

No. 896,320.

PATENTED AUG. 18, 1908

R. C. RAHM.
BRAID.

APPLICATION FILED NOV. 4, 1905.

2 SHEETS—SHEET 1.

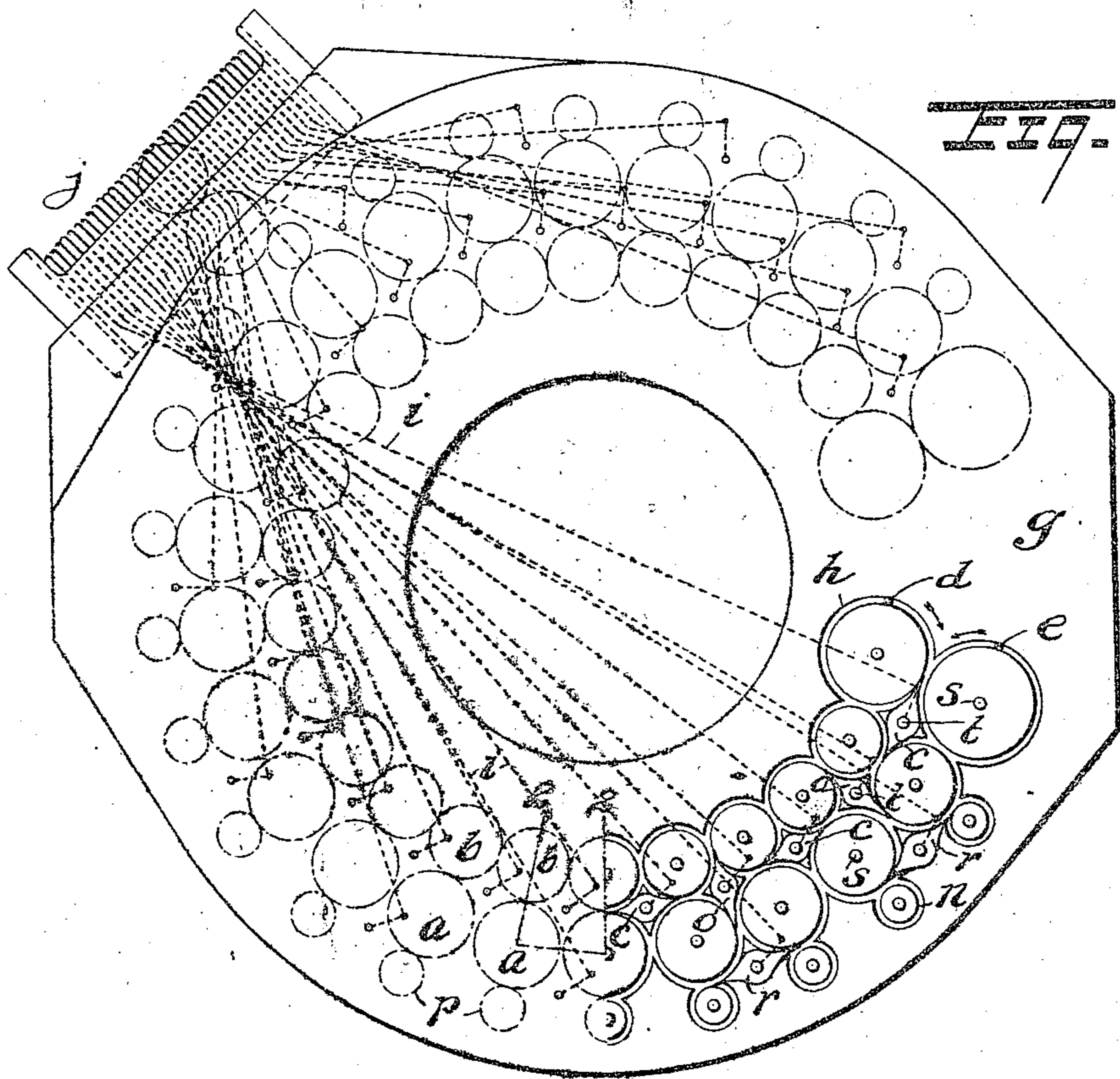
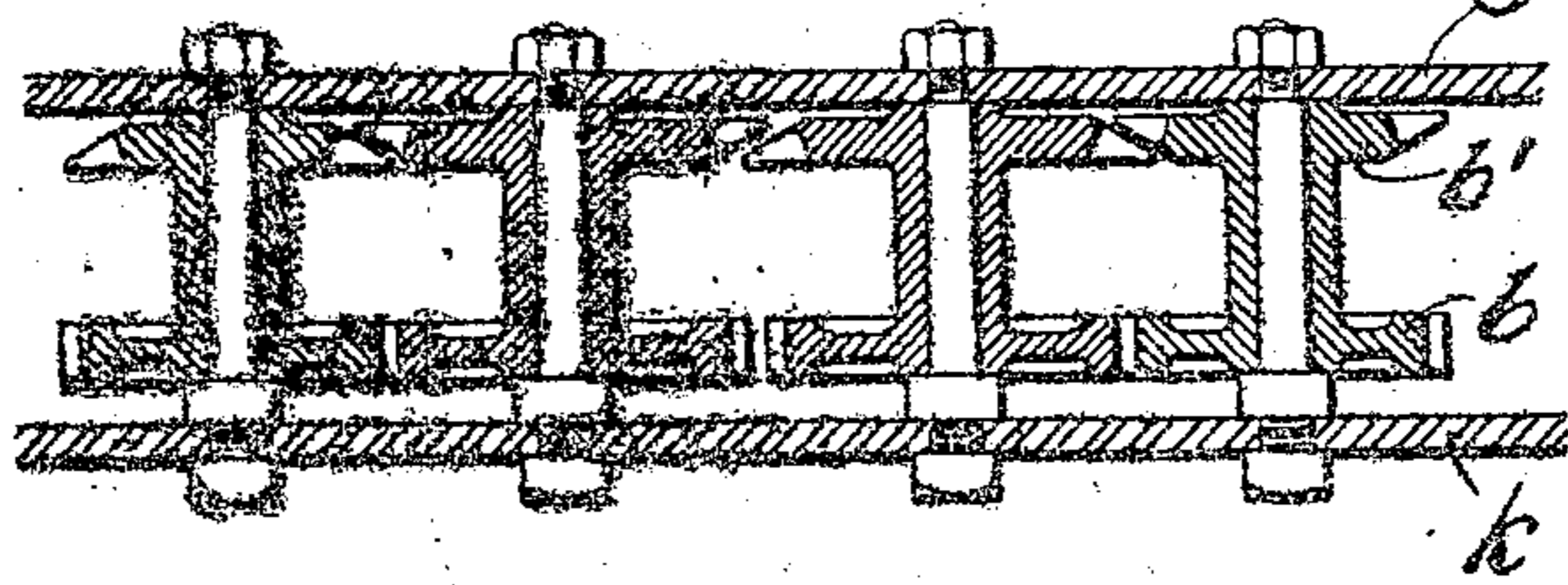


Fig. 2.



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by

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Witnesses
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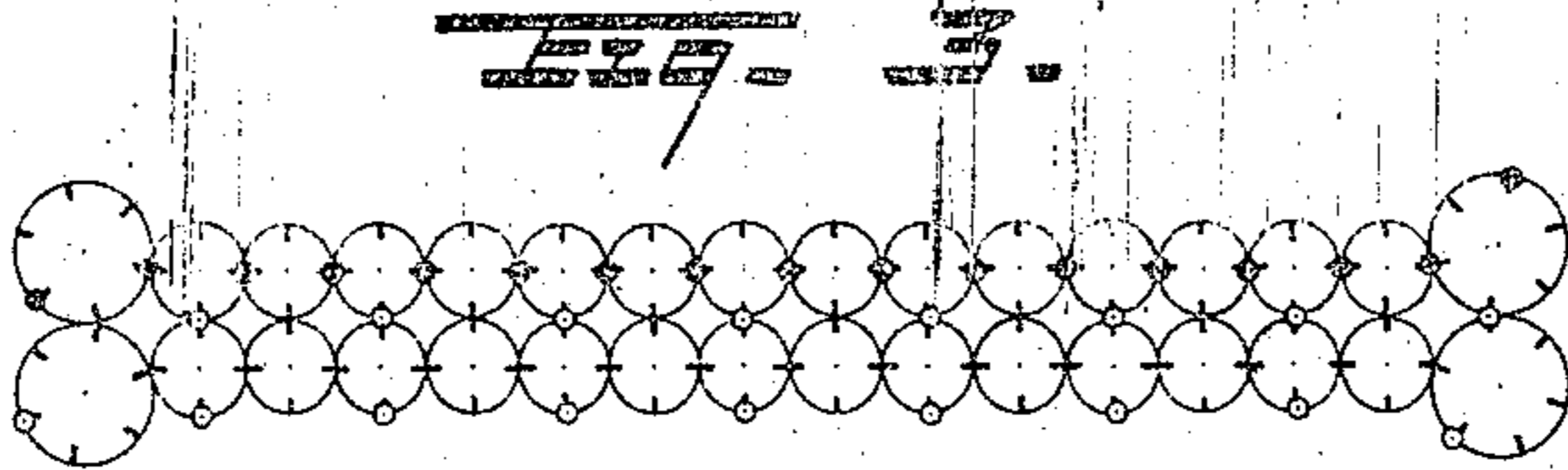


Fig. 4.

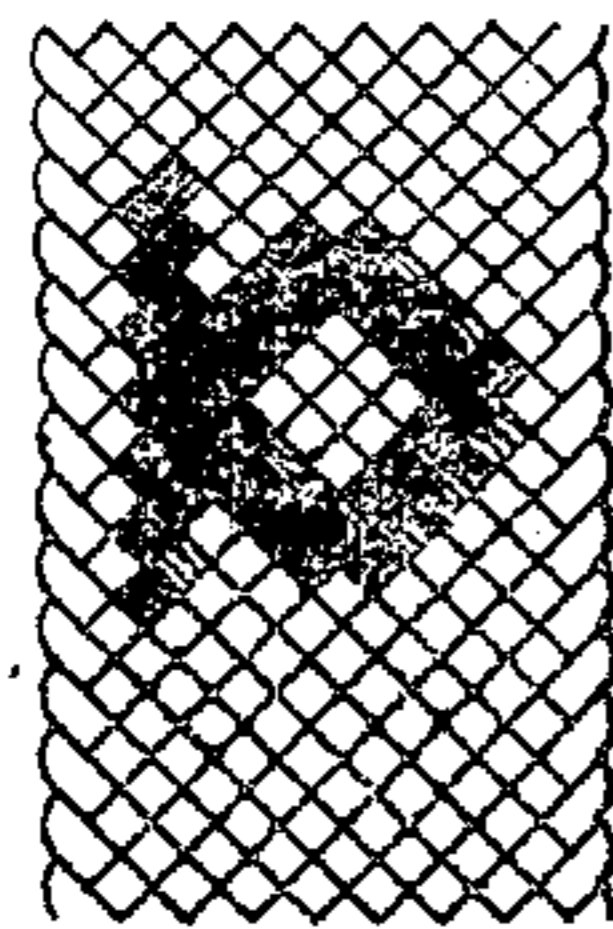
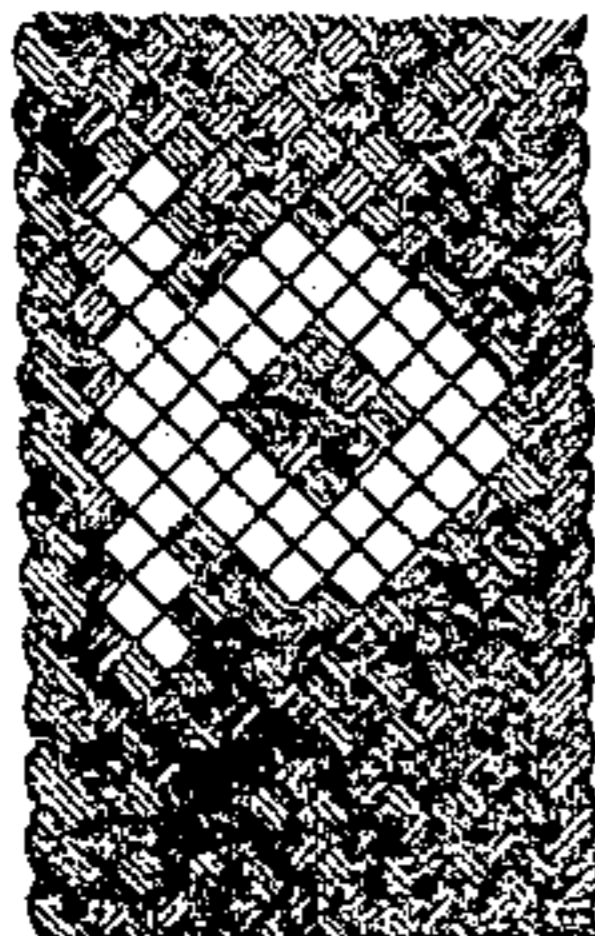


Fig. 5.

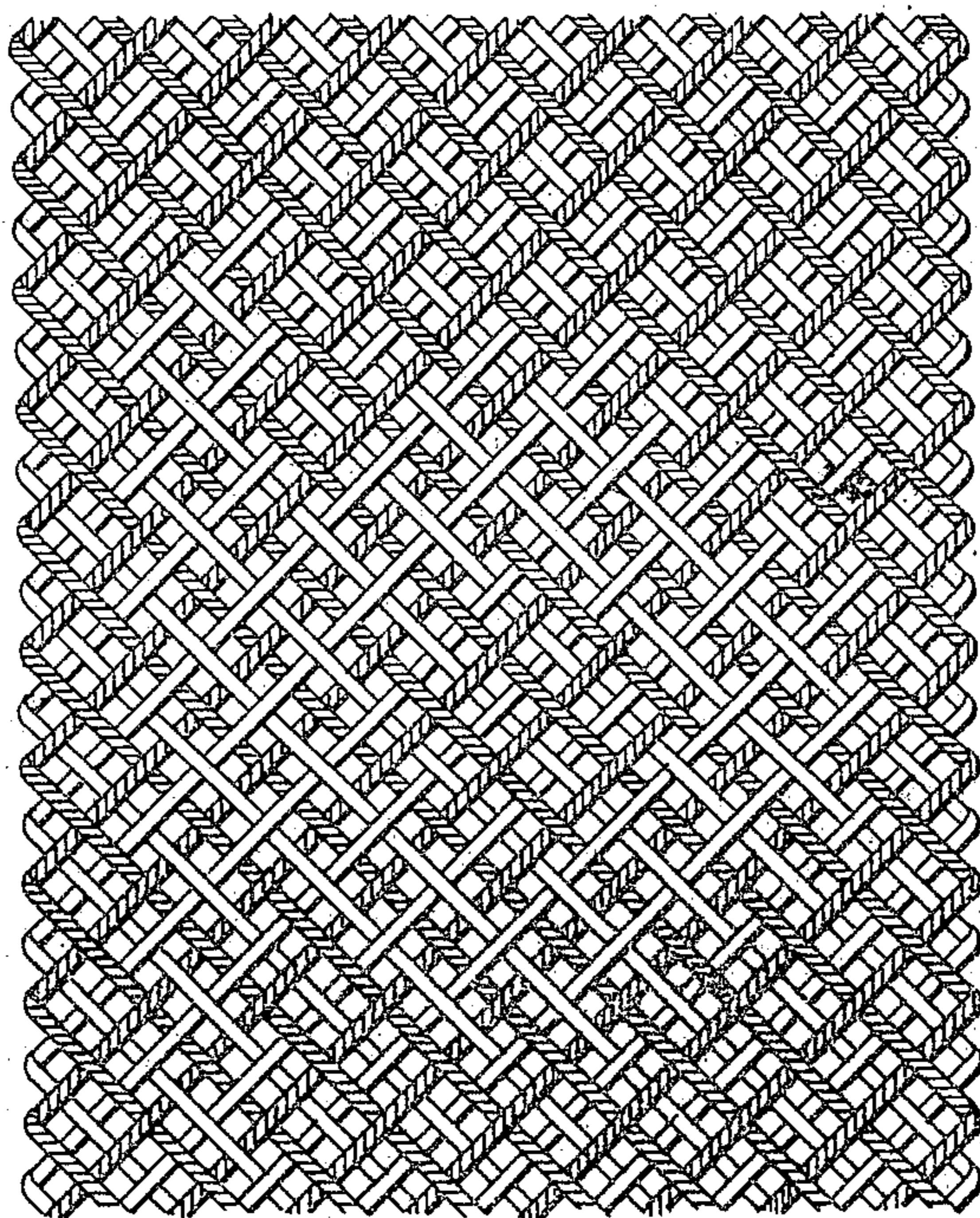


Fig. 6.

Fig. 7.

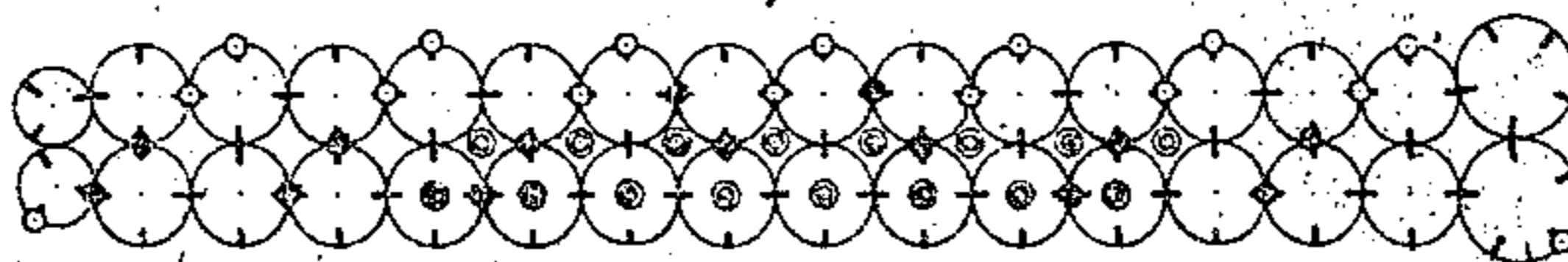
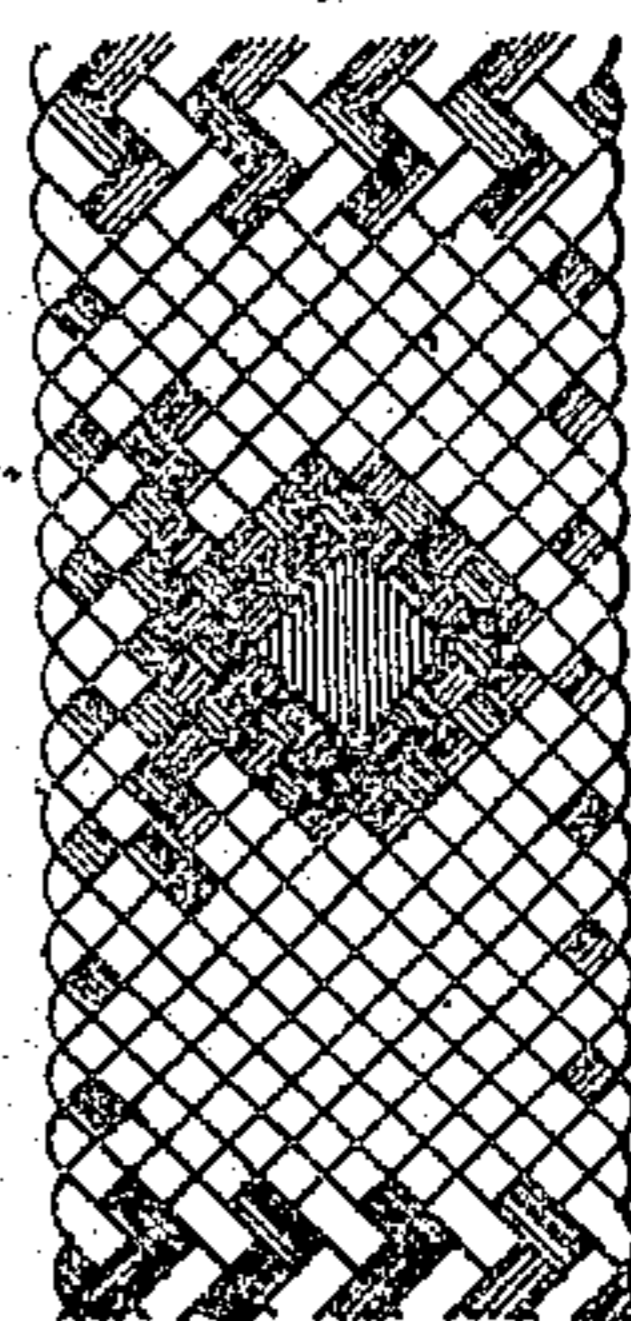


Fig. 7.



Witnesses
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UNITED STATES PATENT OFFICE.

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BRAID.

No. 896,320.

Specification of Letters Patent.

Patented Aug. 18, 1908.

Original application filed October 14, 1904, Serial No. 228,393. Divided and this application filed November 4, 1905. Serial No. 285,821.

To all whom it may concern:

Be it known that I, ROBERT C. RAHM, a citizen of the United States, and a resident of Wyomissing, county of Berks, and State of Pennsylvania, have invented certain new and useful Improvements in Braids, of which the following is a specification.

My invention relates to an improved braided fabric which is made up of two simultaneously-formed braids laid one upon the other and having their threads interchanged in the process of manufacture so as to unite the two; a main object being to provide various figured or embroidery effects by employing different colored carrier threads, by introducing different colored warp threads, and by making a plurality of turns of certain of the carriers at determined points in their course, in connection with a regulated interchange of carriers arranged to normally traverse separate courses.

The present invention is fully described in connection with the accompanying drawings and the novel features are specifically pointed out in the claims; the mechanism referred to being separately described and claimed in Patent No. 856,985, issued June 11th, 1907, on my application, Serial No. 228,393, of which the present is a divisional application.

Figure 1 is a diagrammatic plan view of a braiding machine embodying my invention; a portion thereof showing the communicating race-circle courses with switches controlling the carrier movements therein, and the remaining portion indicating the pitch-circles of the carrier operating gears and the jacquard connections to the switches. Fig. 2 is an enlarged sectional view showing two gears of the outer course in mesh with two of the inner course, the section being on the line 2--2 of Fig. 1, straightened out. Fig. 3 is a diagram of the run proper. Figs. 4 and 5 show the opposite faces of a figured fabric produced by means of my improved mechanism; and Fig. 6 is an enlarged diagrammatic view indicating the lay of the several threads in said fabric. Fig. 7 is a similar view to Fig. 5 indicating an effect produced where warp threads are employed, and Fig. 8 is a diagrammatic view indicating the run of the carriers in producing same.

The top plate *g* of a braiding machine is ordinarily provided with a single race-way or course for the bobbin carriers, formed by intersecting race-circles which are arranged concentric with a series of operating gears for the carriers. In Fig. 1 a portion of such a race-circle course is indicated at *h*, the race-circles of said course being concentric with a series of intermeshing operating gears indicated by their pitch circles. These horn gears, as they are termed, are located between the top plate *g* and the bottom plate *k*, as shown in Fig. 2, and are provided with peripherally notched disks *b*¹ which engage the carriers to traverse the latter in their serpentine course.

In my improved machine I provide a second outer race-circle course, arranged parallel with the course *h*, and having the same number of race-circles, each arranged tangential to an adjoining circle of the inner course so as to afford communication between the two whereby the carriers of each course may be diverted into the other. To regulate this interchange of carriers, a series of switches *c c c* is provided between the two courses, the points of which switches are adapted to open or close such communications as determined by the position to which they are swung upon their pivotal supports: This position being automatically controlled, as indicated, by a suitable jacquard mechanism *j* and wires *i* extending therefrom to the switches.

As shown in Fig. 1 the parallel race-circle courses *h* and *m* are arranged concentric, with the race-circle centers of both courses on the same radial lines, but with increased race-circle diameters in the outer course as required. The horn-gears of both courses being arranged for the same number of carriers, it is necessary that they be rotated in equal times notwithstanding the necessary difference in diameters. This is conveniently accomplished, as indicated in Figs. 1 and 2, by arranging the gears of the inner course in mesh with each other, and each of the outer gears in mesh only with an adjacent inner gear; the outer gears, though of somewhat larger diameter, being provided with only the same number of teeth as the inner gears so as to be rotated in the same time.

These so-called "bastard gears" are readily cut so as to mesh properly with the closer-pitched teeth of the inner gears.

When each set of carriers is held to its own course two separate braids will be formed, the runs being as indicated in Fig. 3. The manner of accomplishing this will be understood by reference to Fig. 1, in which it will be seen that the carrier indicated at *e* will be held to its normal outer course by the switch *c* when the latter is set as shown; and that the turning of said switch immediately after the passage of said carrier *e* will serve in like manner to retain the carrier *d* upon its normal inner course. Thus in order to retain the carriers in their respective outer and inner courses the switches *c* must be kept swinging from one side of the run to the other, in proper time, by the jacquard mechanism. The separate braids thus produced will be of different colors if the carriers of the two runs are provided with differently colored yarns. If the switch *c* however be moved to reverse positions to those just considered then the carrier *e* would be caused to pass into the inner course and the carrier *d* into the outer one; and being of different colors *d* would, for instance show as black in white on the outer, and *e* as white in black on the inner side of the product, while at the same time uniting the otherwise independent braids in a single fabric.

To enable the securing of additional ornamental effects in connection with the interchanging of the outer and inner course threads, provision is made for causing any desired carrier to make a plurality of turns on a given gear or gears before pursuing its normal course. For this purpose a second series of switches *o o*, as shown, are so arranged as to permit a temporary reversal of any carrier movement. In this connection also, the outer course is shown provided with loops *n* adapted to set back carriers whose motion has been thus reversed, in order to avoid collisions which would otherwise result. The carriers are traversed in these loops by gears indicated at *p* Fig. 1, which, as shown, are each driven by an adjacent outer-course gear *a* and are provided with only two carrier-engaging horns instead of the four provided on gears *a* and *b*. Another series of switches *r* are provided to put these two-horn gear into or out of action as determined by the jacquard. Provision is also made for introducing warp threads of desired colors into the fabric, either through the axes of the gears or of the switch post or both as indicated at *s* and *t* in Fig. 1, around which warps the carrier threads are laid so as to cover or to show them as required for different figure effects.

It will be readily understood that the mechanism described enables a very great variety

of ornamental effects to be produced in a fabric made up of two braids the threads of which are interchanged as stated. In Fig. 4 is shown the inner side of a simple design of braid as already described; the colored portion being formed by the black threads of the inner course carriers, and the white portion by the white threads of the outer course carriers which have been exchanged at the required points with the inner course threads. In the corresponding enlarged Fig. 6 the lay of the several threads is clearly shown, and it will be readily seen that the black threads lie entirely on the top of the white except at points within the figure-design, at which points the white threads appear on top of the black ones due to the described interchanging of threads, thus clearly developing the ornamental design and at the same time uniting the two braids in a single fabric. The great variety of ornamental effects made possible, as already stated, by the introduction of warp threads of desired colors, and the making of a plurality of turns of the carriers at desired points, for which provision is made, will be evident to those skilled in the art; as indicated for instance in Fig. 8 where the warp threads are brought to the surface at the center of the figured design shown in Fig. 5, upon one side of the united double braid, the run of the carriers around the warp threads being indicated in the diagrammatic view Fig. 8.

What I claim is:—

1. A braided fabric made up of two simultaneously formed braids laid one upon the other; the threads of said braids being interchanged at portions only thereof to unite the two in determined design and the remaining portions being disconnected.

2. A braided fabric made up of two simultaneously formed braids laid loosely one upon the other but having their threads interchanged at determined portions only in the process of manufacture to unite the two at such portions, and warp threads around which the braid threads are carried so as to expose portions of the warps and thereby form a figured surface.

3. A braided fabric made up of two simultaneously formed braids laid loosely one upon the other but having their threads interchanged at determined portions only in the process of manufacture to unite the two at such portions, and warps having portions thereof exposed to form a figured surface.

4. A braided fabric made up of two simultaneously formed braids of differing threads one laid loosely upon the other but having their threads interchanged at determined portions only in the process of manufacture to unite the two at such portions and form a figured surface.

5. A braided fabric made up of two simul-

taneously formed braids of differing threads,
one laid loosely upon the other but having
their threads interchanged at determined
portions only in the process of manufacture
5 to unite the two at such portions and warps
having portions thereof exposed in the fig-
ured surface.

In testimony whereof, I affix my signature,
in the presence of two witnesses.

ROBERT C. RAHM.

Witnesses:

D. M. STEWART,
W. G. STEWART.