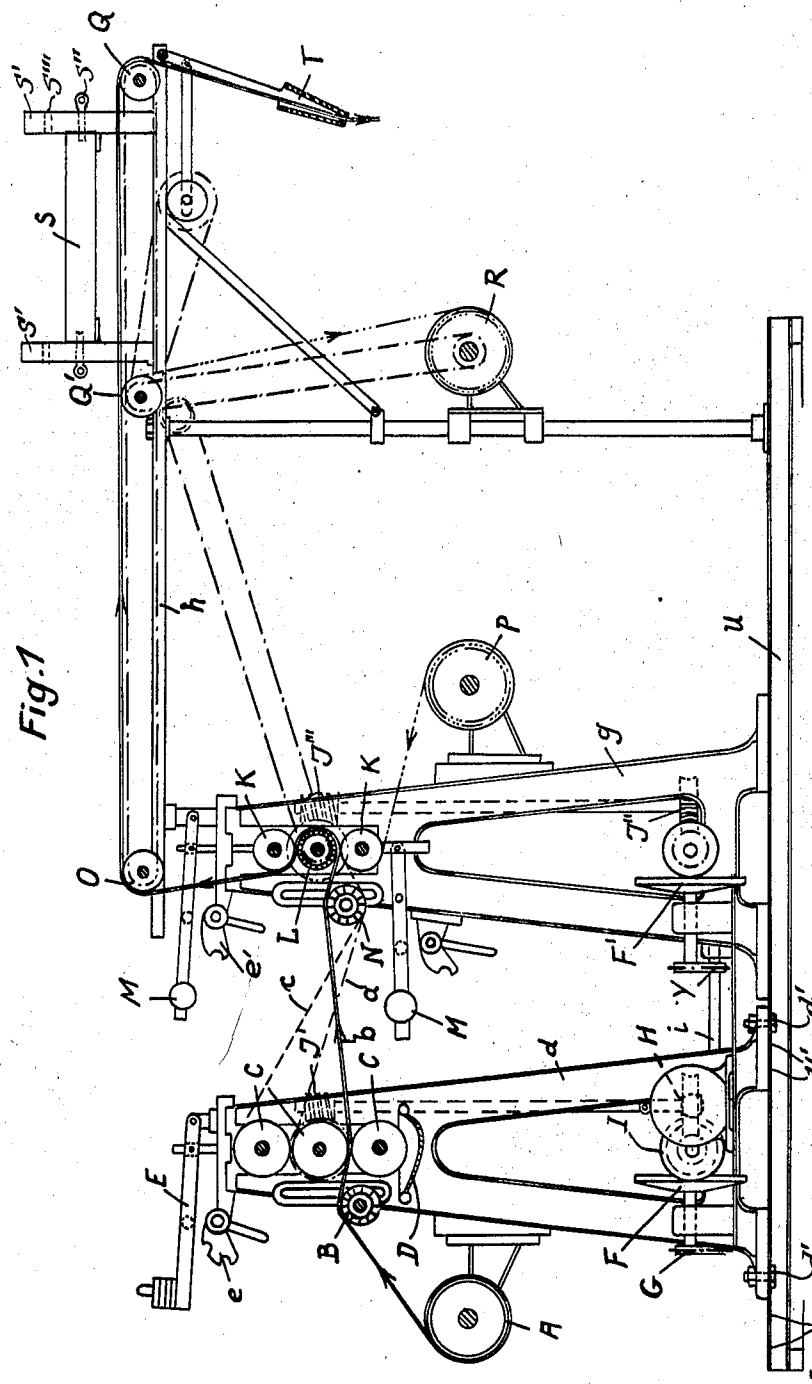
April 16, 1935. A. SARK, BORN ARUNOW 1,998,028

PROCESS AND DEVICE FOR ROTARY SIMULTANEOUS PRINTING BY MEANS OF MULTICOLORED PRINTING BLOCKS

Filed March 5, 1932 3 Sheets-Sheet 1

Fig.1

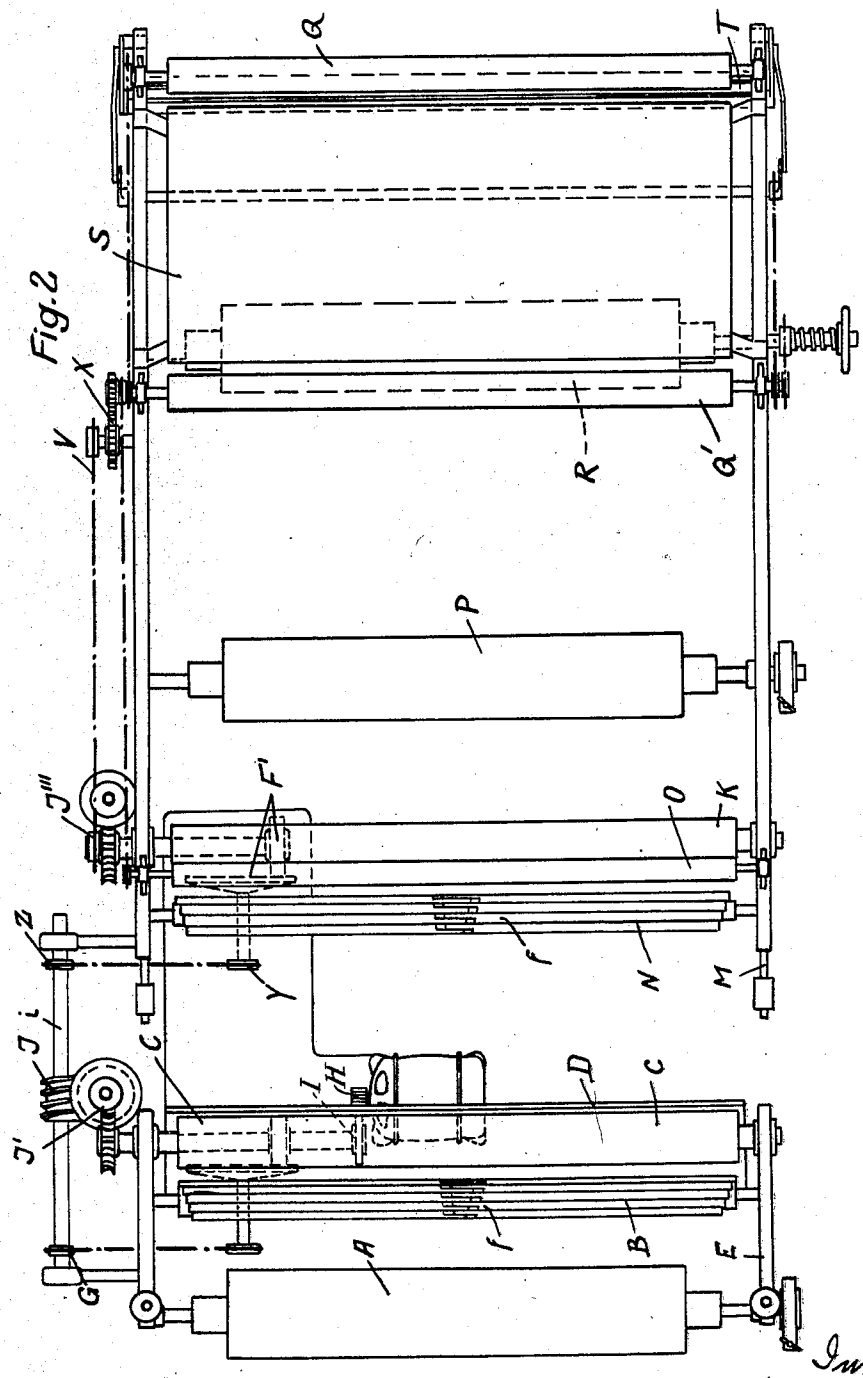


April 16, 1935. A. SARK, BORN ARUNOW 1,998,028

PROCESS AND DEVICE FOR ROTARY SIMULTANEOUS PRINTING
BY MEANS OF MULTICOLORED PRINTING BLOCKS

Filed March 5, 1932 3 Sheets-Sheet 2

Fig. 2



Inventor
Astra Sark
By B. Singer, Atty.

April 16, 1935. A. SARK, BORN ARUNOW 1,998,028

PROCESS AND DEVICE FOR ROTARY SIMULTANEOUS PRINTING BY MEANS OF MULTICOLORED PRINTING BLOCKS

Filed March 5, 1932 3 Sheets-Sheet 3

Fig.3

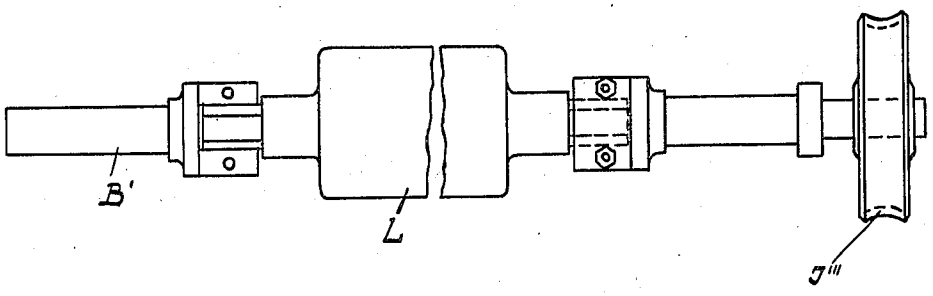


Fig.4

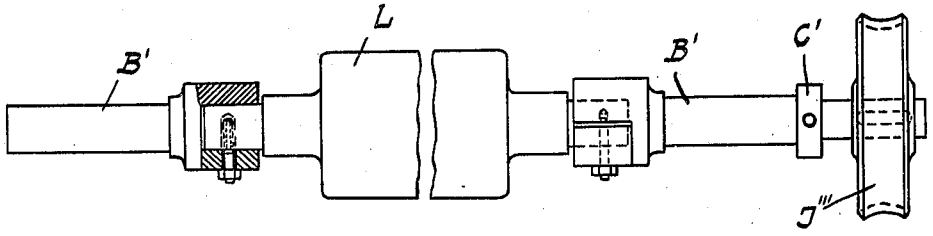


Fig.5

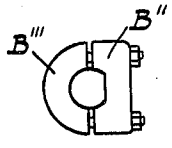
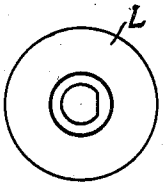


Fig.6



Inventor:
Astra Sark
By B. Singer Atty

Patented Apr. 16, 1935 1,998,028

UNITED STATES PATENT OFFICE

1,998,028

PROCESS AND DEVICE FOR ROTARY SIMULTANEOUS PRINTING BY MEANS OF MULTICOLORED PRINTING BLOCKS

Astra Sark, born Arunow, Lyon-Brotteaux, France, assignor to Société Anonyme Prisma, Lyon, France, a company of France

Application March 5, 1932, Serial No. 597,051
In Germany December 24, 1931

12 Claims. (Cl. 101—134)

The principle of the multicolored printing by means of printing blocks composed after the manner of mosaics, of coloring matters, soluble in water used for moistening the fabric to be printed upon, is the basis of the realization of said invention.

The process and the rotary machine, described below, completely foresee the printing by means of different coloring matters and their solvents of all known chemical compositions.

The essential point consists in the feature that the printing block of water soluble coloring matter is arranged upon a block or printing cylinder and is impressed by means of an elastic pressure cylinder in the rotary printing process, after a web to be printed upon (consisting of fabric, paper, straw, warp or the like) has been previously passed through a moistening device coupled with the printing cylinder by gearing and by which the fabric is moistened with water. Hereby printing upon webs of any desired length in a single continuous process, and in any desired number of different colors, by means of a single cylindrical printing block is rendered possible. The web to be printed upon is successfully dried by heating or blowing immediately after the printing so that it can at once be again rolled up.

Successful constructional forms of the invention, particularly with regard to the regulability of the moistening and drying devices, and of the printing pressure of the printing rollers and printing cylinders are described below, and one constructional form is illustrated in the accompanying drawings, in which

Figure 1 is an elevation of the moistening, printing and drying devices.

Figure 2 is a plan of the same.

Figure 3 is an elevation of a printing cylinder.

Figure 4 is a plan of the same.

Figure 5 illustrates a coupling.

Figure 6 is a front view of the printing cylinder.

Referring to the drawings, the moistening device according to Figures 1 and 2 consists essentially of rollers C, which are coated with a textile material or the like and are displaceably supported perpendicularly over one another in a machine frame *d*. Below the lowest roller C a trough D is arranged for water as a solvent for the coloring matter and into which the roller dips. On the trough is provided a usual device for retaining the water level constant. The bearings of the roller C are loaded by levers E loaded with weights, in such a manner that the pressure between the rollers C can be altered. A lifting device *e* serves for raising the levers E.

In front of the rollers C a laterally stretching roller B and a roller A storing the web to be printed upon (fabric, paper, straw, or a warp) and provided with brakes, are arranged.

The machine frame *d* is displaceably secured upon ground frame U for example by means of screws *d'* and holes U' arranged in the ground frame U at certain distances, in such a manner that the distance of the entire moistening device from the printing device connected behind it, can be altered.

The printing device consists of a printing cylinder L which receives the printing block upon its periphery, and pressure cylinders K, one supported over the printing cylinder and one below the same, the surface of each pressure cylinder being provided with an elastic coating such for example as rubber, textile material, gelatine, or the like. The cylinders K and L are displaceably supported in their frame *g* likewise as the rollers C, and their bearings are adapted to be loaded with a variable pressure by means of weight levers M. The weight levers M are adapted to be raised by means of a lifting device *e'*. In front of the printing cylinder L a stretching roller N is connected which is formed in the same manner as the stretching roller B.

The printing block arranged upon the surface of the printing cylinder L is composed after the manner of a mosaic of any desired number of different coloring materials. The coloring materials are soluble in water, and with which the web to be printed upon is moistened, so that when pressing the moist web against the printing block the latter is partially dissolved upon its surface and delivers its color to the web.

Above the printing and pressure cylinders L, K a roller O is provided on an upper horizontal carrier *h* of the printing machine frame *g*, which roller is provided with a comblike coating in order to pull the web to be printed upon from the cylinders. At the right hand end of the carrier *h* is supported a roller Q coated with velvet over which the web is guided to a swinging folding apparatus T of the usual kind. Above the web printed upon and tensioned between the rollers O and Q, a drying device S is provided which consists for example of a plurality of electric heating elements or fans which may be connected in any desired manner. The distance of the drying device from the web printed upon is made variable in order to be able to suitably vary the drying action. In this end the drying device is mounted by bolts S'' engaging said device and being ar-

ranged displaceably on vertical frames S' having several holes S''' for said bolt at certain distances.

In order to prevent in printing any tearing or the like damage of delicate webs to be printed upon, a roller P which may be provided with a brake, is supported on the printing machine frame *g*, and this roller can carry a strip of material serving as a support which runs, together with the web to be printed upon, over the printing cylinder L and the pressure cylinder K and the comb roller O and can be pulled over a special roller Q' coated with velvet, which is arranged in front of the drying device S, by means of a roller R supported on the machine frame and driven by friction gearing. By means of this supporting strip the web to be printed upon can be conveyed through the printing device.

The common drive of the moistening and printing device is effected from a toothed wheel H driven by an electric motor and supported on the frame *d* of the moistening device. The toothed wheel H drives a transverse shaft *i* provided with a worm wheel J, this drive being effected by means of a toothed wheel I and a change speed gear F formed as a disc drive and a sprocket drive G, while the transverse shaft drives through a worm wheel a worm J' arranged in the upper end of a vertical shaft. The worm J' engages in a worm wheel on the shaft of the central roller C and thus drives the latter.

The transverse shaft *i* carries a chain wheel Z which is axially displaceable thereon and which by means of a chain *y* drives the disc shaft of a disc gear F' serving as the main drive of the printing device, so that the moistening device and printing device work in the same cycle but can be driven at various speeds by means of suitable adjustment of the disc gearing F and F', in order to enable the web to be printed upon to be tensioned in a suitable manner in the longitudinal direction and the working speed to be varied before the entry of the web into the printing device.

The wheel shaft of the disc gear F' drives through a worm wheel J'' a vertical shaft which drives the printing cylinder through a worm drive J'''. The pressure cylinders K also are driven by friction from the printing cylinder. The shaft of the printing cylinder L drives the rollers Q, Q' and the swinging folding apparatus T and the roller R for the supporting strip through a sprocket drive V, a toothed gear X and further sprocket drives connected thereto.

According to Figures 3 to 6, a printing cylinder L is provided at the end of its shaft with stub shafts B', which are supported in the machine frame of the printing machine and are secured against axial displacement by a collar C'. One of these stub shafts carries the said driving worm wheel J'''. The ends of the shaft of the printing cylinder L are secured in a dismountable manner in the stub shafts B'; for example by means of a bearing claw B''' of the stub shafts and of a cover B'' adapted to be screwed thereon, which cover is adapted to be pressed by means of fixing screws against a flat surface of the end of the shaft. The printing cylinders carrying the printing blocks are thereby made easily exchangeable with one another.

The operation is as follows: The web running off from the roller A over the stretching roller B is passed, according as increased or reduced moistening is required, either along the path *a* shown in Fig. 1 immediately through the water trough D, over the lower and the intermediate roller C, or along the path *b* only, between the lower roller C and the intermediate roller, or also along the path *c*, between the lower rollers C and then, for the purpose of wringing out superfluous liquid, between the upper rollers C and then above or below the stretching roller N, which in some cases is driven in the corresponding direction of rotation. The web is thence led round the printing cylinder L where it is provided with the impression. The interval between the moistening and printing device is increased when necessary by displacement of the machine frame *d*, in such a manner that on the way between the two devices a suitably slight drying can take place. By regulating the speed the web to be printed upon is given the suitable longitudinal extension and by means of the stretching rollers B and N, the necessary transverse stretching before the web enters between the printing and pressure cylinders. Along with the web to be printed upon, can run simultaneously from the roller P a relatively stronger supporting strip between the printing and pressure cylinders, whence the web and lining pass over the roller O and the first roller Q' to the drying device S or to the rolling up device R. The web printed upon is dried by the heating device S and then arranged in folds by the folding apparatus T.

Heretofore in processes for rotary printing in colors, it has been necessary to use easily volatile solvents such as turpentine in order to enable the printing and drying to be done at speed, but by such processes it has not been practicable to obtain the extremely delicate colors and gradual transition of colors which can only be obtained by water color printing. I am the first to successfully use water colors in rotary printing and an essential feature of such printing in accordance with my method and apparatus is that the water moistened fabric or web is pressed elastically against the multicolored rotating printing block and that hence the work fabric remains by reason of such elasticity on the printing block for a short time which is effective to cause the fabric to absorb the color and hence the colors are taken up from the block by the fabric with extremely good effect. In my numerous experiments and in the practical operation of my improved apparatus and method I have discovered and demonstrated that only by the use of elastic pressure during the printing and by the use of water soluble coloring matter desirable delicate effects can be obtained. The elastic pressure cylinder used by me affords a clean reception of the colors already in a slightly moistened run of fabric and by the employment of the drying means which operates immediately after the printing, I prevent a running of the colors or a losing of colors upon parts of the printed fabric.

Having thus described my invention, what I claim is:

1. Device for printing by means of printing blocks composed of coloring matter, comprising in combination a printing cylinder with a cylindrical printing block fixed thereon and composed like a mosaic of water soluble coloring matter, pressure cylinders arranged at opposite sides of the printing cylinder so that the web to be printed upon extends around not more than substantially one-half the periphery of the printing cylinder and a moistening device connected in front of the same for the web to be printed upon, and a drying device arranged behind the same.

2. Device as claimed in claim 1, wherein the pressure cylinder device is provided with means for pressing upon it with variable pressure.

3. Device as claimed in claim 1, wherein the moistening device consists of a trough containing a solvent and of at least two cooperating rollers adapted to be brought at will into contact with the web to be printed upon, one of which rollers is adapted to be dipped into said solvent, and including pressing means by which the rollers are adapted to be pressed against one another with variable pressure.

4. Device as claimed in claim 1, including moistening and stretching rollers and a common drive for said printing and pressure cylinders and said moistening and stretching rollers.

5. Device as claimed in claim 1, including longitudinally stretching rollers wherein for the moistening and longitudinally stretching rollers special change speed gears are provided, in order to facilitate more or less rapid printing or more or less intensive stretching of the web to be printed.

6. Device as claimed in claim 1, wherein the moistening device is displaceably secured upon a frame so arranged that the distance between the moistening device and printing device is variable.

7. Device as claimed in claim 1, wherein the pressure cylinders are arranged exchangeably to enable cylinders covered with rubber to be exchanged for cylinders covered with gelatine and for cylinders covered with textile material.

8. Device as claimed in claim 1, wherein behind the printing device the said drying device has means for altering its distance from the web to be printed upon to vary the temperature at the web as may be required.

9. Device as claimed in claim 1, wherein for the printing cylinder and pressure cylinder change speed gears are provided to facilitate more or less rapid printing and more or less intensive stretching of the web to be printed.

10. The herein described process of printing, consisting in producing a printing block in the form of a cylinder of water soluble coloring matter, causing a work fabric to pass partially around the periphery of said printing cylinder, moistening said work fabric with water and removing superfluous water from the same prior to its passage around the cylinder and subjecting such work fabric during its passage around the printing cylinder to elastic pressure between the printing cylinder and the pressure cylinder.

11. The process of printing from a printing block composed of water soluble coloring matter, consisting in arranging said block on a printing cylinder, moistening a work fabric with water, removing superfluous water from the fabric and subjecting the work fabric which has thus been moistened and from which the superfluous water has been removed to elastic, yielding pressure against the block on the printing cylinder to cause a dwell of the fabric on the block.

12. Rotary printing apparatus of the class described, comprising a printing cylinder, a cylindrical printing block thereon composed of water soluble coloring matter, an elastic surfaced pressure cylinder, means for pressing said pressure cylinder against said printing cylinder and block, means for moistening the work fabric with water before a surface to be printed reaches said cylinders and means behind said cylinders for drying the printed fabric.

ASTRA SARK, BORN ARUNOW.