

No. 864,515.

PATENTED AUG. 27, 1907.

M. COLLINS.
CARDING ENGINE.

APPLICATION FILED JUNE 30, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

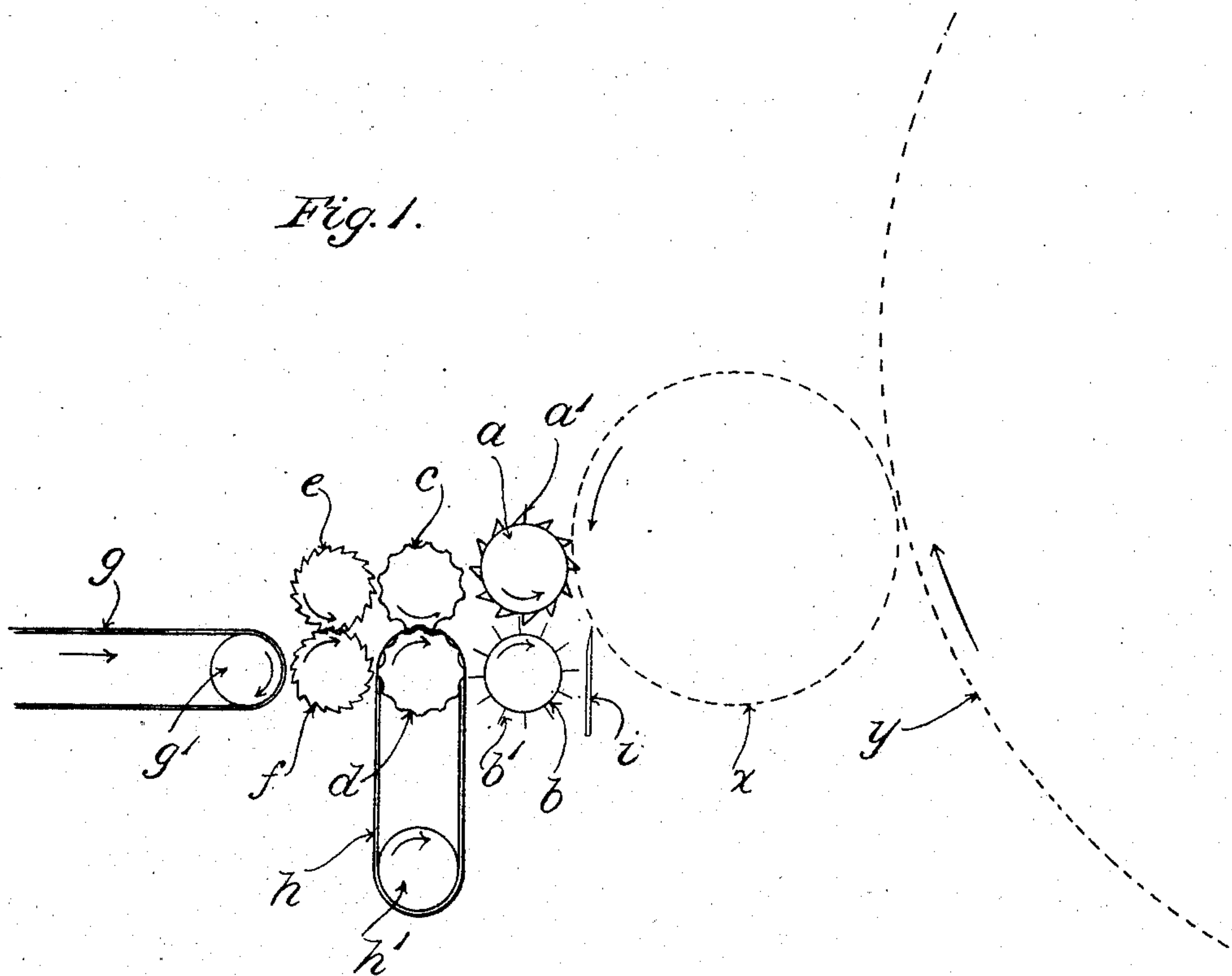
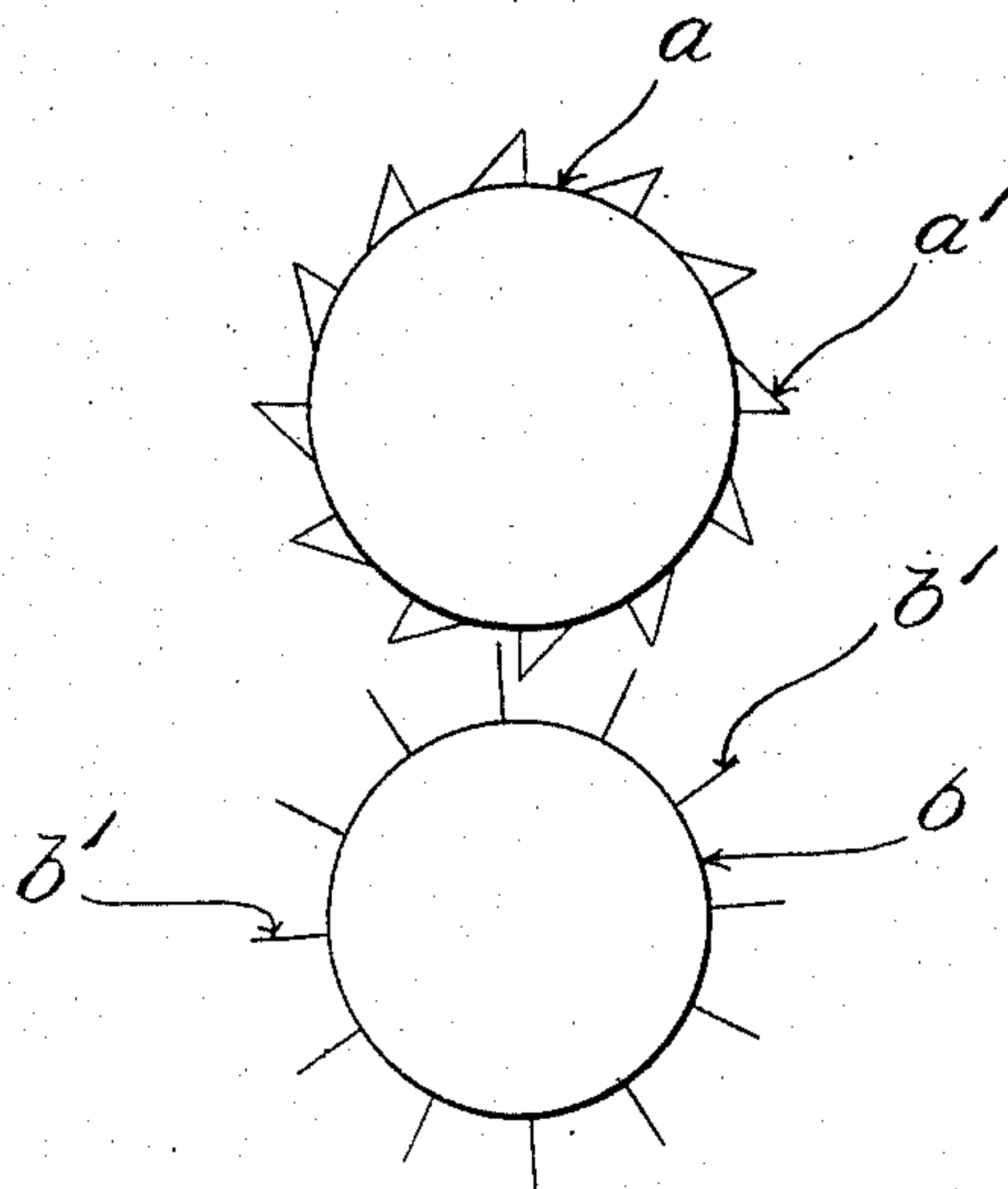


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

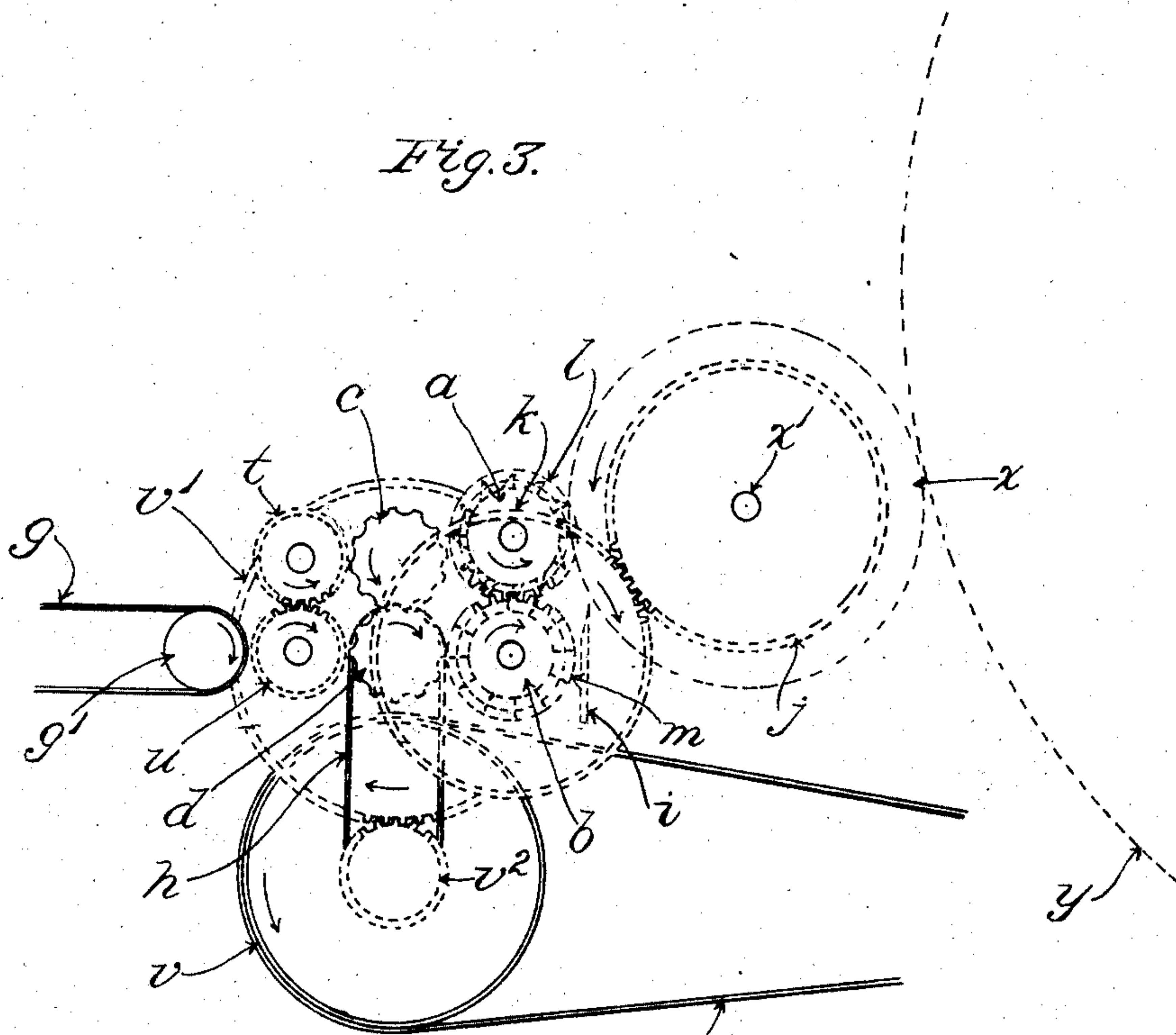
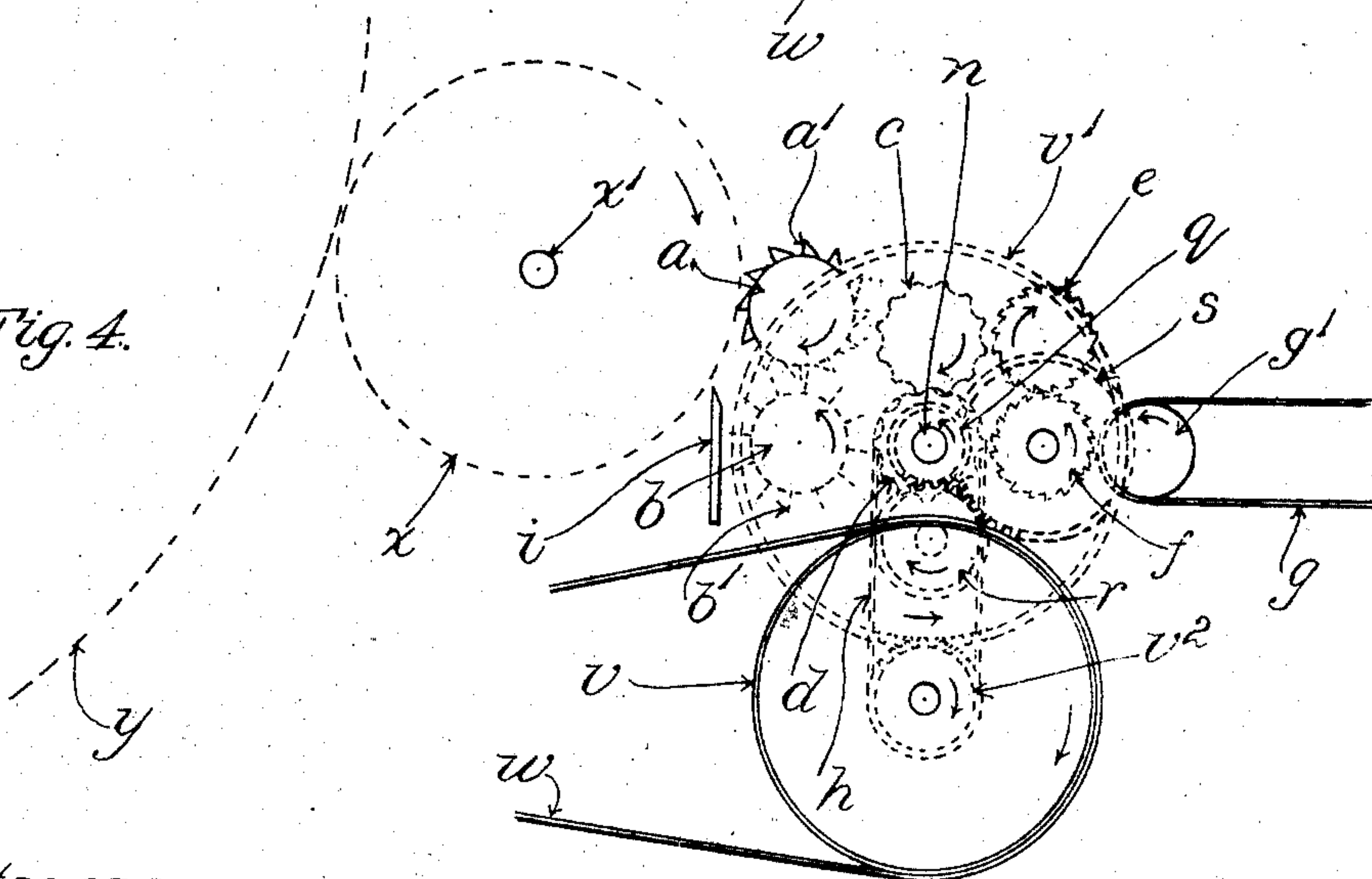


Fig. 4.



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UNITED STATES PATENT OFFICE.

MICHAEL COLLINS, OF LOWELL, MASSACHUSETTS.

CARDING-ENGINE.

No. 864,515.

Specification of Letters Patent.

Patented Aug. 27, 1907.

Application filed June 30, 1905. Serial No. 267,683.

To all whom it may concern:

Be it known that I, MICHAEL COLLINS, a citizen of the United States, residing at Lowell, in the county of Middlesex, State of Massachusetts, have invented
5 a certain new and useful Improvement in Carding-Engines and the Like, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention has relation to carding engines, and
10 has for its general objects to facilitate the straightening of the fibers which are operated upon, to decrease the strain upon the fibers while being operated upon, and breakage of the said fibers, to increase the efficiency of a carding engine, and to effect the separation
15 tion of burs and other foreign matter from the fibers. The invention is applicable to machines for operating upon various fibers, but I have contemplated more especially its employment in machines for operating upon wool and cotton.

20 The drawings show an embodiment of the invention in a wool carding engine.

In the same,—Figure 1 is a diagram of parts of a wool carding engine containing an embodiment of the invention. Fig. 2 is a detail view showing the lick-
25 er-in cylinder which is hereinafter described, and the bur-guard or bur-guard cylinder which coöperates therewith. Figs. 3 and 4 are views showing, respectively, the driving-connections at the opposite sides of the machine.

30 Having reference to the drawings, and more particularly to Fig. 1 thereof,—A portion of the feed-apron of a carding engine is shown at *g*, and one of the supporting and actuating rolls for the said feed-apron is represented at *g'*. At *e, f*, are a pair of feed-
35 rolls to which the fibers placed upon the feed-apron are advanced by the movement of the latter. At *c, d*, are two fluted rolls to which the fibers are presented by the feed-rolls *e, f*. An endless apron *h*, is shown extended around the fluted roll *d* and a carrier-roll *h'*,
40 and passing between the two rolls *c, d*. At *a* is a toothed cylinder to which the fibers pass from the fluted rolls, the said cylinder constituting in the illustrated embodiment of the invention the lick-
45 er-in of a carding engine, and *b* is a bur-guard or bur-guard cylinder, the blades of which coöperate with the teeth of the cylinder *a*. At *x* is a tumbler or intermediary cylinder taking the fibers from the lick-
50 er-in *a*, and at *y* is shown a portion of the main cylinder of a carding engine, which latter cylinder receives the fibers from the tumbler or intermediary cylinder *x*. A ledger-blade acting in connection with the surface of the
55 tumbler *x* is shown at *i*.

The drawings indicate simply the general character of the peripheries of the rolls *e, f, c, d*, and *a, b*. The
55 feed-rolls *e, f*, have toothed peripheries. The teeth thereof point backwardly or reversely with relation

to the direction of the rotation of the said rolls, as indicated by Fig. 1. The teeth of one feed-roll intermesh with those of the other. Usually, the said feed-rolls will be furnished with ordinary saw-toothed
60 clothing. They may be clothed with saw-toothed lick-in wire, wound in spirals around the respective rolls, and with the spiral of one roll the opposite or reverse of that of the other roll in order that the lines of teeth of the two rolls may intermesh
65 properly with one another. Or, as frequently the case in practice in carding engines and the like machines, the feed-rolls may be clothed with closely set pointed teeth, such, for instance, as the well-known so-called "cock-spur" teeth and "tenter-hook" teeth.
70

The fluted rolls are constructed properly to permit the apron *h* to work between them. The purpose of the said apron is as usual in the case of the like combination of an endless apron with a pair of fluted rolls; namely, to prevent the fibers from being crushed and
75 thereby injured while grasped between the said rolls.

The cylinder *a* is furnished with pointed teeth *a', a'*, etc., which are arranged in lines extending parallel with one another lengthwise of the cylinder, and spaced uniformly around the circumference thereof. Con-
80 veniently, in practice, the said cylinder *a* may be built of a shaft or body, and rings having peripheral saw-teeth strung on said shaft or body in alternation with plain or untoothed spacing rings, as frequently the case in the construction of rolls and cylinders of card-
85 ing engines. The bur-guard or bur-guard cylinder *b* is provided, as in the case of the like cylinders in other carding engines, burring machines, etc., with radial blades *b', b'*, etc., which are spaced uniformly around the circumference of such cylinder, and extend par-
90 allel with one another lengthwise of the said cylinder *b*. The blades *b', b'*, etc., of the bur-guard or bur-guard cylinder *b* intermesh with the lines of teeth *a', a'*, of the cylinder *a*. That is to say, the peripheral edges of the said blades intersect and project within the cir-
95 cular path which is described by the teeth *a', a'*, of the cylinder *a*. The said blades *b', b'*, alternate in sequence with the lines of teeth *a', a'*, etc.

The tumbler *x* and main cylinder *y*, which are indicated simply in outline by dotted lines, are fur-
100 nished in practice with toothed clothing of approved character, which may, in most instances, be ordinary wire card-clothing.

The surface speed of the feed rolls is relatively small, as, for instance, about one foot per minute. That of
105 the fluted rolls *c, d*, is relatively a little faster, as, for instance, about four feet per minute. The toothed cylinder or lick-er-in *a* and bur-guard or bur-guard cylinder *b* have a considerably higher relative speed than the fluted rolls, namely, about one hundred feet per min-
110 ute. The tumbler has a proportionately higher surface speed, as for example, about four hundred feet per

minute. That of the main cylinder *y* is much higher, for, example, about a thousand feet per minute. These speeds may be varied more or less in practice as may be found proper or advisable.

5 The leading ends of the fibers, as the latter advance from the rolls *c*, *d*, are presented gradually to the teeth *a'*, *a'*, and blades *b'*, *b'*, and acted upon thereby. Such leading ends are gently brushed and combed by the
10 by the rotation of the rolls *c*, *d*, to the point where the blades of the bur-guard intermesh with the teeth of the licker-in. Here, the said blades serve successively as supports by which the leading portions of the fibers are upheld and presented to the action of the teeth *a'*.
15 The said blades support the said portions of the fibers at front and rear, respectively, of a given line of teeth which may be in engagement with the fibers. The lines of teeth *a'*, acting successively intermediate the successive blades *b'* in the rotation of the cylinders,
20 penetrate and pass through or between the fibers with a straightening and combing effect. The teeth will pass freely and fully between those fibers which are straight, but when a tooth *a'* meets a snarl or tangle which is too hard to be combed out at once, the snarl
25 or tangle will be permitted to give or yield and will slip off the apex of that tooth, and also off the apices of the teeth which next succeed in action, thereby obviating breakage of fibers, until, under the repeated attacks of the teeth, it finally is loosened and caused
30 to yield. The repeated contact of successive lines of teeth of the intermediate cylinder *a* with the fibers during the gradual feed of the latter effectuates a progressive combing and straightening of the fibers, beginning at the leading extremities of the latter and
35 operating to gradually extend the straightening action toward the rear portions of the fibers as the latter are delivered by the rotation of the rolls *c*, *d*, thereby rendering the action easy and harmless instead of harsh and provocative of breakage. As the leading ends of
40 the fibers are presented to the teeth of the intermediate cylinder, they simply enter freely in among such teeth and the fibers are acted upon by the teeth without being snapped forward and broken. The fibers are not taken forward by the cylinder *a* until their rear ends
45 are released from the bite of the grasping and holding fluted rolls *c*, *d*.

In operation, the fluted rolls *c*, *d*, and apron *h* cooperating therewith, take a positive hold upon the fibers which have been advanced to the same by the feed-
50 rolls *e*, *f*, and in consequence of such positive hold, and the higher surface speed of the said fluted rolls and apron, these last draw the said fibers through or between the teeth of the more slowly moving feed-rolls *e*, *f*. This has the result of effecting a slight combing of
55 the fibers, extending them somewhat in the direction of their length, and making them lie straight and parallel with one another in the direction extending from the feed-apron *g* to the rolls *c*, *d*, so that in advancing farther within the machine they shall travel onward
60 endwise or substantially so. By effecting the preliminary straightening of the fibers and causing them to travel endwise, or substantially so, to the instrumentalities by which the next operation in the machine is performed, such operation is facilitated and ex-
65 pedited, and the capacity of the machine is increased,

while the tendency to breakage of the fibers is reduced. As the leading ends of the fibers advance from the fluted rolls *c*, *d*, and apron *h* toward the licker-in cylinder *a* and bur-guard cylinder *b*, the teeth *a'*, *a'*, etc., of the licker-in cylinder act upon the same from above, while
70 the blades *b'*, *b'*, etc., of the bur-guard *b* act against the same from beneath. Burs and other foreign matters attached to or accompanying the fibers are, by the action of the teeth *a'*, *a'*, of the licker-in cylinder *a*, forced downward and forward, while by the action of
75 the blades *b'*, *b'*, of the bur-guard cylinder *b* they are pushed forward, and thus they become loosened and detached. As soon as detached from the fibers and free therefrom, the burs or other foreign matters drop into the pockets or spaces between the blades *b'*, *b'*,
80 from which pockets or spaces they discharge under the force of gravity as the rotary motion of the guard-cylinder carries such pockets or spaces to the under side of the cylinder. By the rotation of licker-in cylinder *a* the fibers are extended forward lengthwise toward the
85 tumbler *x*. The combing, straightening, and separating action upon the leading portions of the fibers continues until the rear portions of the fibers have passed from the grasp of the fluted rolls *c*, *d* and their apron *h*. As soon as the fibers are released from such grasp, they
90 are drawn forward by the tumbler *x* between and past the cylinders *a*, *b*, the rear portions of the fibers being instantly drawn lengthwise by the said tumbler on to and through or between the teeth *a'*, *a'*, of the licker-in cylinder *a*, and the blades *b'*, *b'*, of the bur-guard cylin-
95 der *b*, thereby causing such portions to be combed and straightened in being pulled through the said teeth *a'*, *a'*, and past the bur-guard cylinder *b*, and causing burs and other foreign matters not previously removed by the action of the cylinders *a* and *b*, or tending to ac-
100 company the fibers as the latter are drawn forward by tumbler *x*, to be stripped from the fibers by the conjoint action of the said teeth and blades. The fibers after being carried forward by the tumbler *x* are transferred to the main cylinder *y*. By the machine as thus
105 explained, the fibers are progressively straightened, disentangled, and parallelized, the action beginning with the leading or advancing ends thereof and continuing throughout the length thereof; they are arranged to extend lengthwise in the direction of their travel
110 though the machine; and they continue to travel lengthwise through the same. The ledger-blade *i* acts in connection with the tumbler *x* to remove from the latter any loose foreign matter that may reach the same.

Briefly restated, it will be perceived from the fore-
115 going description that the licker-in cylinder *a* and bur-guard cylinder *b* operate first upon the leading portions of the fibers to straighten and comb such portions and remove the burs therefrom through their forward action upon such portions while the succeeding por-
120 tions are held in the bite of the grasping and holding rolls *c*, *d*, and that the said cylinders then perform the like operations upon the rear portions of the fibers, as soon as the rear ends of the latter are released from the bite of the grasping and holding rolls *c*, *d*, as the fibers
125 are drawn forward with respect to such cylinders by the more rapidly rotating tumbler *x*, the teeth *a'* of the cylinder *a* performing the combing and straightening operations upon the said rear portions as the fibers are pulled therethrough and the burs and other for-
130

foreign matters being held back by the said teeth and the blades *b'*.

An important and characteristic feature of the lick-
in cylinder *a* is the fact that the teeth of the same are
5 arranged to work smooth to point, as it may be termed,
with relation to the grasping and holding rolls *c*, *d*, and
first point to point and then smooth to point with rela-
tion to the tumbler *x*. The expression "smooth to
10 point" as commonly employed in the art, and as em-
ployed herein, has reference to the action of the teeth
of the rolls or cylinders of a carding mechanism or the
like with respect to the fibers, and as used in the pres-
ent connection indicates the fact that the teeth of lick-
in cylinder *a*, moving points backward, operate to
15 brush, straighten, and comb the fibers which are held
in the grasp of rolls *c*, *d*, without pulling the said fibers
forward in the machine. The expression "point to
to point", as used herein with reference to the action of
the lick-in cylinder *a* at first upon the fibers with
20 relation to the tumbler *x*, indicates that during such
action the teeth of the cylinder *a* operate to hold or
detain the fibers against the tendency of the teeth of
tumbler *x*, the latter teeth rotating points foremost, to
draw the fibers forward to the said tumbler. While the
25 fibers continue to be thus held or detained their leading
portions are combed and straightened by the action of
the teeth of tumbler *x*. The expression "smooth to
point" as used herein with reference to the action of the
said cylinder with relation to the tumbler, indicates that
30 during such action the fibers are released by the lick-
in cylinder *a* to the tumbler *x* and are carried forward
by the teeth of the latter. The point to point action
occurs in the case of a given tooth or teeth of the lick-
in cylinder while such tooth or teeth is or are in position
35 during the rotation of the said cylinder to detain the
fibers against the pull that is exerted thereon by the
teeth of the tumbler; while the smooth to point action
occurs when the tooth or teeth has or have been carried
by the rotation of the lick-in cylinder around into a
40 position in which the fibers are yielded up without re-
sistance. The cylinder *b* as will be perceived, has two
functions, one thereof being to sustain the fibers against
the action of the teeth of cylinder *a*, in which respect it
acts as a rotary grid, and the other thereof being to effect
45 or assist in effecting the removal of burs and other for-
eign matters from the fibers. In some cases, the said
cylinder may be omitted, or it may be replaced by a
substitute device for the performance of these functions
or of either thereof. I do not limit myself to the par-
50 ticular arrangement of the cylinders *a*, *b*, with relation
to each other and to the adjacent elements of the ma-
chine as shown and described herein, inasmuch as the
relative positions may be varied without necessarily
involving departure from the principles of the inven-
55 tion.

For the purpose of actuating the feed-rolls *e*, *f*, and
fluted rolls *c*, *d*, a driving-band *w*, Figs. 3 and 4, passes
around a band-pulley *v* having fast therewith a pinion
*v*², the said pulley and pinion being suitably mounted
60 upon the machine-frame. The pinion *v*² engages with
the gear-wheel *v'* which is fast on the shaft *n* of the lower
fluted roll *d*, as shown best in Fig. 4. The said fluted
roll *d* by its rotation communicates movement to the
apron *h* and upper fluted roll *c*. Motion is transmitted
65 from the lower fluted roll *d* to the lower feed-roll *f* by

means of a pinion *q*, Fig. 4, which is fast upon the shaft
n of the said lower fluted roll *d*, a carrier pinion *r*, and a
gear-wheel *s* which is fast upon one journal of the said
lower feed-roll *f*. The upper feed-roll *e* is driven from
the lower feed-roll *f* by means of a pinion *u*, Fig. 3, 70
which is fast upon one journal of the feed-roll *f* and
meshes with a like pinion *t* which is fast upon one jour-
nal of the feed-roll *e*. Motion is transmitted to the bur-
guard *b* from the tumbler *x* by means of a gear *j* upon
one journal *x'* of the latter, meshing with a gear *k* which 75
is fast upon one journal of the bur-guard. From the
bur-guard *b* the lick-in cylinder *a* is driven by means
of a pinion *m* which is fast upon one journal of the bur-
guard and meshes with a pinion *l* which is fast upon one
journal of the lick-in cylinder *a*. 80

I claim as my invention:—

1. In a carding or the like machine, the combination
with devices operating to feed or advance the fibers and
hold the same firmly while the leading portions thereof are
being combed and straightened, and a toothed cylinder, of 85
an intermediary toothed cylinder and actuating means for
the said intermediary toothed cylinder communicating
thereto a surface speed considerably exceeding the speed
of the said feeding devices, the said intermediary cylinder
operating smooth to point with relation to the feeding de- 90
vices, to thereby comb and straighten the said leading por-
tions of the fibers, and operating first point to point and
then smooth to point with relation to the said toothed cy-
linder, to thereby comb the rear portions of the fibers as
they are drawn forward by the toothed cylinder and then 95
deliver the fibers freely to the latter, substantially as de-
scribed.
2. In a carding or the like machine, the combination
with devices operating to feed or advance the fibers and
hold the same firmly while the leading portions thereof are 100
combed and straightened, and a toothed cylinder, of an in-
termediary toothed cylinder and actuating means for the
said intermediary toothed cylinder communicating thereto
a surface speed considerably exceeding the speed of the
said feeding devices, the said intermediary cylinder operat- 105
ing smooth to point with relation to the feeding devices,
to thereby comb and straighten the said leading portions
of the fiber, and operating first point to point and then
smooth to point with relation to the said toothed cylinder
to thereby comb the rear portions of the fibers as they are 110
drawn forwardly by the toothed cylinder and then deliver
the fibers freely to the latter, and means to sustain the
fibers against the action of the teeth of the intermediary
cylinder.
3. In a carding or the like machine, the combination 115
with devices operating to advance the fibers and hold the
same firmly while the leading portions thereof are combed
and straightened, and a toothed cylinder, of intermediary
combing and burring devices operating smooth to point
with relation to the feeding devices to thereby comb and 120
straighten the leading portions of the fibers and remove
the burs and other foreign matters therefrom, and operat-
ing first point to point and then smooth to point with re-
lation to the said toothed cylinder to thereby comb the
rear portions of the fibers and remove burs and other for- 125
eign matter therefrom as the fibers are drawn forward by
the said cylinder, and then deliver the fibers freely to the
latter.
4. In a carding or the like machine, the combination 130
with the fluted rolls operating to hold the fibers firmly
while the leading portions thereof are being combed and
straightened, and the toothed cylinder, of the intermediary
cylinder and actuating means for the said intermediary
toothed cylinder communicating thereto a surface speed
considerably exceeding the speed of the said feeding devices, 135
the said intermediary cylinder operating smooth to point
with relation to the said fluted rolls to thereby comb and
straighten the leading portions of the fibers which are ad-
vanced by the said rolls, and operating first point to point
and then smooth to point with relation to the said toothed 140
cylinder to thereby comb the rear portions of the fibers as

they are drawn forward by the toothed cylinder and then deliver the fibers freely to the latter, substantially as described.

- 5 In a carding or the like machine, the combination
with the fluted rolls operating to hold the fibers firmly
while the leading portions thereof are being combed and
straightened, and the toothed cylinder, of the intermediary
cylinder operating smooth to point with relation to the
10 said fluted rolls to thereby comb and straighten the lead-
ing portions of the fibers which are advanced by the said
rolls, and operating first point to point and then smooth to
point with relation to the said toothed cylinder to thereby
comb the rear portions of the fibers as they are drawn for-
ward by the toothed cylinder and then deliver the fibers
15 freely to the latter, and the bur-guard between which and
the intermediary cylinder the fibers are caused to advance.

6. In a carding or the like machine, the combination
with the rolls *e, f*, having the backwardly-pointing teeth, of
the fluted rolls *c, d*, operating to draw the fibers through
20 the said teeth and thereby effect a preliminary straighten-
ing thereof, the toothed cylinder, and the intermediary

cylinder operating smooth to point with relation to the
fluted rolls and first point to point and then smooth to
point with relation to the toothed cylinder, substantially
as described.

7. In a carding or the like machine, the combination
with the rolls *e, f*, having the backwardly-pointing teeth,
of the fluted rolls *c, d*, operating to draw the fibers through
the said teeth and thereby effect a preliminary straighten-
ing thereof, the toothed cylinder, the intermediary cylinder
operating smooth to point with relation to the fluted rolls
and first point to point and then smooth to point with re-
lation to the toothed cylinder, and the bur-guard coöperat-
ing with the said intermediary cylinder, substantially as
described.

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

MICHAEL COLLINS.

Witnesses:.

CHAS. F. RANDALL,
EDITH J. ANDERSON.