

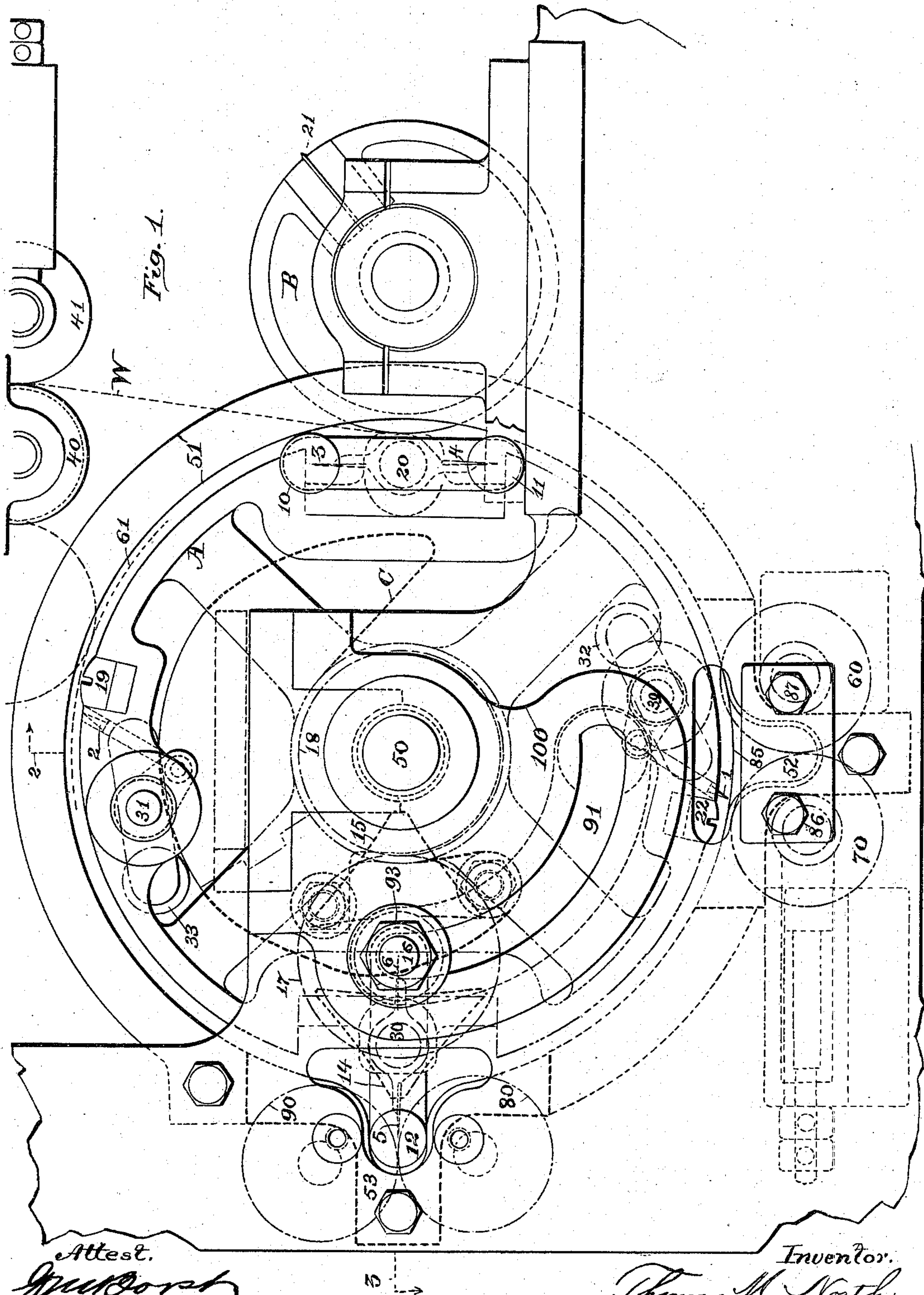
(No Model.)

4 Sheets—Sheet 1.

T. M. NORTH.
ROTARY FOLDING MACHINE.

No. 573,348.

Patented Dec. 15, 1896.



Attest.
John B. Orest
A. V. Bourke

Inventor.
Thomas M. North
by *Philip Munson & Phelps*
Attys.

(No Model.)

4 Sheets—Sheet 2.

T. M. NORTH.
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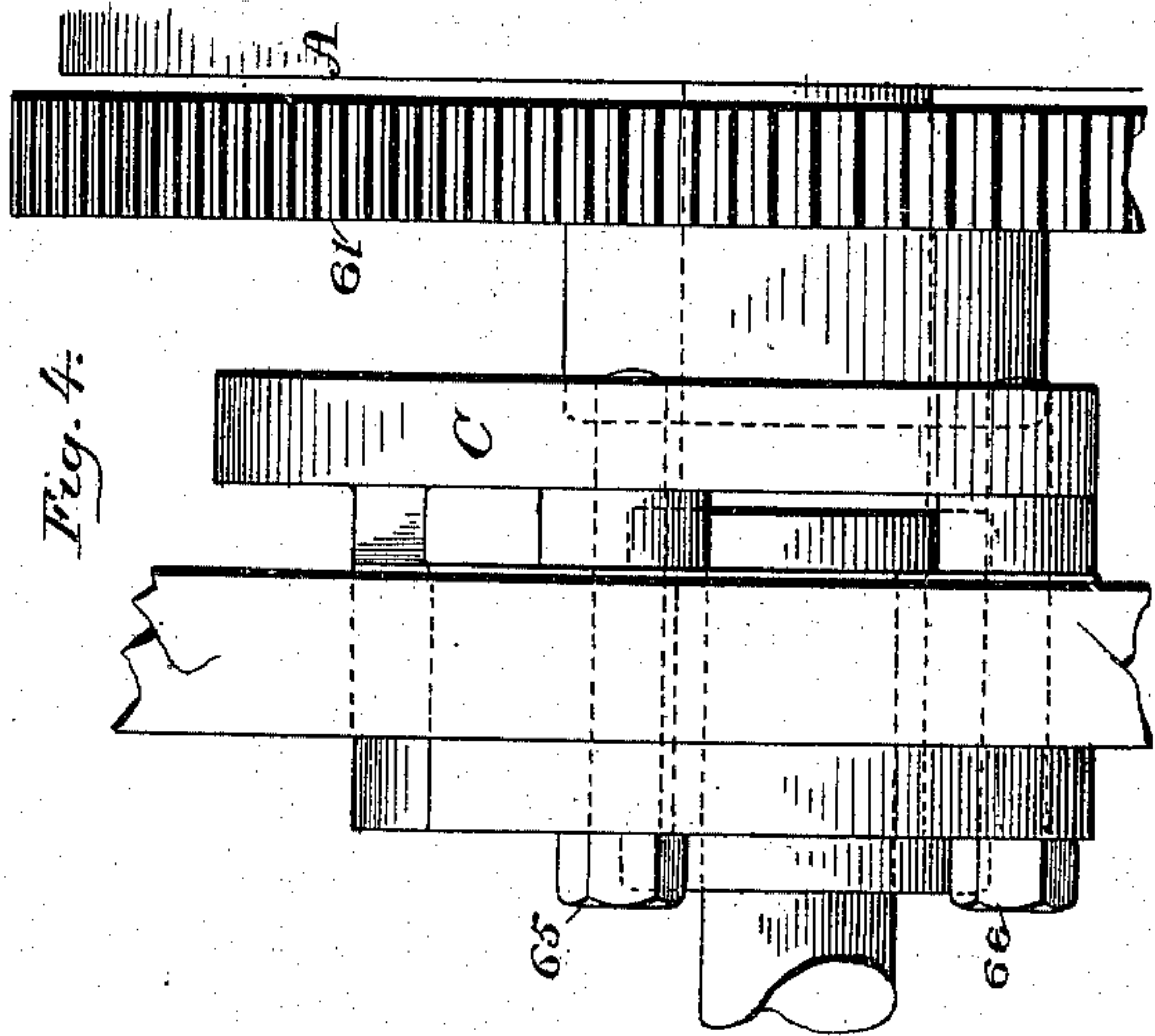
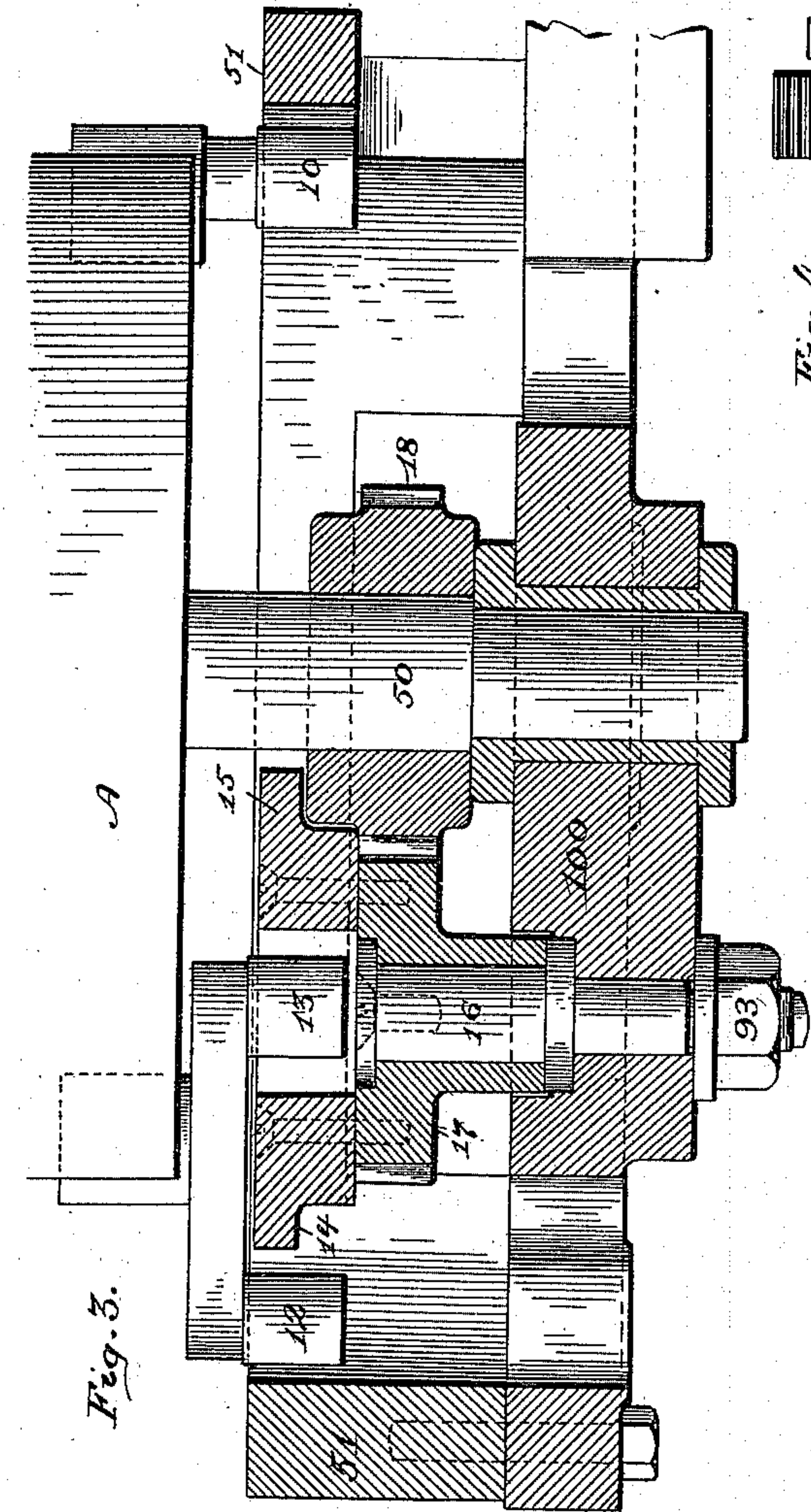


Fig. 5.

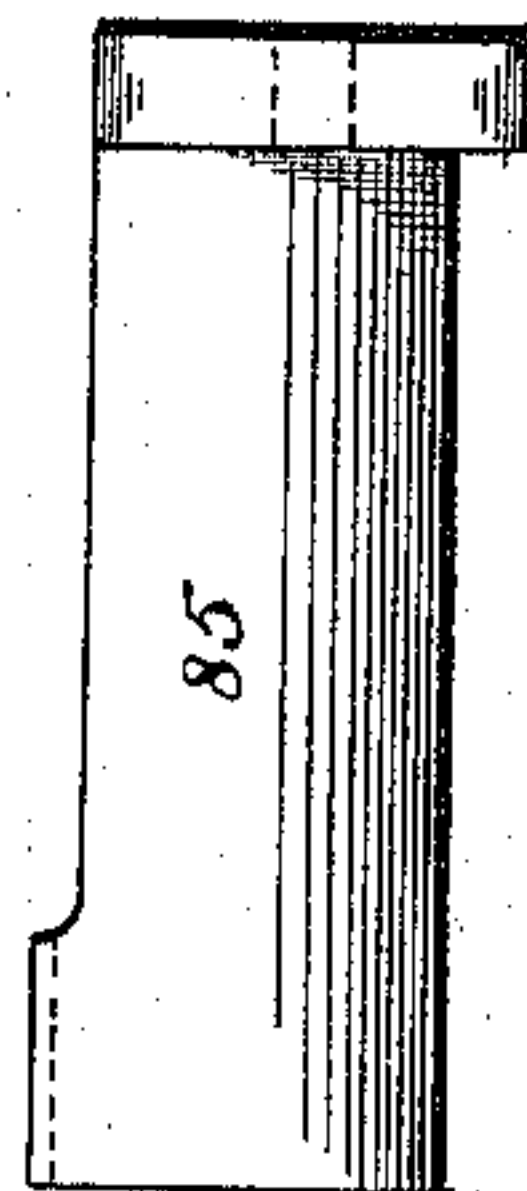
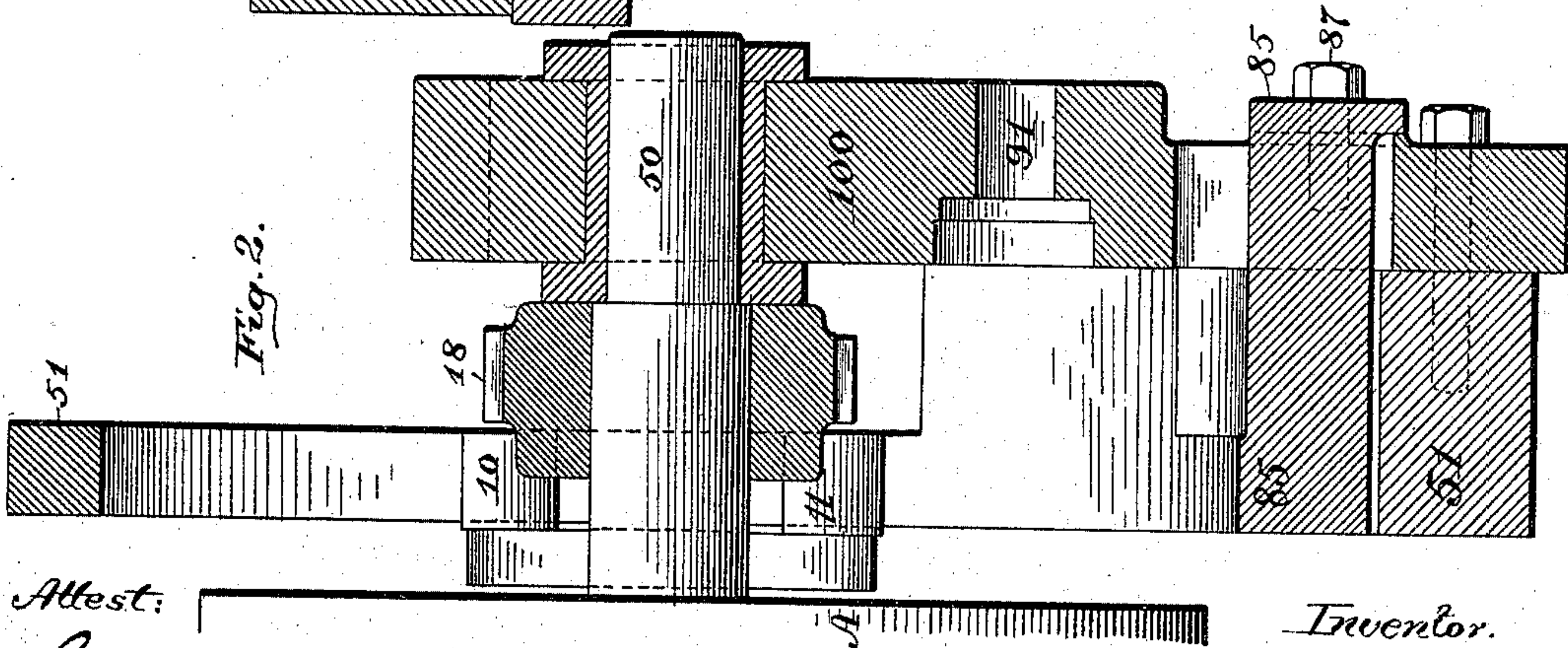
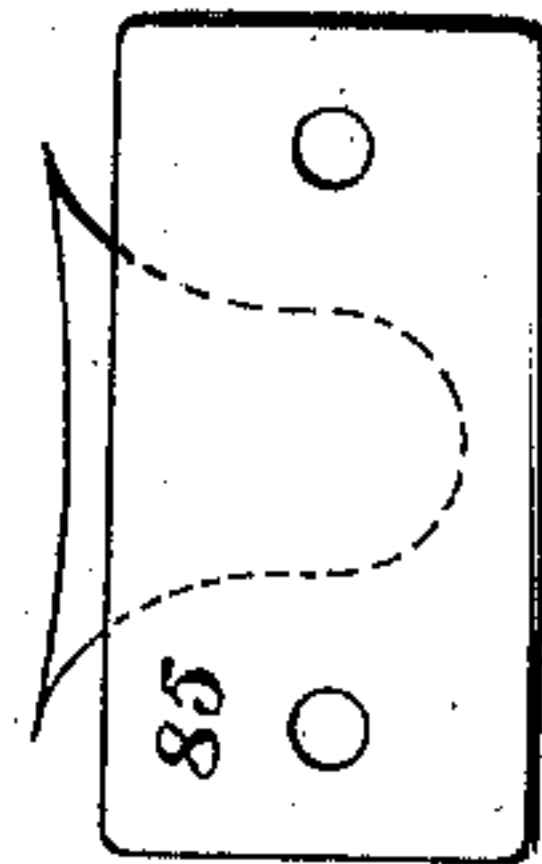


Fig. 6.



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4 Sheets—Sheet 3.

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Fig. 7.

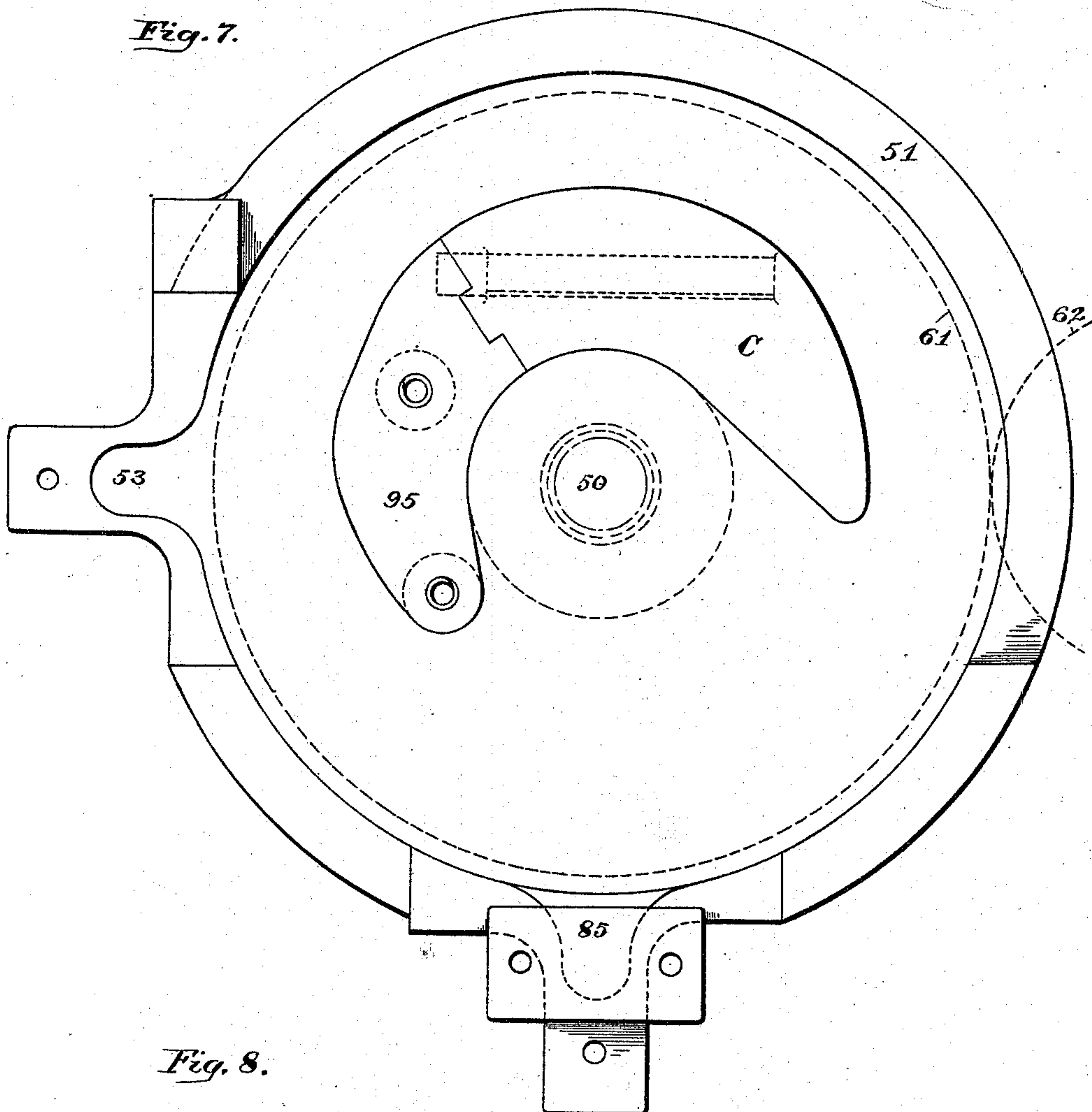
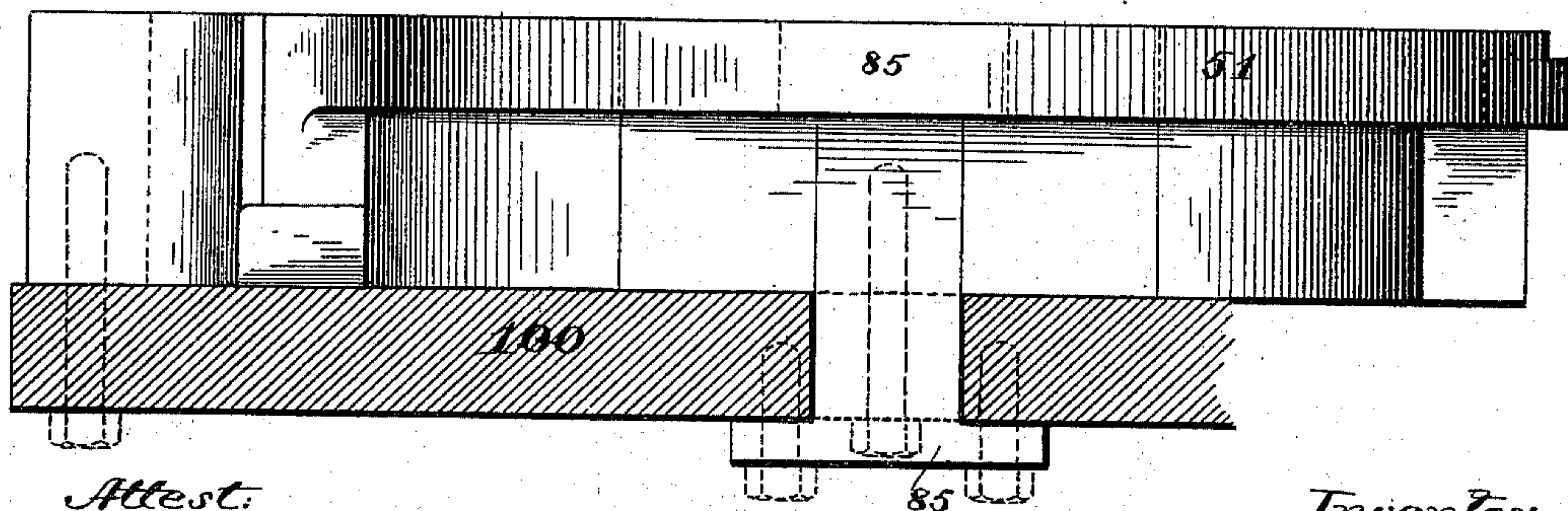


Fig. 8.



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4 Sheets—Sheet 4.

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Fig. 11.

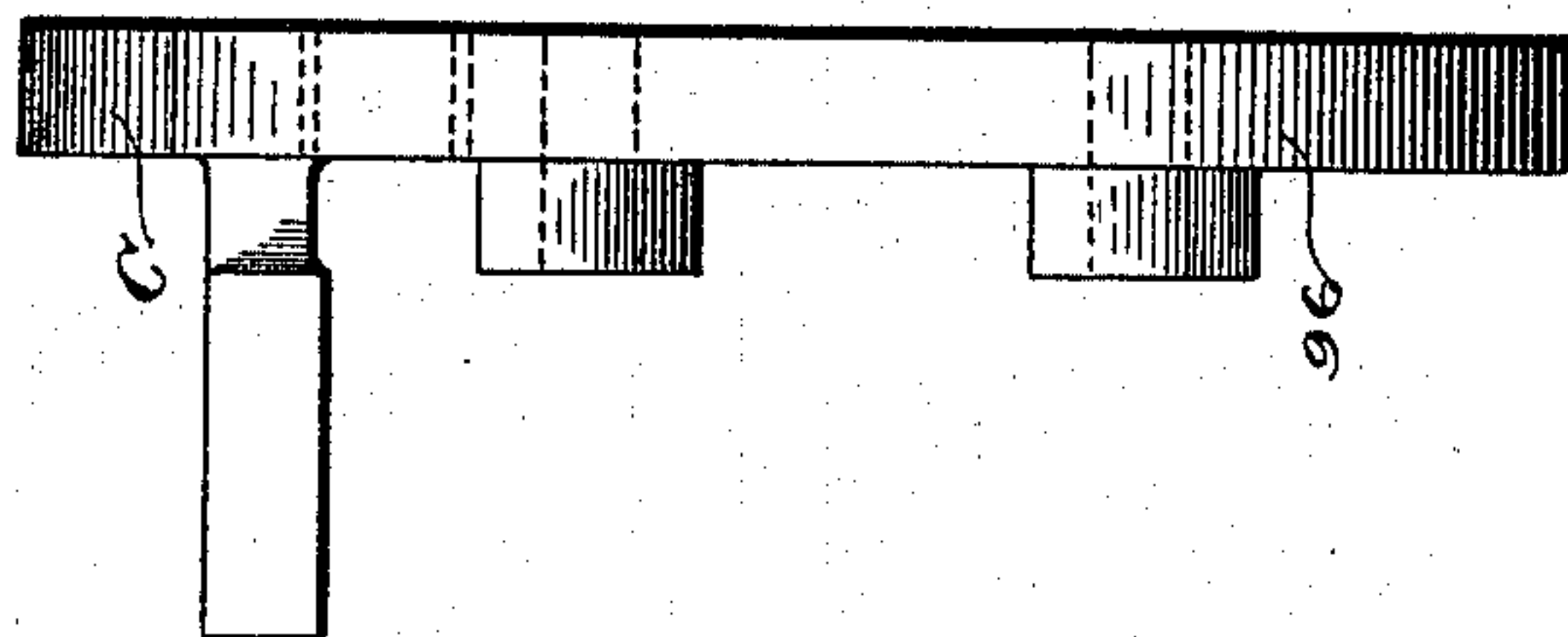


Fig. 10.

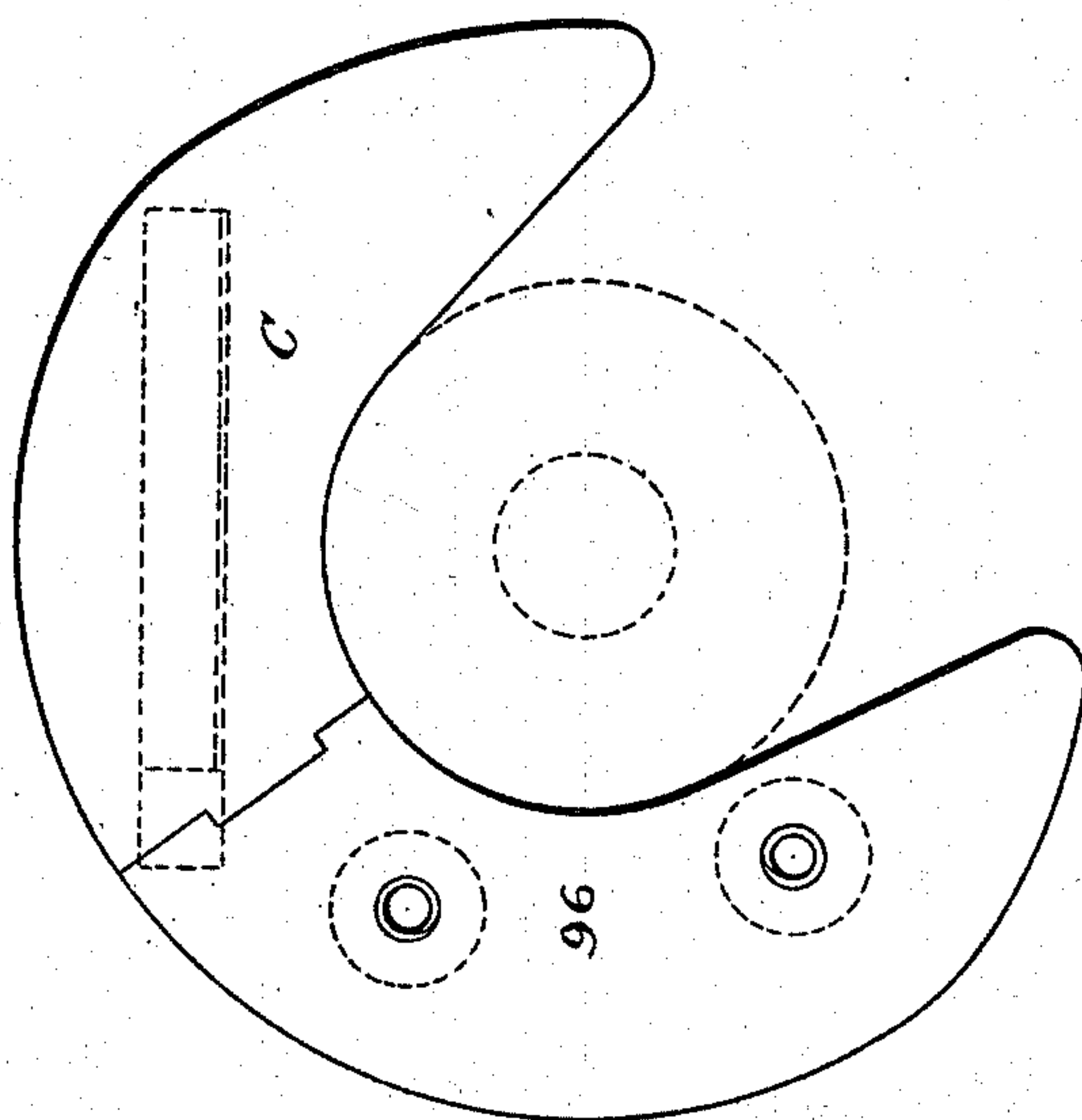
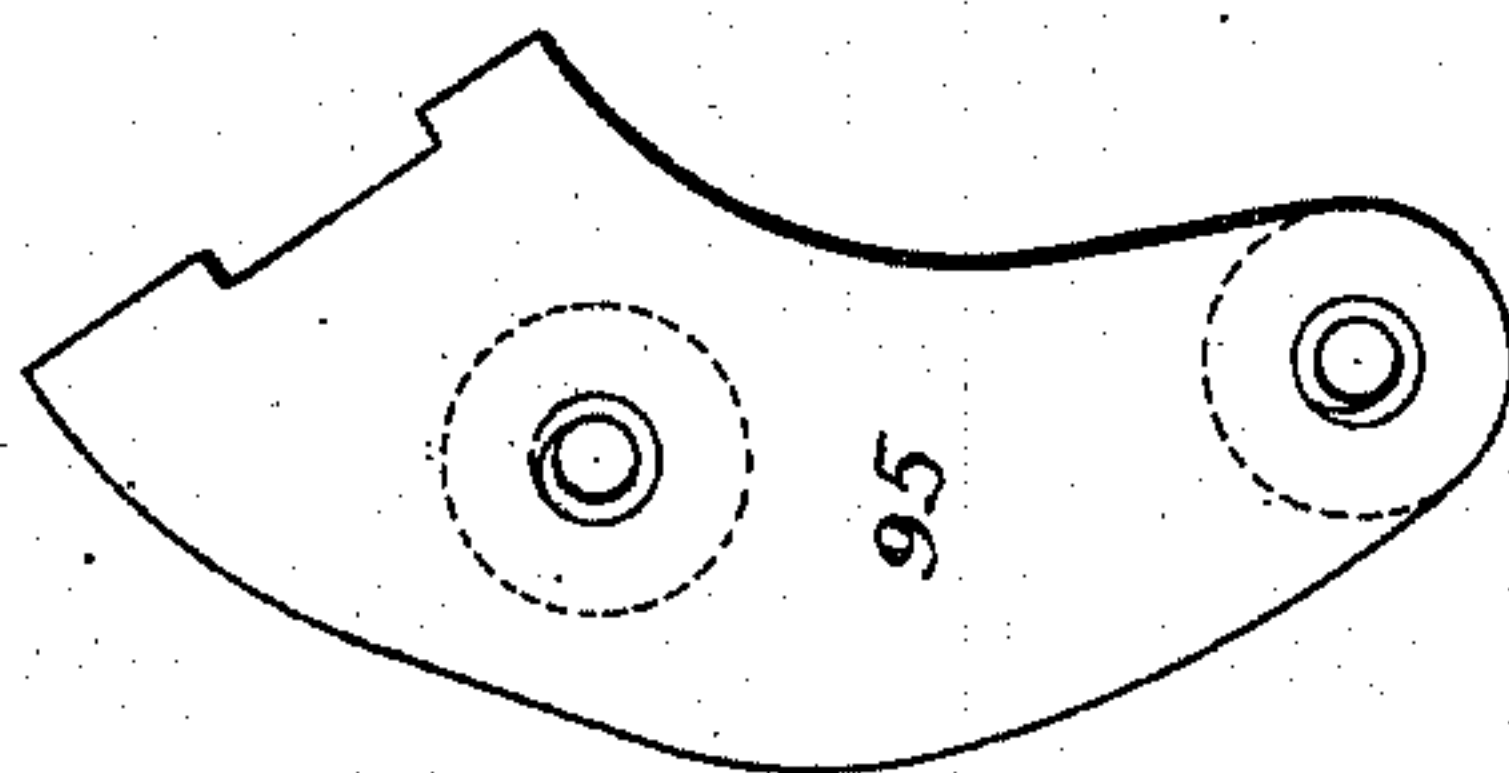


Fig. 9.



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UNITED STATES PATENT OFFICE.

THOMAS M. NORTH, OF BROOKLYN, NEW YORK, ASSIGNOR TO ROBERT HOE, THEODORE H. MEAD, AND CHARLES W. CARPENTER, OF NEW YORK, N. Y.

ROTARY FOLDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 573,348, dated December 15, 1896.

Application filed April 25, 1895. Serial No. 547,090. (No model.)

To all whom it may concern:

Be it known that I, THOMAS M. NORTH, a subject of the Queen of Great Britain, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Rotating Folding Mechanism, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to improvements in rotary folding-machines, such as constitute in part the delivery mechanism for printing-machines, in which a printed web is divided transversely into sheets which are transversely folded for delivery. In such delivery mechanisms the primary transverse fold is usually made to double the sheet into a product suitable for counter sale or bulk delivery, but where it is desired to reduce the size of the product to that suitable for mailing it is necessary to further fold the product.

The object to be attained is the direct conveyance of the sheet from the point where the primary transverse fold is imparted to it to the final delivery without further folding or to the mail-folder for one or more additional folds, reducing its size for mailing purposes, as may be required; and to that end the invention consists in providing the rotary folding-machine with means whereby its folding-blade is made to perform the folding operation to produce transverse folds in the printed sheet at either one of two sets of folding-rollers by novel combinations of devices too specifically hereinafter explained and pointed out in the claims to need preliminary description.

A practical embodiment of the invention is illustrated in the accompanying drawings, wherein—

Figure 1 is an end elevation of an apparatus embodying these improvements. Fig. 2 is an elevation of the same as seen on the section-line 2 of Fig. 1, looking in the direction pointed by the arrow-head. Fig. 3 is a plan view of the same as seen on the section-line 3 of Fig. 1, looking in the direction pointed by the arrow-head. Fig. 4 is a side elevation at the gear end thereof of a portion of the ap-

paratus, showing more particularly the position of the pin-operating cam. Figs. 5 and 6 are respectively side and end elevations of the pathway-closing block. Fig. 7 is an elevation of the folding-blade guide and of the pin-operating cam, showing their relation to each other. Fig. 8 is a plan view of the folding-blade guide. Fig. 9 is an elevation of interchangeable part of pin-operating cam. Fig. 10 shows the pin-operating cam complete. Fig. 11 is a side elevation of Fig. 10.

In its general features the rotary folding apparatus illustrated does not differ from the ordinary construction of such folder. Thus in a general sense a rotating folding-blade carried in a circular path by a carrier, as a cylinder, is projected so as to enter between a pair of revolving folding-rollers and be withdrawn therefrom, operating, during such movement, with respect to the folding-rollers to double the paper led over these rollers into their nip, which rollers carry the folded sheet outward.

In the illustration the folding-blade carrier or cylinder A rotates upon a shaft 50 and supports at opposite points hung on shafts 20 30 double folding-blades, as 3 4 and 5 6, said folding-blades being provided with rock-arms whose bowls 10 11 and 12 13 travel in contact with the inner periphery of the guard 51 while maintained in inoperative position and enter a recess or socket therein, as 52 53, when a blade is being projected between the folding-rollers, their entry into the recess or socket 52 or 53 being caused by contact of their rock-arms with flying cams, as 14 or 15, which cams are carried by a wheel 17, that is mounted upon a stud or short shaft 16 and arranged so as to be constantly meshed with a driving-wheel 18, fast upon the cylinder-shaft 50, all of which construction and operation are shown and described in Patent No. 197,693, to which reference is made for a more particular description thereof. This carrier A, in addition to supporting the rotary folding-blades, is provided with cutting-slots 19 22, with which coöperates a cutting-blade 21, that is supported by a companion carrier B of half the size of the carrier A and caused to run at a uniform surface speed

therewith by being geared to the same by means of wheels 61 62, only one, 61, of which is shown in full lines. (See Figs. 4 and 7.)

The carrier A furthermore supports sheet-carrying pins 1 2, mounted at opposite points therein and reciprocated to protrude or be withdrawn by means of rock-shafts 31 39 and rock-arms 32 33, which latter are moved by a stationary cam C.

It will now be understood that a web of material, as W, emerging from any source, as a printing-machine, or threaded through feeding-rollers, as 40 41, and led therefrom to and between the carriers A B will, as the cutting-blade 21 and cutting-slot, as 22, are brought into coöperation, be severed transversely, the leading end of the web thus freed being then impaled upon the pins, as 1, which are always protruded for this purpose in approaching the cylinder B. The leading end of the web thus held by the pins 1 will be carried onward upon the surface of the carrier A until a suitable point is reached, when the cam C will so rock the pin-shaft 39 as to withdraw the pins 1 and release the leading end of the web. This action of the pins will be about simultaneous with that of the cutter 21 and cutting-slot 19, at which time the leading one, say 4, of the rotating folding-blades will be projected between the revolving folding-rollers, say 60 70, and a sheet be thus doubled or folded off from the carrier A and carried therefrom by the said rollers for further manipulation. The semirotation of the rotating folding-blade 4 in performing this folding operation is accomplished by means of a flying cam, as 14 or 15, so moving with respect to the approach of the bowl 11 on the rock-arm of the said rotating folding-blade as to form an outwardly-curving pathway for the same between one side of the cam and the adjacent wall of the socket 52 in the guard 51, as the bowl enters this socket, and a like curving pathway for it between the other side of the cam and adjacent wall of the guard 51, as the bowl leaves said socket, all of which is explained in the patent above referred to.

The double folding-blades 3 4 and 5 6 may each operate at the folding-rollers 60 70 or at the folding-rollers 80 90 by the following means: The wheel 17 for rotating the flying cam 14 or 15, according as the cam is single or double, is mounted on a short shaft 16 by means of a sleeve which enables it to turn between shoulders on said shaft, which shaft 16 is capable of movement in a curved guideway 91, (see Figs. 1 and 2,) in which said wheel 17 and the flying cam or cams which it carries may, while the wheel 17 and its driver 18 remain in constant gear, be swung from the position of adjustment shown in Fig. 1, where the shafts 16 and 30 are alined with the shaft 50 and a point equidistant from the shafts of the rollers 80 90 to a similar position of adjustment with respect to the shafts of the rollers 60 70, in either of which positions of adjustment the parts are secured

by means of the screw-threaded outer end of the shaft 16 and the jam-nut 93.

When the parts are adjusted in the positions shown in Fig. 1, it is obvious that the point at which the sheet-holding pins must be withdrawn from the sheet, so as to release the same to be properly folded through the rollers 80 90, must be provided for at a different point from that at which the same operation is performed when the folding is done through the rollers 60 70. To provide for this, the pin-cam C (shown in dotted lines in Fig. 1 and in full lines in Figs. 7 and 10) is constructed with a removable portion, so that interchangeable parts, as 95 96, (see Figs. 9 and 10,) may be adjusted for use, according as the pins are to be withdrawn to release the sheet in coöperation with the folding-blade while performing the folding operation through the rollers 80 90 or 60 70. Thus if the folding operation is to be performed with the rollers 80 90, as in Fig. 1, the pin-cam C will have its part 95 adjusted in place, as shown in Fig. 7, the same being held to the framework by means of bolts 65 66. (See Fig. 4.) Thus arranged the bowl 32 or 33 on the rock-arm of the pin-shaft will be moved outward at the proper time to withdraw the pins and release the leading end of the sheet as the central portion or fold-line thereof is in proper position to be doubled through the rollers 80 90, which pins having thus been withdrawn will again be protruded as said bowl runs onto the low part of said cam as the cutting-point is approached. When, however, the folding operation is to be carried on through the rollers 60 70, the pin-cam C will have the larger interchangeable part 96 (shown in Fig. 10) attached in lieu of the part 95 by the same means, namely, the screw-bolts 65 66, whereupon the bowl 32 or 33 of the rock-arm for vibrating the pin-shaft will engage the cam C at such a point with relation to said rollers 60 70 as to withdraw the pins and release the leading end of the sheet at the proper time to admit of the same being properly folded between said rollers 60 70, the pins being protruded to engage the severed end of the web as their rock-shaft bowl passes onto the low part of said cam C, as before described.

It is obvious that when the folding operation is to be carried on at the rollers 80 90 the socket 52, into which the bowls of the rock-arms of the rotary folding-blades enter during the folding operation at that point, should, in order that the folding-blade may not be turned out uselessly at that point, be provided with a guide stop-block 85, which shall form a continuation of the inner guiding-periphery of the guard 51. This guide stop-block 85 is illustrated in Figs. 5 and 6 as detached and in Figs. 1, 2, 7, and 8 as in place. It is fixed in place by means of screws 86 87, so that its upper curved face coincides with the arc of curvature of the inner periphery of the guard 51, and thus forms therewith a

smooth pathway for the rock-arms of the rotary folding-blades past the folding-rollers 60 70, and when the folding operation is to be performed at the rollers 60 70 this guide stop-block 85 will be adjusted in like relation in respect of the rollers 80 90 as the screw-holes in corresponding position with relation to said rollers for the screws 86 87 indicate.

10 What, therefore, is claimed is—

1. In combination with a rotating carrier, a rotating folding-blade supported thereby, and two sets of folding-rollers with which said blade may coöperate, of a rotating cam for projecting said blade between the rollers, a wheel, as 17, for rotating the cam, a driving-wheel 18 therefor, and a guideway 91, in which the shaft of the wheel 17 may be adjusted,

without disconnecting the wheels 17, 18, so as to cause the blade to operate at one or the other of the two sets of rollers, substantially as described. 20

2. In combination with a guard 51 and its sockets 52, 53 of a rotating folding-blade, two sets of folding-rollers, a rotating cam for projecting the said blade between one or the other of said sets of rollers, and a removable adjustable stop-block, as 85, for closing the unused socket, substantially as described. 25

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses. 30

THOMAS M. NORTH.

Witnesses:

F. W. H. CRANE,
E. L. SPEIR.