G. F. GEB.

CARDING MECHANISM.

APPLICATION FILED APR. 23, 1904.

978,998.

Patented Dec. 20, 1910.

5 SHEETS—SHEET 1.

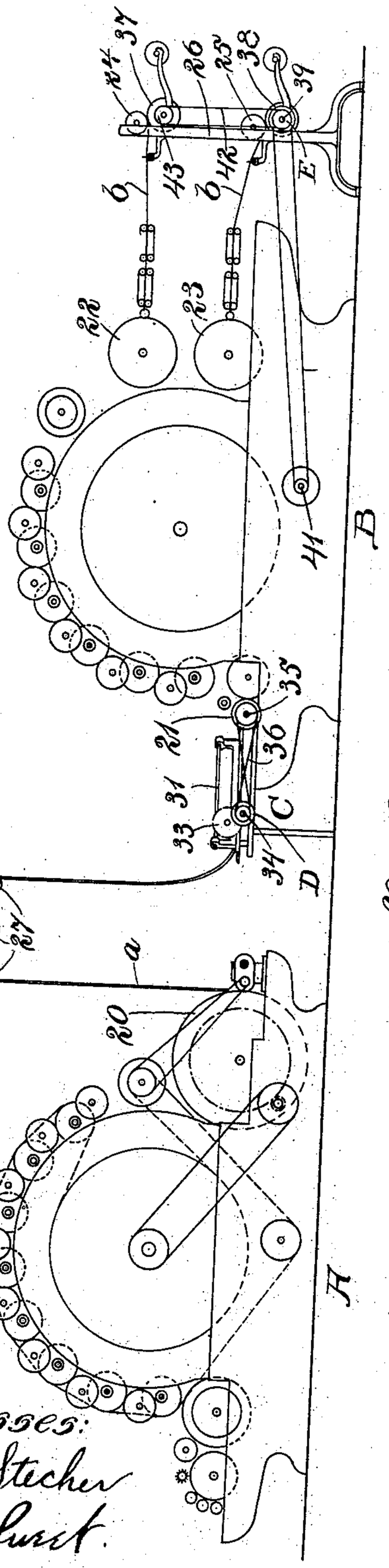
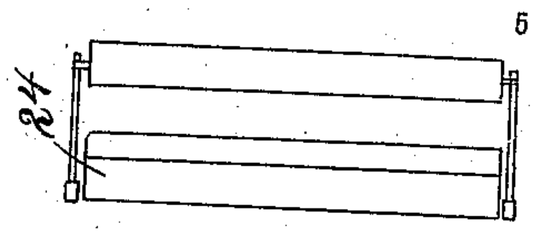


Fig. 1.



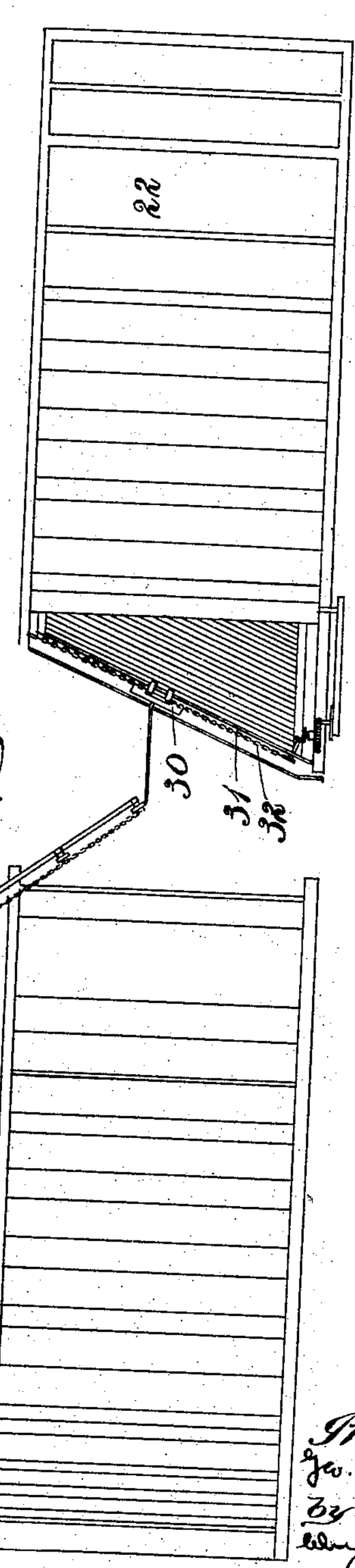


Fig. 2.

Witnesses:
C. C. Stecher
F. D. Lust.

Inventor.
Geo. F. Geb
by
Wright Brown Quinby
Attorneys.

G. F. GEB.

CARDING MECHANISM.

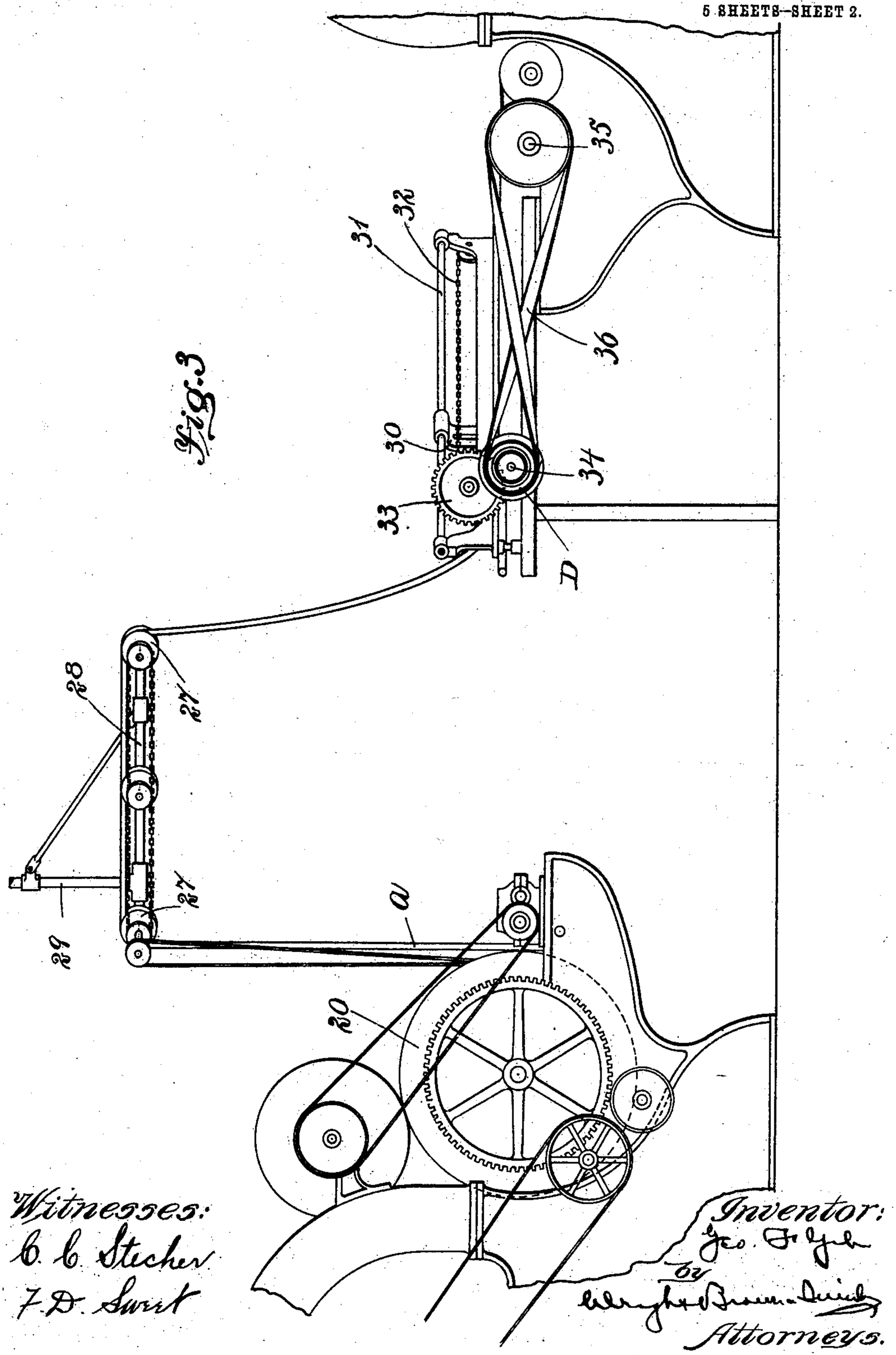
APPLICATION FILED APR. 23, 1904.

978,998.

Patented Dec. 20, 1910.

5 SHEETS—SHEET 2.

Fig. 3



Witnesses:
C. C. Stecher
F. D. Lurie

Inventor:
Geo. F. Geb
by
Albright & Brown-Smith
Attorneys.

G. F. GEB.

CARDING MECHANISM.

APPLICATION FILED APR. 23, 1904.

978,998.

Patented Dec. 20, 1910.

5 SHEETS—SHEET 3.

Fig. 5

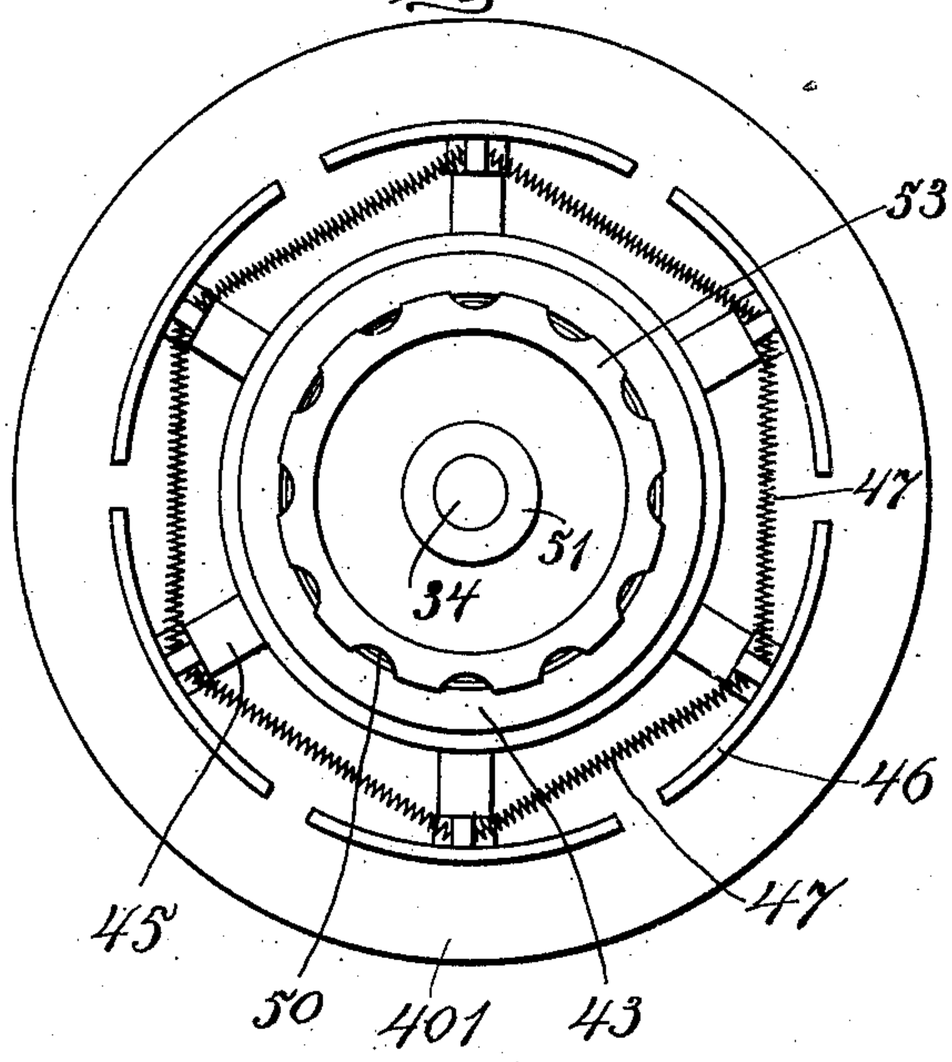


Fig. 6

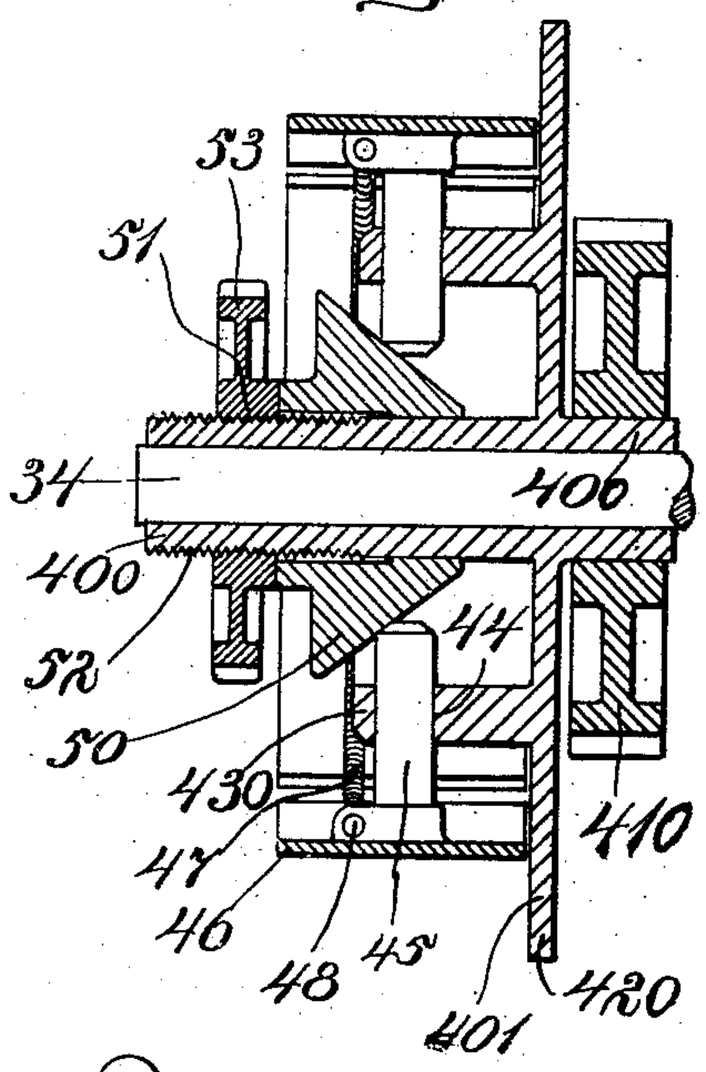
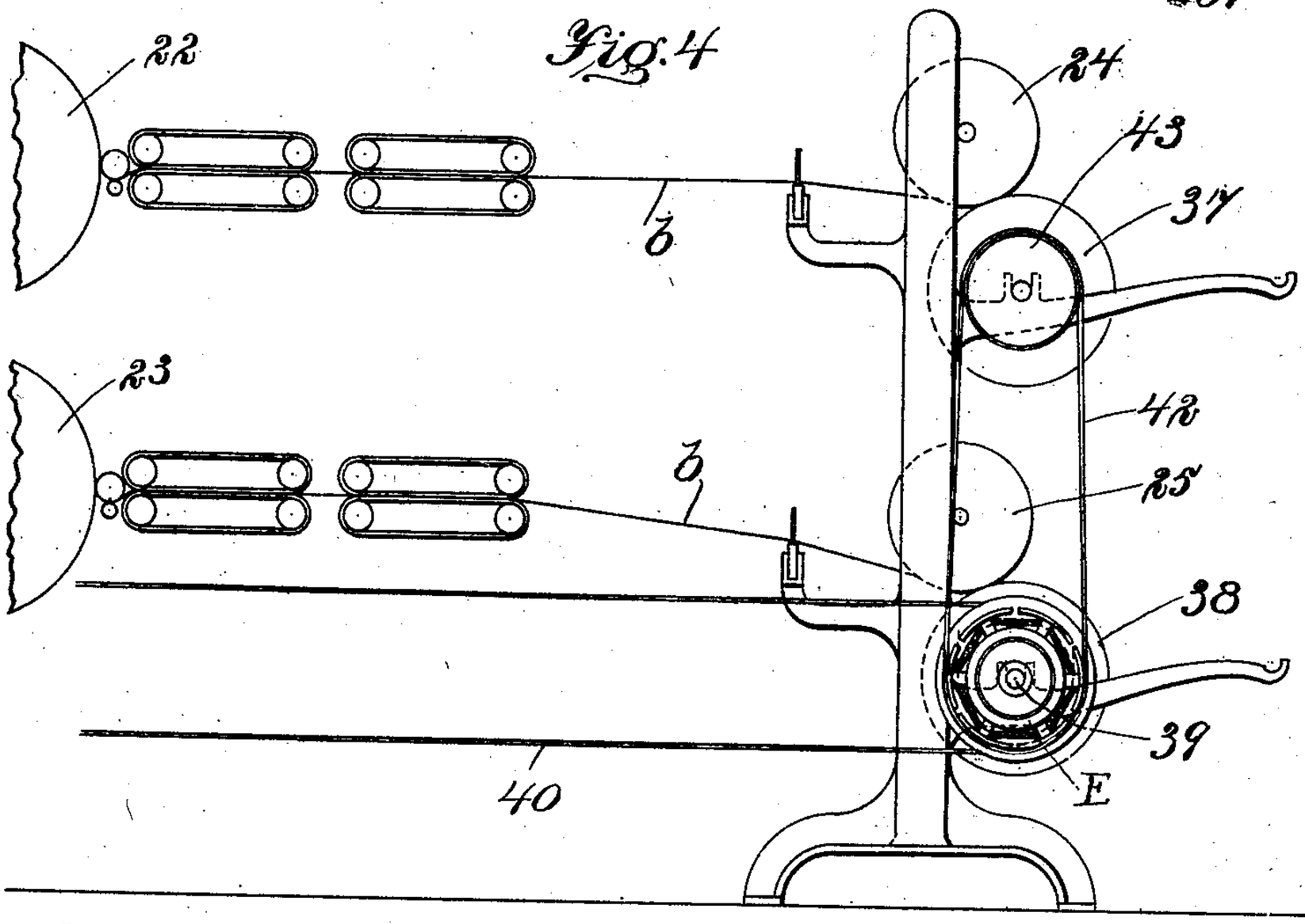


Fig. 4



Witnesses:

C. C. Stocker

F. D. Sweet

Inventor:

Geo. F. Geb

by

Albright Brown & Albright

his Attorneys.

G. F. GEB.

CARDING MECHANISM.

APPLICATION FILED APR. 23, 1904.

978,998.

Patented Dec. 20, 1910.

5 SHEETS—SHEET 4.

Fig. 7

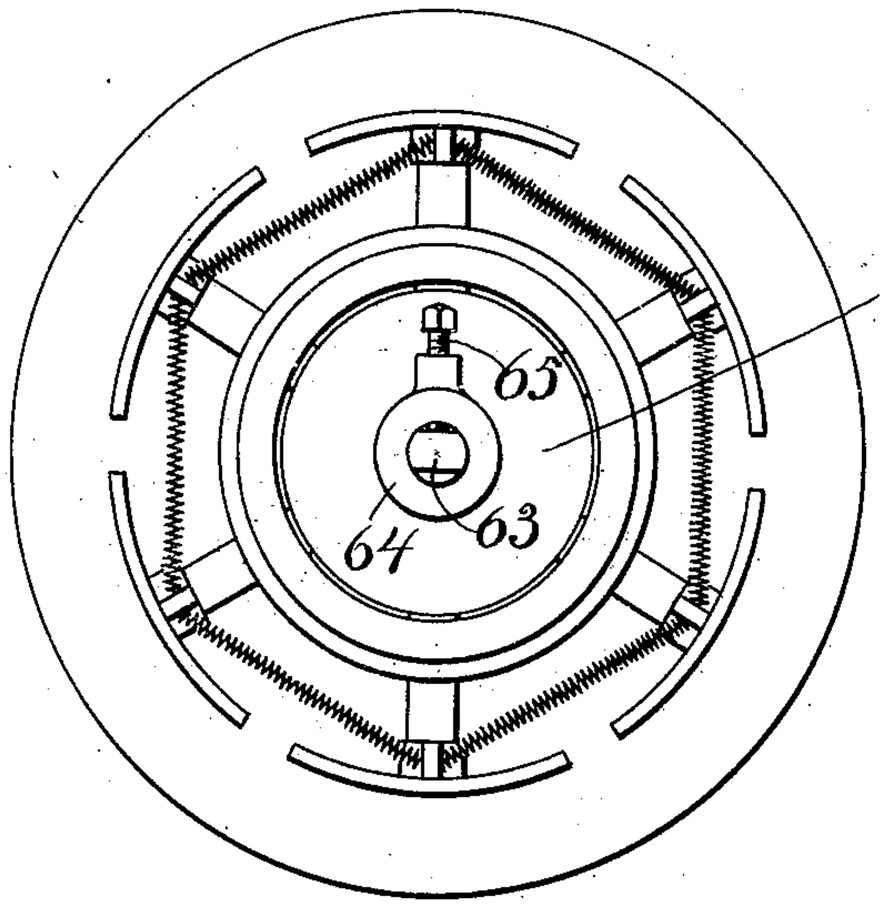


Fig. 8

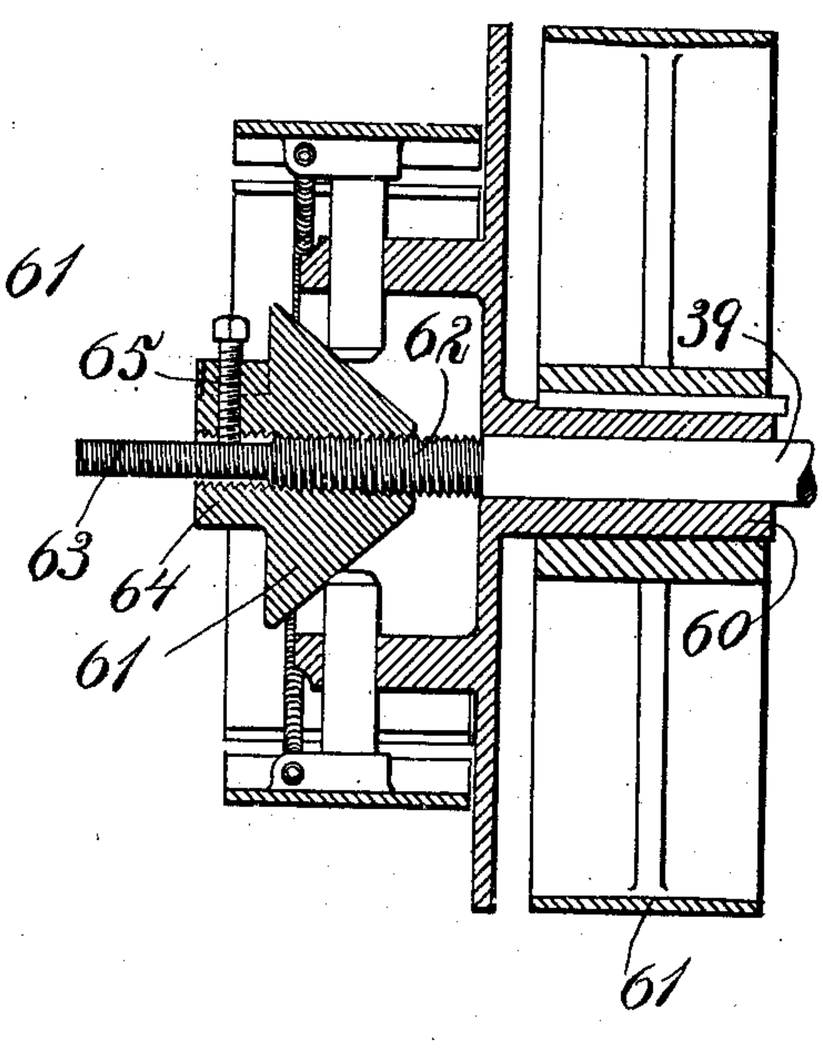


Fig. 9

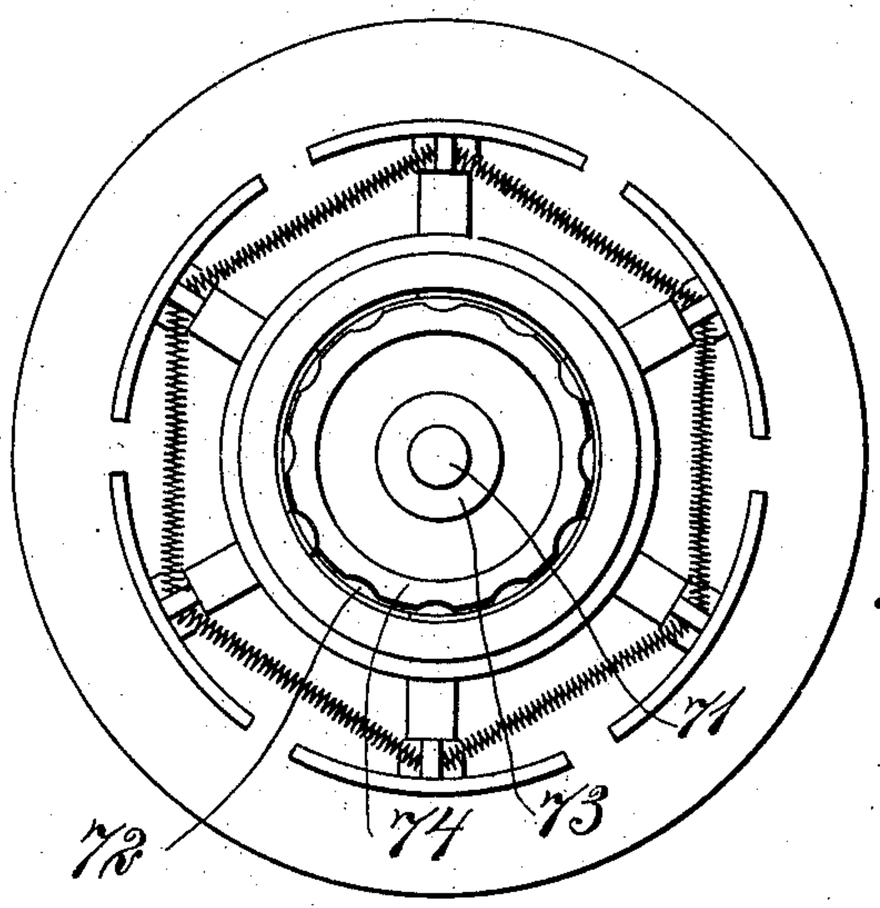
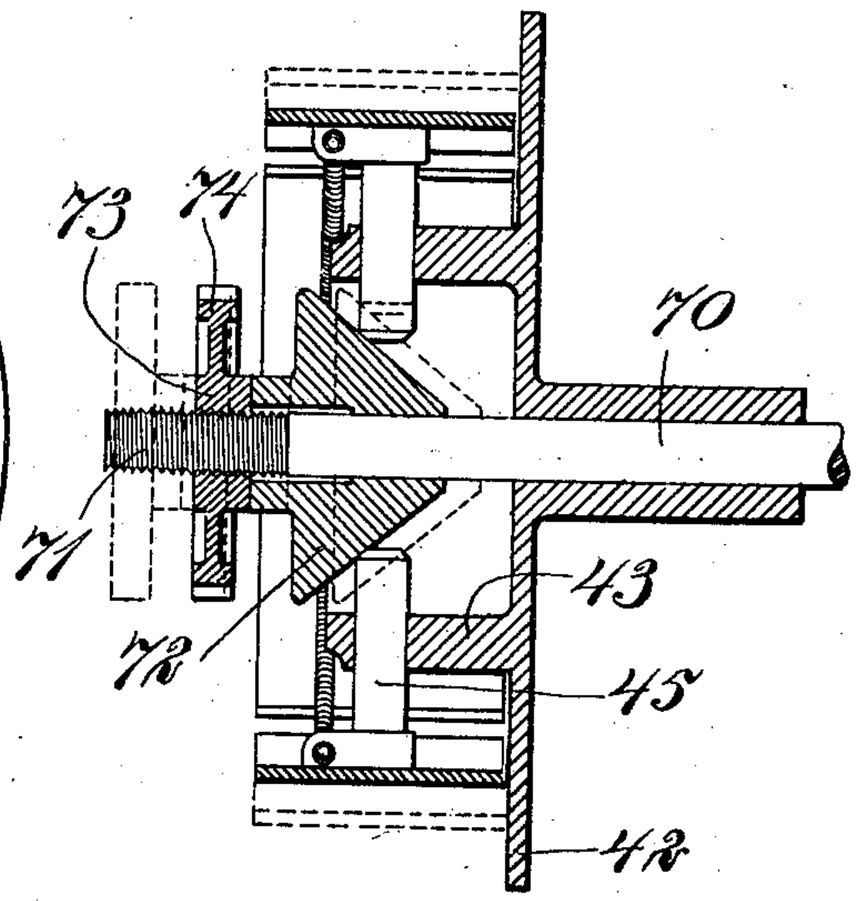


Fig. 10



Witnesses:
C. C. Stecher
F. D. Sweet

Inventor:
Geo. F. Geb
by
Langhor Brown Dunn
Attorneys:

G. F. GEB.

CARDING MECHANISM.

APPLICATION FILED APR. 23, 1904.

978,998.

Patented Dec. 20, 1910.

5 SHEETS—SHEET 5.

Fig. 12.

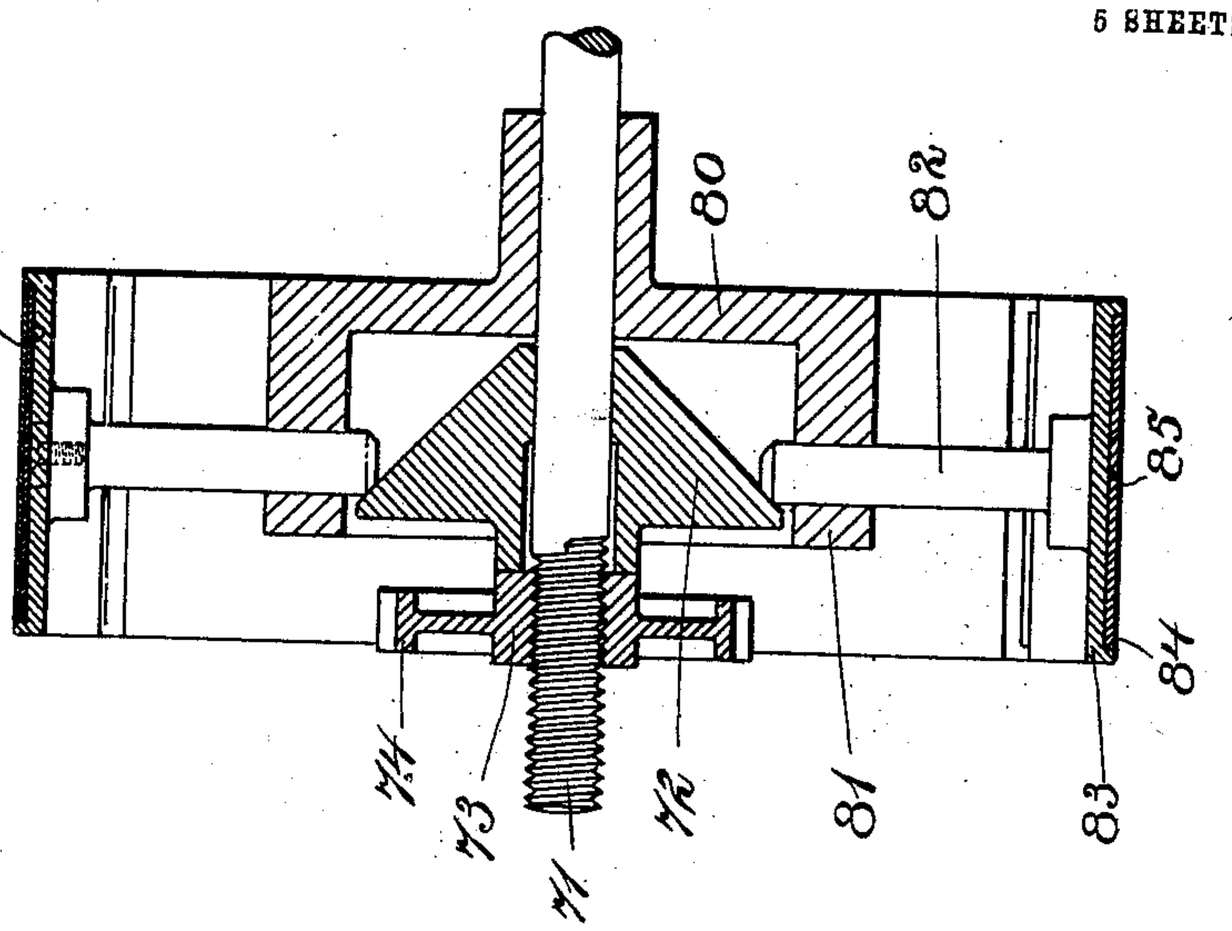
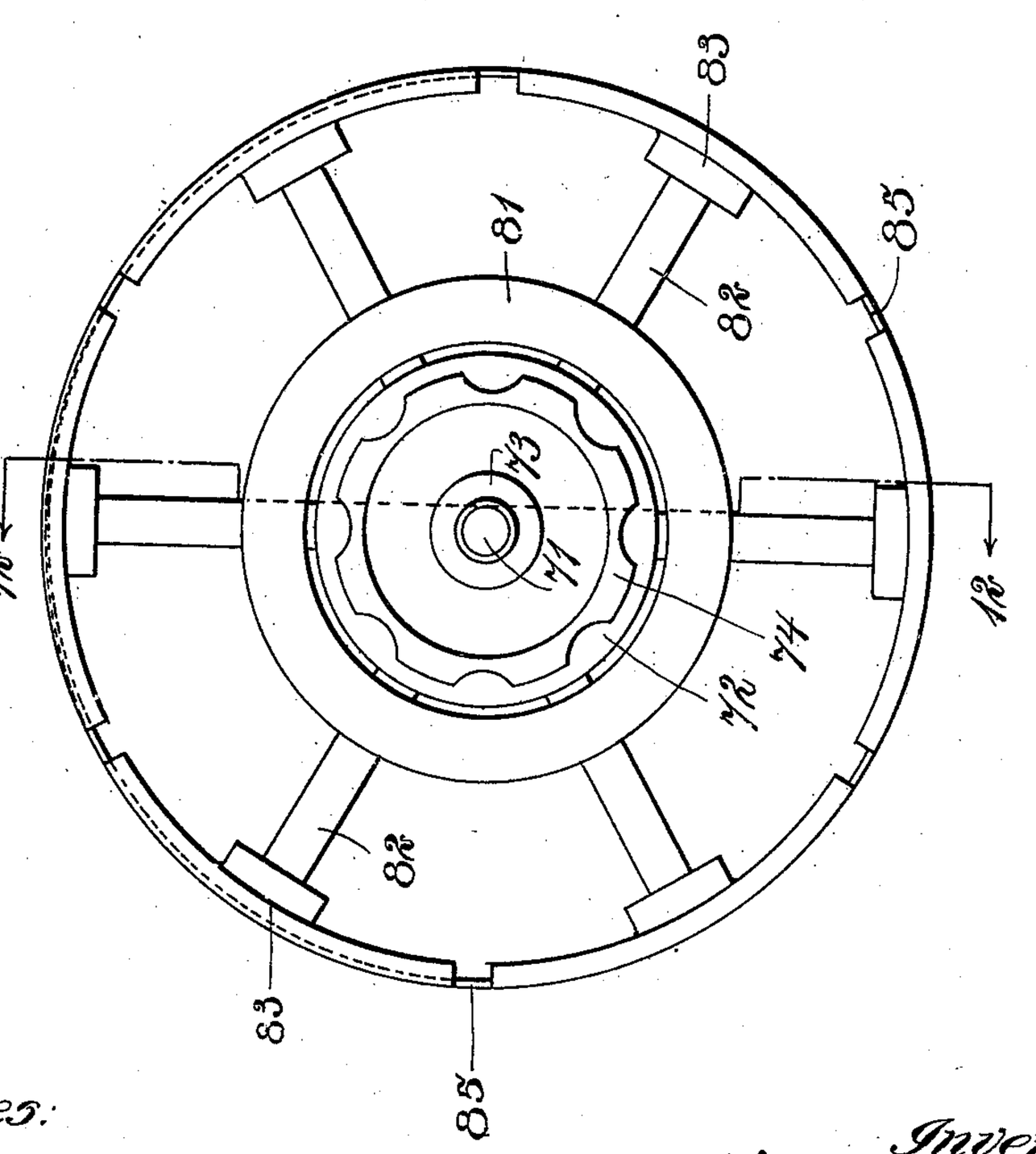


Fig. 11.



Witnesses:

C. C. Stocker

F. D. Sweet

Inventor.

Geo. F. Geb

by

Dough & Brown, Cumby

his Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE F. GEB, OF FRANKLIN, MASSACHUSETTS.

CARDING MECHANISM.

978,998. Specification of Letters Patent. **Patented Dec. 20, 1910.**

Application filed April 23, 1904. Serial No. 204,591.

To all whom it may concern:

Be it known that I, GEORGE F. GEB, of Franklin, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Carding Mechanism, of which the following is a specification.

This invention has relation primarily to carding machinery.

In the carding operation, the drawing passes from a second breaker, so-called, to the finisher, and is delivered to the licker-in by a feeding attachment which lays the drawing in zigzag courses upon a traveling apron. The finishing card is provided with two doffers which receive the fiber from the main cylinder and deliver it to the condenser or rub-apron, from which it is finally delivered to spools.

It is difficult to so operate the second breaker and the finisher that the drawing will be delivered to the feeding attachment exactly as it is needed. In some instances, the drawing is delivered at such a rapid rate to the feeder that it loops down upon the floor and as it is more or less twisted, it consequently doubles, twists and breaks. On the other hand, the speed of the second finisher and the feeder is oftentimes such that the drawing is not delivered to the feeder as rapidly as it is needed, with the result that it becomes strained and broken. This over-supply or under-supply of the drawing to the feeder, is not due to a difference in the speed of running of the two cards, but is due to the variations in the nature of the stock and the fineness of the yarn. Again, in the finisher there is a differential delivery of the roving or drawing from the two doffers to the winding-spools. This likewise is due to a difference in the nature of the stock or in the fineness of the yarn. For instance, to explain, where a coarser grade of stock is delivered from the finisher, the roving or drawing from the top doffer becomes heavier than the roving from the bottom doffer, and vice versa, if a finer grade of stock is passed through the finisher, the roving or drawing from the top doffer is lighter than the roving or drawing from the bottom doffer.

Now the object of the invention is to provide the feeder for the finisher with means adapted to be manually controlled by the operator for varying the speed of the feeder-carriage so that the drawing may be laid upon the apron in proportion as it is delivered from the second breaker so as to prevent the drawing from either looping or being drawn too taut; and it has further for its object to provide instrumentalities by means of which a differential rotation of the upper spool-drum of the finisher may be effected so as to compensate for variations in the thickness or fineness of the roving or drawing as it is delivered from the doffer. These instrumentalities serve to produce a unitary result,—that is to say, they serve to enable the manufacturer to so adjust the machine for each batch of stock that is passed through the cards that it is delivered without becoming broken or wasted, and without stopping the machine.

Referring to the accompanying drawings,—Figure 1 represents a side elevation, and partially diagrammatically, two carding machines, to wit,—the second breaker and the finisher set in operative relation. Fig. 2 represents a plan view of the same. Fig. 3 represents an enlarged view of the adjacent ends of the second breaker and the finisher and illustrates the means for delivering the drawing from the said second breaker to the said finisher. Fig. 4 represents the drum-driven spools for receiving the rovings or drawings from the condensers which are located at the delivery end of the finisher. Fig. 5 represents in front elevation one form of instrumentality for securing a differential speed of the feeder for the finisher and of the top drum which drives the spool on which the roving or drawing is wound from the upper doffer. Fig. 6 represents a longitudinal section through the instrumentality illustrated in Fig. 5. Figs. 7 and 8 illustrate respectively in front elevation and in section another form of expanding pulley which may be used in lieu of that shown in Figs. 5 and 6. Figs. 9 and 10 illustrate still another form which may be employed, the difference between the last two forms being chiefly in the method of adjusting the cone. Figs. 11 and 12 illustrate still another form of expanding pulley which may be used in lieu of those shown in Figs. 5 to 10, inclusive.

Referring to the drawings, and particularly to Figs. 1 and 2,—A indicates a carding machine which is known as the "second breaker," and B indicates another carding machine in operative relation thereto, which is termed the "finisher." The drawing *a*

is conducted from the doffer 20 of the second breaker to the licker-in 21 of the finisher, and the rovings *b b* are conducted from the upper and lower doffers 22 23 of the finisher to the spools 24 25 on the spool-stand 26 adjacent the delivery end of the finisher. It will be understood that the second breaker A is equipped with the usual cylinder workers, strippers and "fancies," so that the yarn is delivered from the doffer 20 in a thick drawing, being combed off from the doffer in the usual way. This drawing *a* is carried up and over pulleys 27 on an arm 28 which is suspended by a rod 29 in the usual way. The arm 28 is adapted to swing around the axis of the rod 29 so as to follow the feeding carriage.

The feeding mechanism is indicated as a whole at C. This may consist of the ordinary Apperly feeder, which as shown in Fig. 2, is provided with the carriage 30 reciprocated along the guide-rod 31 by an endless chain 32. This carriage is provided with the usual drawing-in rolls (not shown) so that as it reciprocates, it lays the drawing in zigzag courses upon an apron as shown in Fig. 2. The chain-actuator 32 is driven from a gear 33 which is in turn actuated from a shaft 34. Usually said shaft 34 is driven from the licker-in shaft 35 by means of either a crossed or straight belt 36 so that the feeder-carriage will move at a certain speed with relation to the speed of rotation of the licker-in shaft.

Referring now to Fig. 4, in connection with Fig. 1, it will be seen that the spools 24 25 for the rovings or drawings *c c* are rotated by drums 37 38 respectively. The shaft 39 for the drum 38 is driven by a belt 40 from a shaft 41 which may form a part of the condenser of the finisher. The drum 37 is driven from the shaft 39 by a belt 42, a pulley 43 attached to the said drum 37, and a pulley on the said shaft 39.

The mechanism as thus far explained does not differ from the carding mechanism heretofore employed. In accordance with my invention, however, I interpose between the belt 36 and the shaft 34 in Fig. 3, and between the shaft 39 and the belt 42 in Fig. 4, an expanding pulley which may be manually adjusted by the operator for the purpose of effecting a differential movement of the feeder-carriage, and a differential rotation of the upper drum for the purposes hereinbefore stated. Owing to the fact that the expanding pulley may be manually controlled by the operator while the entire mechanism is in operation, the strand of yarn can be delivered to the carding machine in proportion as it is received or taken up thereby. In other words, the exact relation between the delivery of the yarn by the Apperly feeder and its taking up by the card may be accurately determined.

It is evident that any suitable form of expanding pulley may be utilized for this purpose, and I have shown and will describe several which may be employed.

In Figs. 5 and 6 is shown an expanding pulley which may be utilized for the feeder mechanism. The pulley itself is indicated in Fig. 3 and in Fig. 1 at D. In detail, it consists of a hub 400 upon which is secured the pinion 410 which intermeshes with and drives the gear 33 of the feeder. This hub is provided with a disk 420 and the said disk is formed with an annular rim 430 which encircles and is concentric with the hub 400. Projecting beyond the said flange is a peripheral flange 401. Into the said rim at regular distances are drilled radial apertures 44 to receive radial spokes 45. These spokes are all radially movable with respect to the hub 400. Each spoke consists of a cylindrical shank having upon its outer end a segment 46, all of the various segments approximating a circle as shown in Fig. 5. Each of the said segments is provided with parallel sides and the inner side of each segment is in close juxtaposition to the flange 401, whereby said segment is held against rotation so that it is free to slide radially with respect to said disk. The said spokes with their segment-shaped heads are all held inward by an endless helical spring 47 which is passed through eyes 48 formed in the spokes inside of the said heads. For the purpose of adjusting the segments and thereby effecting the expansion or contraction of the pulley a cone 50 is employed. In Figs. 5 and 6 this cone is illustrated as apertured to slide upon the hub 400 of the pulley, and is adjusted in position by a nut 51 with internal threads to engage threads 52 on the hub 400. The nut 51 is formed with a milled flange 53 to enable it to be rotated with convenience.

The employment of an expansion pulley such as just described for the belt 36 enables the operator by moving the segments 46 around which the said belt is passed, to either expand or contract the pulley, to vary the speed of the feeder-carriage so that the drawing will be properly laid upon the apron just as rapidly as it is received from the breaker. This requires a fine adjustment, and it happens frequently that an adjustment must be made a number of times in the course of a day in accordance with the character of the stock that is being carded. This is a thing that has never previously been accomplished in the carding of fibers, as it has been necessary for the operator to remove the belt 36 from the pulley and secure to the periphery of the pulley or remove therefrom fillets or pieces of belting to increase or decrease the size of the pulley, as the case may be. This previous method of adjustment necessitated the stopping of

the card with its consequent detriment to the work and loss of time and increased cost of production.

In Figs. 7 and 8 another form of expanding pulley is shown. This pulley is shown as being one which drives the upper drum 37 on the spool-stand. The hub 60 of the pulley is secured to the drum-shaft 39 and upon it is secured the belt-pulley 61 which is driven by the belt 40. This pulley, which is indicated as a whole at E, in Figs. 1 and 4, is substantially similar to that shown in Figs. 5 and 6, except that a different adjustment is provided for the cone 61. In this case the shaft 39 is threaded at its ends as at 62 and the cone is internally threaded to screw thereon. The extremity of the shaft 39 is flattened, as at 63, and the hub 64 of the cone has a set-screw 65 passed through it to engage the flattened portion of the shaft 39 after the cone is adjusted.

By the employment of the expansion pulley E the upper spool 24 may be driven either more rapidly or more slowly than the spool 25, in accordance with the character of the stock that is being put through the finisher.

The varying character of the stock that is passed through the finisher requires a variation in the speed of rotation of the upper doffer 22, this being accomplished by differential gearing. The operator, however, is able to quickly adjust the expansion-pulley E so as to drive the drum 37 at the proper speed with relation to the speed of the lower drum 38. Heretofore, it has been a very difficult matter to secure the fine adjustment of the parts to secure the rotation of the top-spool at exactly the right speed. The roving or drawing is practically untwisted, and is very tender so that it is liable to break if it is drawn too tightly, and yet on the other hand, if it is not wound with sufficient tension upon the spool, it does not deliver therefrom properly and makes imperfect yarn when the roving or drawing is subsequently spun.

In Figs. 9 and 10 an expansion-pulley is shown which may be utilized for either that at D or at E in Fig. 1. This pulley necessitates the threading of the non-rotary shaft 70 at its outer end as at 71. The cone 72 is loose upon the shaft, but is adjusted thereon by a nut 73 on the threaded end 71, said nut having the milled flange 74 to permit its easy rotation. In this case, the disk 420, flange 430 and spokes 45 all rotate with the cone 72 about the shaft 70, this being true of the corresponding parts of the pulley shown in Figs. 5 and 6. In Fig. 8, however, the said parts rotate relatively to the cone, since the latter is fast on the shaft 39. In Figs. 11 and 12, another form of pulley is illustrated. In this case, the flange 80 does not project beyond the rim 81. For the purpose, however, of preventing an independent rotation of the spokes 82, each segment 83 is grooved upon its outer face as at 84 for the reception of a flat circular spring 85 which encircles all of the segments and the ends of which may overlap as shown at the top of Fig. 12. This spring takes the place of that at 47 in Figs. 5 to 10, inclusive, and not only serves to hold the ends of the spokes against the cone, but also, as stated, prevents the rotation of the said spokes. It will be quite apparent that the pulley which I have thus described is simple in construction and may be manufactured at a relatively low cost. The spokes are easily adjusted in each case by moving the cone longitudinally. It is also apparent that in lieu of any of the pulleys which I have shown others may be employed for accomplishing the purposes of effecting a variation in speed of movement of the feeder carriage or of the speed of rotation of the principal spool. The speed of the top doffer is varied accordingly so as to make the roving or drawing of the same uniformity as the bottom roving, that is, the speed is varied from top to bottom, the bottom being the standard.

Having thus explained the nature of the invention, and described a way of constructing and using the same, although without attempting to set forth all of the forms in which it may be made, or all of the modes of its use, I declare that what I claim is:—

1. In mechanism of the character referred to, a finisher, a feeding mechanism therefor having a traveling carriage for delivering a strand of yarn, drums for rotating the spools which receive the rovings or drawings, independent means for varying the speed of the traveling carriage and independent means for varying the speed of rotation of one of said drums.

2. In carding machinery, the combination with an instrumentality for delivering a drawing or roving, an instrumentality for receiving and taking up said drawing or roving, a belt-driven pulley for actuating said second-mentioned instrumentality, and means for varying the speed of rotation of said pulley to vary the speed of said second-mentioned instrumentality whereby it disposes of the said drawing or roving in proportion as it is delivered by said delivering instrumentality.

In testimony whereof I have affixed my signature, in presence of two witnesses.

GEORGE F. GEB.

Witnesses:
JAMES E. DONAHUE,
WILLIAM KIRBY.