

No. 746,215.

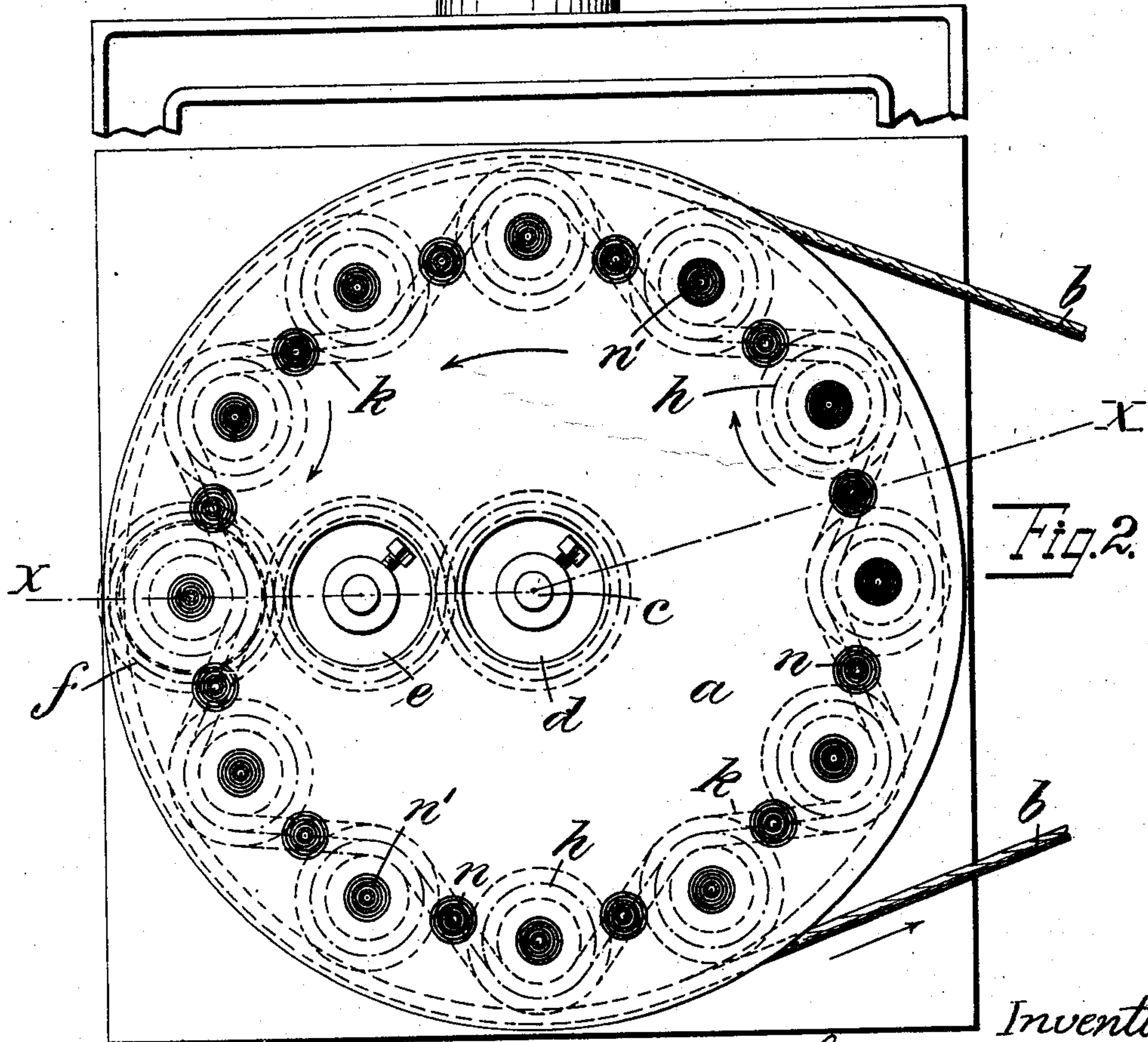
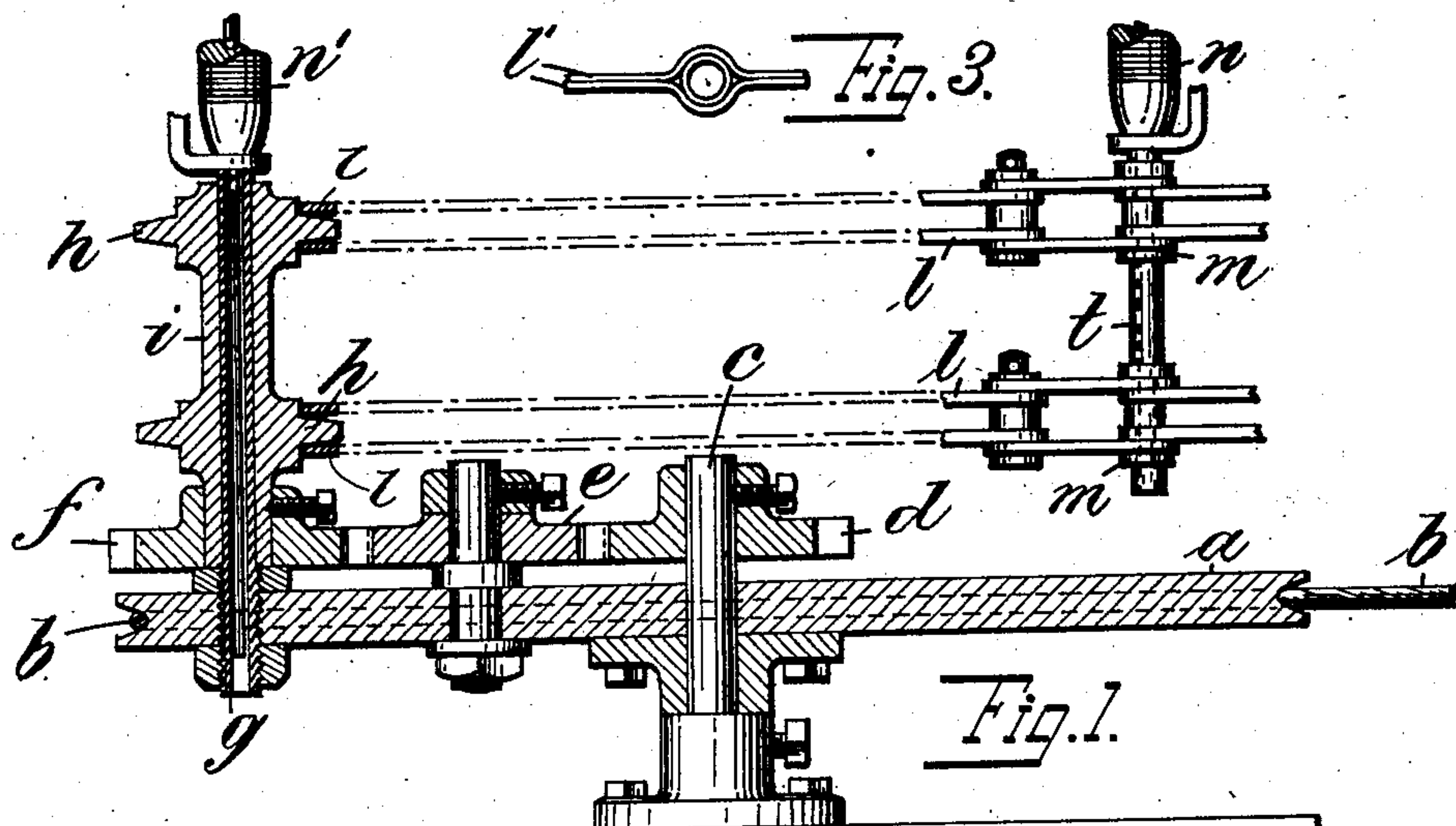
PATENTED DEC. 8, 1903.

L. W. WHITEHEAD.  
BRAIDING MACHINE.

APPLICATION FILED MAY 13, 1902. RENEWED SEPT. 12, 1903.

NO MODEL.

2 SHEETS—SHEET 1.



Witnesses  
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Frank A. Ober

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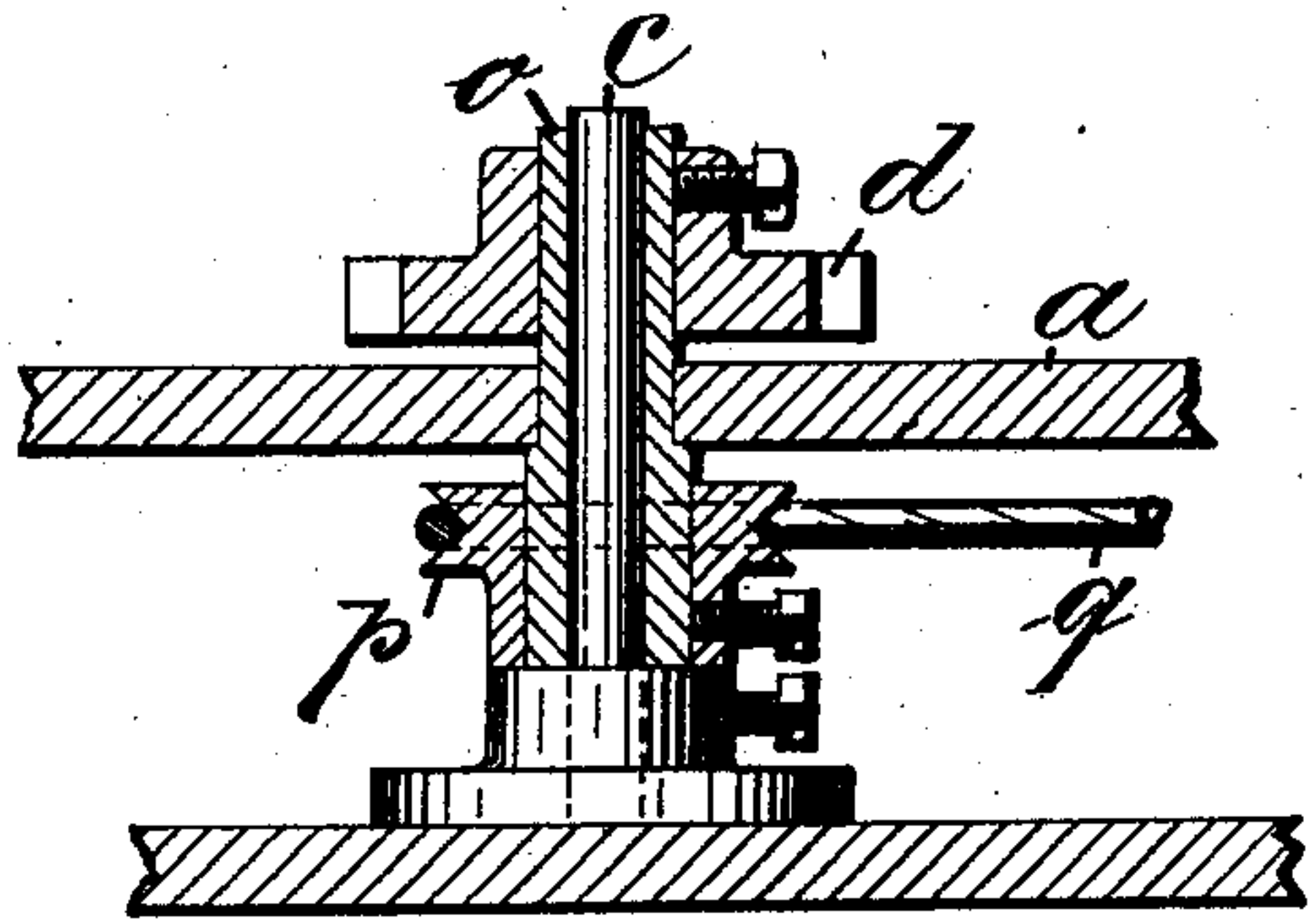
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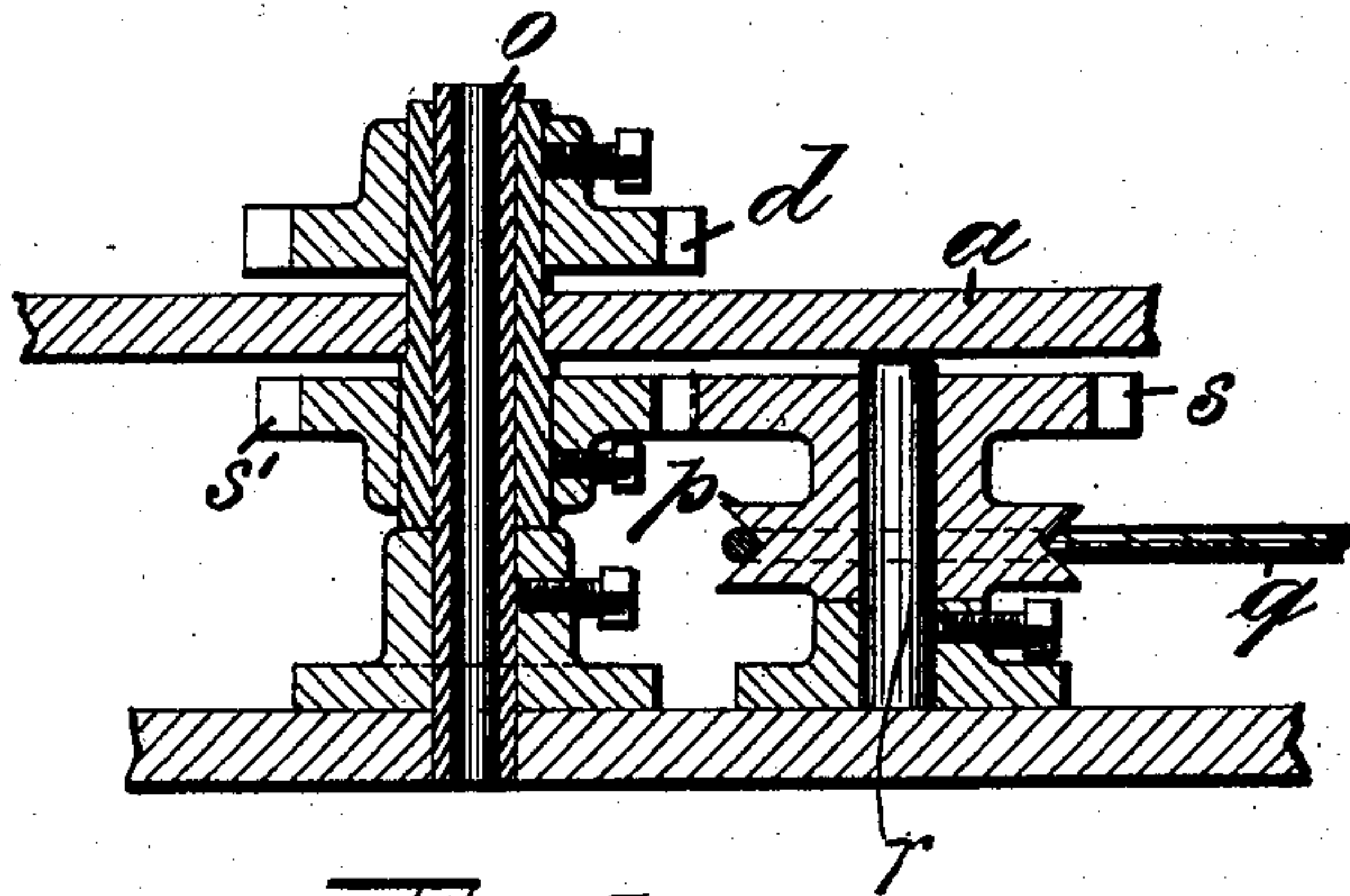
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NO MODEL.

2 SHEETS—SHEET 2.



*Fig. 4.*



*Fig. 5.*

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# UNITED STATES PATENT OFFICE.

LOUIS WOLFENDEN WHITEHEAD, OF MANCHESTER, ENGLAND.

## BRAIDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 746,215, dated December 8, 1903.

Application filed May 13, 1902. Renewed September 12, 1903. Serial No. 172,928. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS WOLFENDEN WHITEHEAD, a subject of the King of Great Britain, and a resident of Manchester, in the county of Lancaster, England, have invented new and useful Improvements in Braiding-Machines, of which the following is a specification.

This invention relates to improvements in braiding-machines, which improvements have been designed for the purpose of simplifying the construction, of increasing the production, and of promoting the durability of the machines.

In a machine constructed to embody these improvements there is a rotary table ring or disk, upon which there are fixed a plurality of equally-spaced supports which may have the form of vertical tubes. At the center of the rotary part there is a toothed wheel which is geared directly or through an intermediate wheel, with a similar wheel on one of the supports. Connected with the wheel on the support there is a second toothed wheel or two connected parallel wheels constructed to drive a flexible chain or band carrier, which wheels will be hereinafter called "sprocket-wheels." Similar free sprocket-wheels are also mounted upon the remaining supports, and the flexible carrier is arranged upon them, passing outside supports bearing odd numbers and inside those bearing even numbers when the supports bear consecutive numbers. Twice as many braiding-spindles are used on the braiding-head as there are supports. Of these one half are arranged in the supports and the other half are mounted in the flexible carrier at equal distances apart. When the braiding-head is rotated, the spindles in the supports are carried around in one direction, while the spindles in the flexible carrier are carried around either in the same direction at the same or at a different speed or in the opposite direction at an equal or different speed, according to the ratio of the gearing and to whether or not the gearing is direct or indirect. By this means a smoother and more rapid working can be obtained and a large variety of different patterns can be produced in the work.

The accompanying drawings illustrate these improvements and will be hereinafter referred to.

Figure 1 represents a section along the line  $xx$  of Fig. 2. Fig. 2 is a plan view of the improved braiding-head, and Fig. 3 a partial plan of a modified flexible spindle-carrier. Figs. 4 and 5 show, in vertical section, two modifications of the gearing.

As shown by the drawings, the rotary part  $a$  is driven by the endless band  $b$  upon the fixed center  $c$  in the direction indicated by the arrows. The fixed center is shown to be solid; but if the braiding is to be formed around a core of any kind the center  $c$  is made hollow for the vertical passage of the core through it, as in other braiding-machines. Three gearing-wheels are shown in Figs. 1 and 2, of which  $d$  is fixed upon the center,  $e$  is an idle intermediate wheel, and  $f$  is on one of the supports  $g$ . On the same support there is mounted the parallel pair of sprocket-wheels  $h$  on the sleeve  $i$ , on which sleeve the wheel  $f$  is fixed. Similar sprocket-wheels, without the wheel  $f$ , are fixed on each of the other supports, or in the case of a braiding-head with six spindles or less these sprocket-wheels may be mounted on alternate spindles only. A flexible endless carrier  $k$ , so constructed as to be capable of being driven by the sprocket-wheels, is then arranged in and out upon them, as shown by Fig. 2, so that it passes alternately inside and outside the supports  $g$ . The carrier is also so constructed that it can receive at equal distances apart as many spindles as there are supports. A convenient method of constructing the flexible carrier is to form it of two parallel pitch-chains  $l$ , in which either all the rivets are hollow or those rivets  $m$  only at the points where tubes  $t$  for the reception of the spindles are carried. One half of the total number of spindles  $n$  are thus inserted into and carried in the hollow rivet  $m$  by the flexible carrier  $l$  and the other half  $n'$  in and by the supports  $g$ . The flexible spindle-carrier may alternatively be made of two leather or steel bands  $l'$ , Fig. 3, in which pockets  $m'$  are made for the reception of the spindles. The so-formed flexible carrier may be geared with the wheels



$h$  or equivalent wheels by means well known, such as by equally-spaced projections or holes thereon or therein.

With the gearing and arrangement of the flexible carrier shown in the drawings, Figs. 1 and 2, the rotation of the braiding-head in one direction will effect the movement of the flexible carrier and its spindles in the opposite direction, as indicated by the arrows, Fig. 2, and these spindles will have a sinuous path, as shown, so that threads from all the spindles  $n$  and  $n'$ , collected at the usual central point, will be braided together. If the carrier  $k$  be made to pass around the outer arcs of the wheels  $h$  instead of around the inner arcs, its motion will naturally be in the opposite direction.

The braiding-head constructed as described permits the production of a great variety of patterns beyond those which can be produced by the customary devices employed in connection with existing machines. Thus by varying the ratio between the wheels  $d$  and  $f$  a higher or lower relatively rate of movement may be given to the spindles in the flexible carrier  $k$ . By freeing the wheel  $d$  a winding motion instead of a braiding motion will be produced as long as may be desired. By omitting the intermediate wheel  $e$  and by varying the ratio of the directly-g geared wheels  $d$  and  $f$  results may be obtained varying from winding to complete braiding. As shown by Fig. 4, the wheel  $d$ , instead of being fixed or free, as indicated by Figs. 1 and 2, may be mounted upon a sleeve  $o$ , which extends downward through the table  $a$ , where there is fixed upon it a grooved pulley  $p$ , driven by the supplementary endless band  $q$ , or in place of the pulley  $p$  there may be fixed upon

the sleeve  $o$  a change-wheel  $s'$ , Fig. 5, gearing with another change-wheel  $s$  on a spindle  $r$ . In this case the pulley  $p$  is fixed upon the spindle  $r$ .

Any of the ordinary and suitable spindles now used in braiding-machines may be employed, those shown being of the usual construction.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a braiding-machine, the combination of a rotary part  $a$ , supports thereon for one half of the total number of spindles, sprocket-wheels on the spindle-supports, a gear-wheel  $f$  on one of the spindle-supports connected with the sprocket-wheel on that support, a wheel  $d$  mounted concentrically with the part  $a$  and geared with the wheel  $f$ , an endless flexible carrier  $k$  passing alternately inside and outside the supports and gearing with the sprocket-wheels, and devices in the flexible carrier for the reception of the remaining spindles  $n$ , substantially as set forth.

2. In a braiding-machine, the combination of a braiding-head, a series of spindles, a flexible carrier, gearing carried upon the head for moving the carrier, one half of said spindles being equidistant on the head and the remainder being carried by the flexible carrier, and means for moving the flexible carrier in and out and between the equidistant spindles.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS WOLFENDEN WHITEHEAD.

Witnesses:

FRANK. A. HEYS,  
ARTHUR MILLWARD.