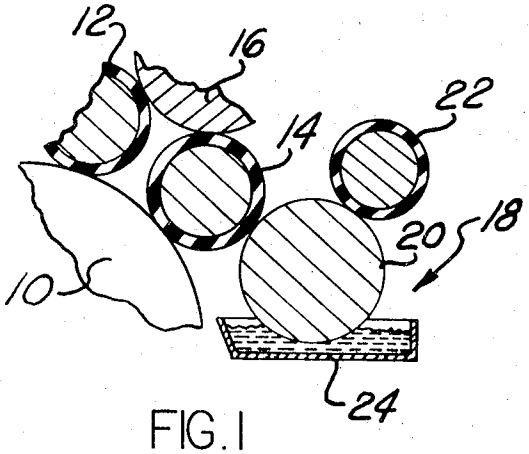


FIG. 1

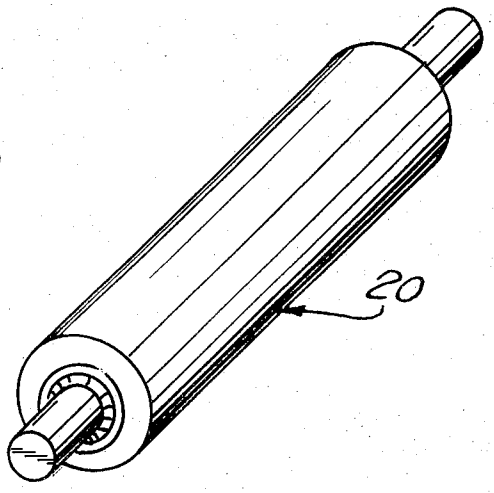


FIG. 2

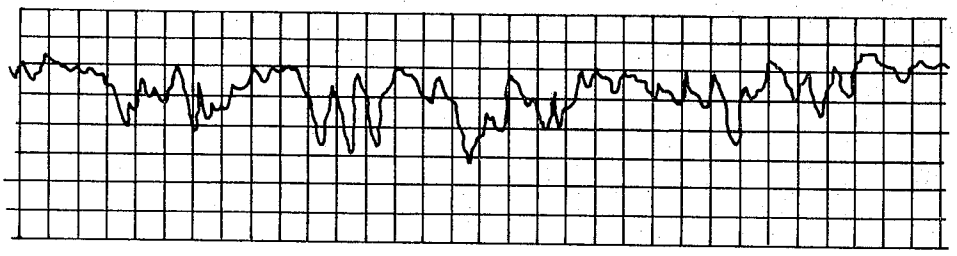
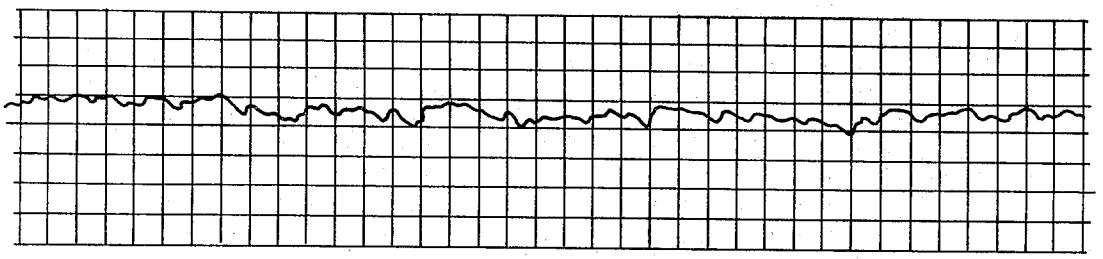


FIG. 3

FIG. 4



METHOD OF MANUFACTURING A HYDROPHILIC DAMPENING ROLL

BACKGROUND OF THE INVENTION

Polished chrome rolls have been used in fluid applying mechanisms, particularly dampening mechanisms for printing presses, to apply a thin film of fluid to a member to be coated. The present invention is particularly concerned with providing a polished hydrophilic roll for use in a dampening system where the film of dampening fluid being applied to a printing plate is controlled by rotating the polished roll and a cooperating roll at different surface speeds.

It has been conventional to polish the hydrophilic rolls to be used in this type of dampener until they have an average roughness of 3 or 4 micro-inches. The finish of a surface measured in micro-inches is an average roughness commonly measured by moving a diamond-point stylus over a surface and translating its up-down (vertical) movements into a meter reading. This reading is not an actual dimension but it is a composite value or index and represents the average vertical distance in micro-inches from a datum line for every point of a surface profile occurring in the length of the surface sampled. Because it is an average, it does not define the profile of a surface. Surfaces having widely varying peaks and valleys can result in the same micro-inch reading. Experience has shown that rolls which are ground to the desired micro-inch finish often do not function well in dampeners for a printing press.

SUMMARY OF THE INVENTION

I have discovered that the rolls which are ground to what is normally considered the proper micro-inch finish often do not function well in a dampener for a printing press because the surface has had a large number of peaks and valleys, which while producing the desired average roughness, have a depth greater or higher than plus or minus 5 micro-inches. These peaks and valleys carry an excessive amount of dampening fluid when a thin film is being applied often rendering the dampener unacceptable. I have further determined that this problem is overcome or minimized if the surface is ground to a finish where the peaks and valleys are limited in number and depth so that they do not carry more water than the thickness of the film desired. In the preferred embodiment for use in a dampener of a printing press, the peaks and valleys from a center line which have a height or depth greater than 5 micro-inches, that is, plus or minus 2.5 micro-inches from the center line, are in the preferred embodiment, less than 100. For fine control, it is also preferable that the number of peaks and valleys which deviate by more than 5 micro-inches from the center line are less than ten per inch and, preferably, less than five.

DESCRIPTION OF THE DRAWINGS

The present invention will be better understood from the following detailed description of the preferred embodiment thereof made with reference to the accompanying drawings, forming a part of this specification, for all subject matter shown therein and in which:

FIG. **1** is a fragmentary cross-sectional view of a dampening mechanism embodying the roll of the present invention;

FIG. **2** is a view showing a roll of the type to which the present invention relates;

FIG. **3** is a chart showing the profile roughness of a roll having an average roughness of 3 micro-inches; and

FIG. **4** is a chart showing the profile roughness of a roll in accordance with the present invention.

Referring to the drawings, FIG. **1** illustrates a printing press dampener in which a plate cylinder **10** of a conventional lithographic printing press receives ink from an inker comprising ink form rolls **12, 14** and an ink distributing roll **16** and dampening fluid from a dampening mechanism **18** having a hydrophilic pan roll **20** which runs in a pan **24** containing dampening fluid. The roll **20** also runs in engagement with the ink form roll **14** to transfer a film of dampening fluid thereto and is driven at a speed which is variable to control the amount of dampening fluid applied to the ink form roll **14.** The ink form roll **14** is driven at press speed while the pan roll **20** is normally rotating at a surface speed different from the surface speed of the ink form roll **14.** The pan roll **20** picks up the dampening fluid from the pan **24** and carries the dampening fluid through a metering nip formed by a metering roll **22** which is located in advance of the engagement of the pan roll **20** with the ink form roll **14.** The dampener and printing press as thus far described are conventional and well known in the art.

The pan roll **20** is illustrated in FIG. **3** and has a hard metal surface, preferably chrome, thereon which is rendered hydrophilic by etching in accordance with conventional techniques. Heretofore, the rolls have been ground when manufactured until they have an average roughness of 2 to 5 micro-inches. FIG. **3** illustrates the roughness profile of a surface having an average roughness of 3 micro-inches. However, the profile roughness exhibits a large number of peaks or valleys per inch of length. The profile roughness in FIG. **3** was obtained by use of a Bendix peak counter on a roll which had been manufactured for use in a dampening mechanism and had the finish ground to a roughness of 3 micro-inches. The roughness profile in FIG. **3** has approximately 570–678 peaks and valleys per inch of length which deviate plus or minus 2.5 micro-inches, from the center line. FIG. **4** shows the finish of the roll after regrinding with a 500 grit wheel until it exhibited only 30 to 45 peaks and valleys per inch which were greater than 2.5 microinches, measured with respect to the center line, and from 0 to 2 peaks and valleys per inch where the peaks exceeded 5 micro-inches from the center line. The average roughness of the finish after regrinding was 1.6 micro-inches.

A roll manufactured in accordance with the invention may have an average roughness different from 1.6 micro-inches so long as the number of peaks and valleys per inch of length which exceed from the mean, or center, line of the profile plus or minus 5 micro-inches and 2.5 micro-inches are limited so that the peaks and valleys which exceed 5 micro-inches are less than about ten per inch and those which exceed 2.5 micro-inches are less than about 100 per inch of length. Preferably, those which exceed 5 microinches are less than 5 per inch and those which exceed 2.5 micro-inches are less than 50 per inch.

In measuring the profile roughness as illustrated in FIGS. **3** and **4,** the terms average roughness and center (or mean) line and waviness are used in this application

and are based on definitions in the official *Standard ASA B46.1 — 1946* "Surface Texture" and are as follows:

Average roughness — The average vertical dimension of the surface profile in micro-inches from the mean or center line as measured along the roughness-width cutoff. The widest spacing between repetitive surface irregularities to be included in the measurement of average roughness value.

Roughness — The finer irregularities in the surface texture produced mostly by the machining process including tool-feed marks and other fine irregularities occurring within the roughness-width cutoff.

Center (or mean) line — The theoretical line from which the vertical deviations of the profile are measured to compute average roughness. The line runs parallel to the general direction of the profile and lies within the roughness-width cutoff. The location of the center line is such that the sum of the areas of the peaks above the line equals the sum of the areas of the valleys below it.

Roughness-width cutoff — The widest spacing between repetitive surface irregularities to be included in the measurement of average roughness value. Common cutoff values are 0.003, 0.10 and 0.030 inch and these may be used in practicing the present invention.

The roughness of a surface is to be distinguished from the waviness of the surface. The waviness is a periodic irregularity that contributes to surface texture and its spacing is usually wider than the roughness-width cutoff so that the waviness affects are usually not included in the roughness average. Waviness results primarily from external effects, such as deflection, vibration, chatter, or heat treatment warpage. The profile of a surface may be considered as roughness surface imposed on waviness.

In measuring waviness and roughness, it will be appreciated that when a stylus moves over a surface to obtain an electric signal in accordance with the profile of the surface, the low frequency component of the signal is the waviness while the higher frequency components correspond to the profile roughness as distinguished from the average roughness. The commercial instruments which measure profile roughness do it in this manner and, therefore, a "pure" geometric construction of waviness and roughness is not necessarily provided but this does not mean that the plots are incorrect or inaccurate since the separation of waviness and roughness is somewhat arbitrary even when done geometrically.

In accordance with the present invention, when a roll is being prepared for a dampener, it is ground, the finish measured and grinding continued until the proper finish is acquired as described above and the roll then etched in a conventional manner to make the roll hydrophilic. It has been found that conventional etches may be used to effect the etching without affecting the profile roughness of the surface.

What I claim is:

1. The method of manufacturing a hydrophilic roll for a printing press dampening mechanism for use in transferring a dampening fluid comprising the steps of providing the roll with a hard metal surface capable of being rendered hydrophilic, grinding the surface of the roll to a finish where the profile roughness of the surface has less than 100 peaks and valleys per lineal inch which deviate in excess of plus or minus 2.5 microinch from the center line for the peaks and valleys and less than 10 peaks and valleys per said lineal inch which deviate in excess of plus or minus **5** micro-inch from said center line including the steps of measuring the peaks and valleys of the ground surface and continuing the grinding of the surface with a fine enough grinding wheel until the said profile roughness is obtained.

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