

(No Model.)

2 Sheets—Sheet 1.

G. A. ALLISON.  
CARDING MACHINE.

No. 411,367.

Patented Sept. 17, 1889.

Fig. 1.

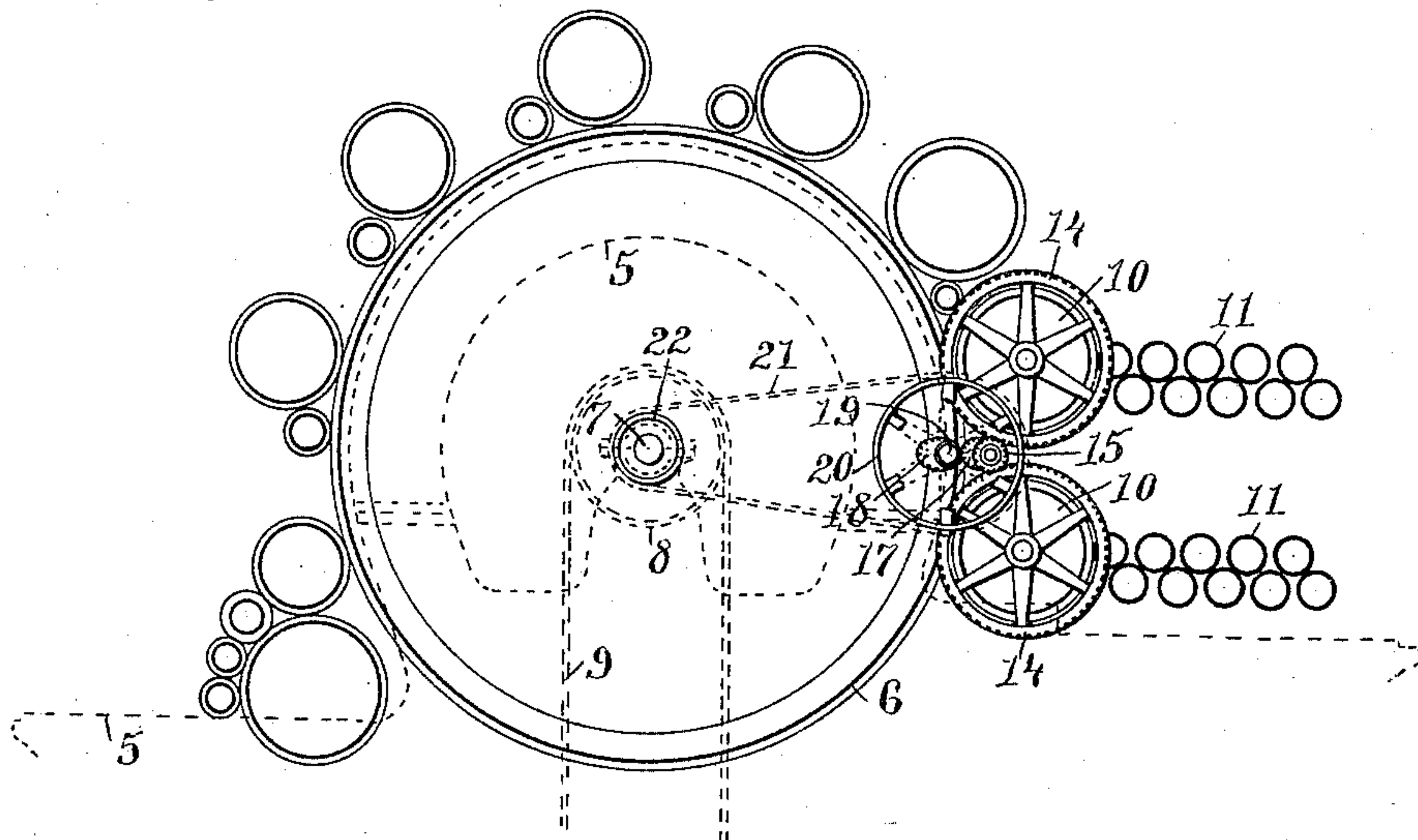


Fig. 2.

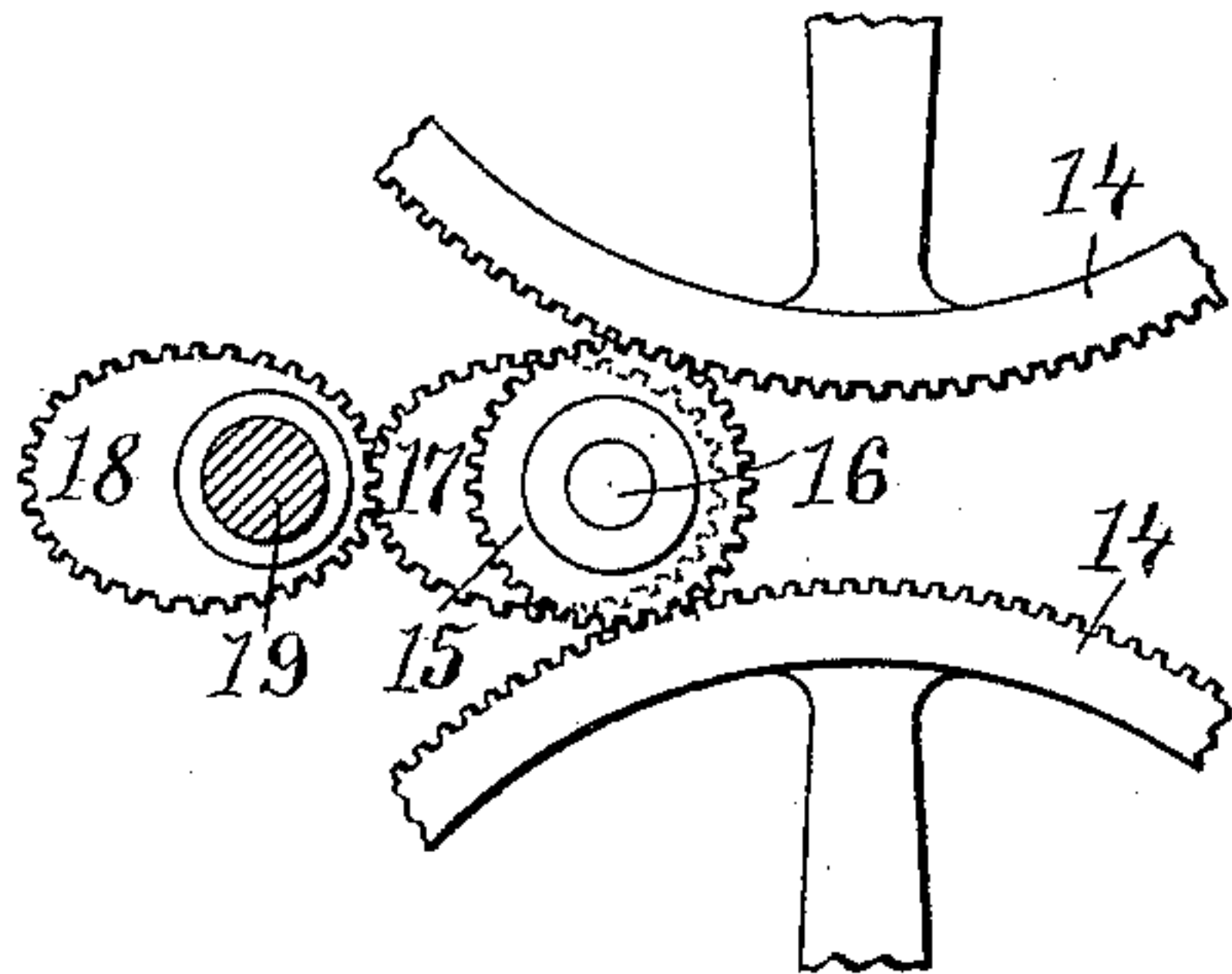


Fig. 3.

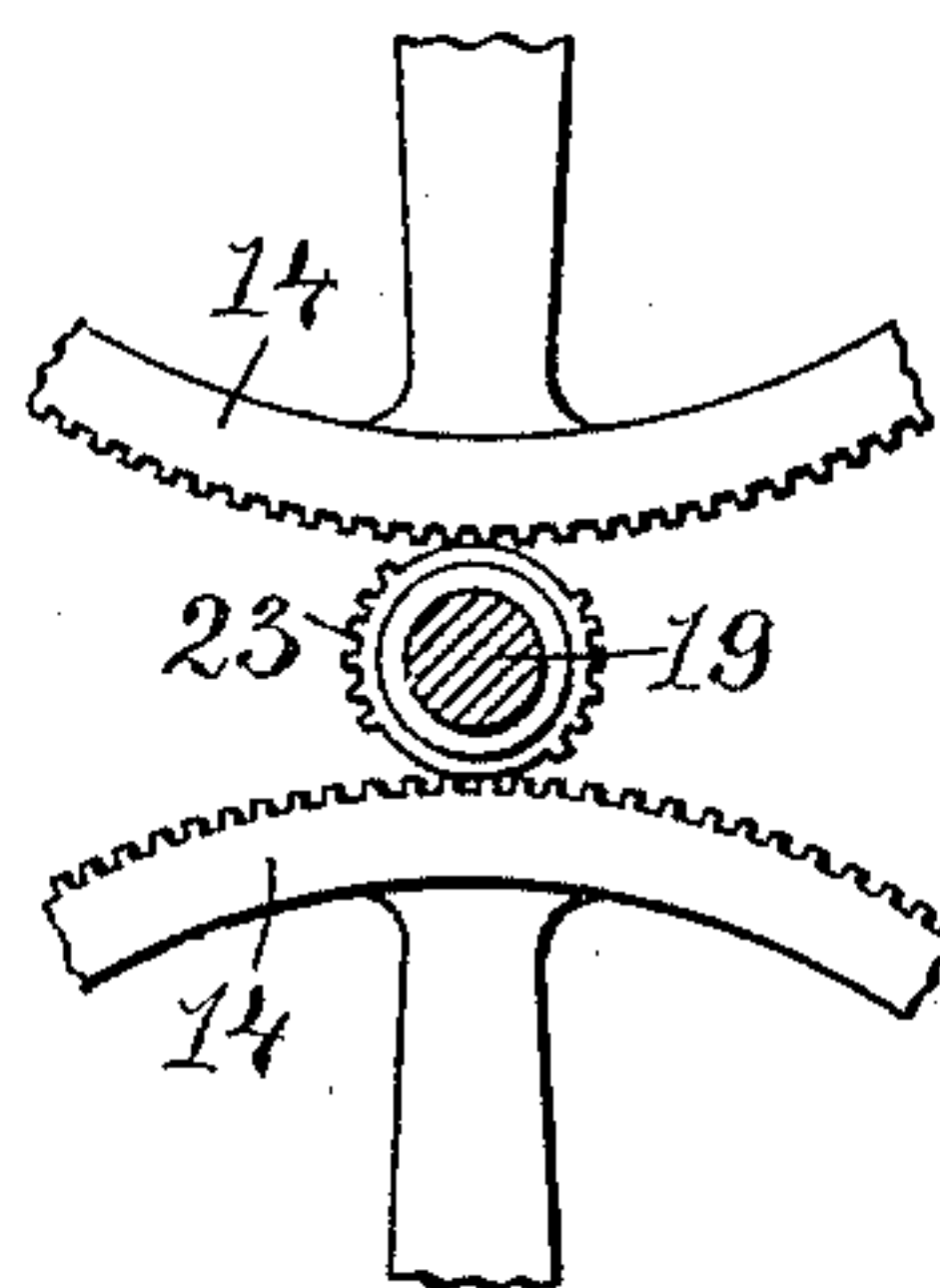


Fig. 4.

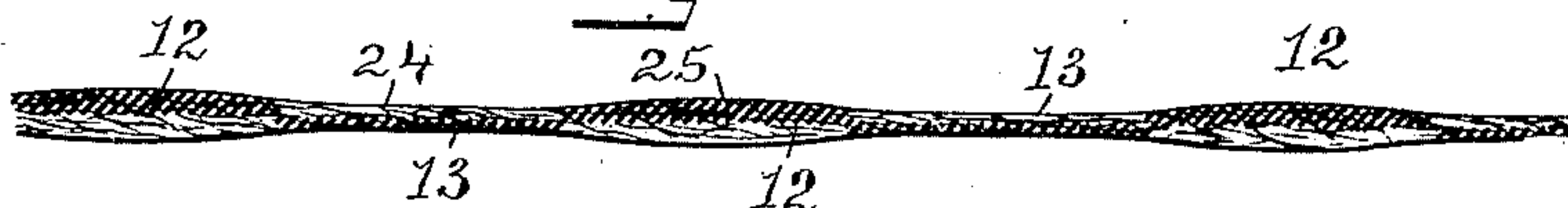
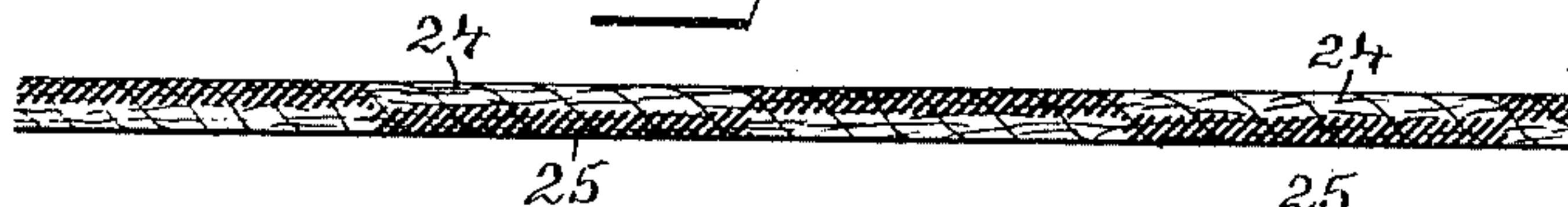


Fig. 5.



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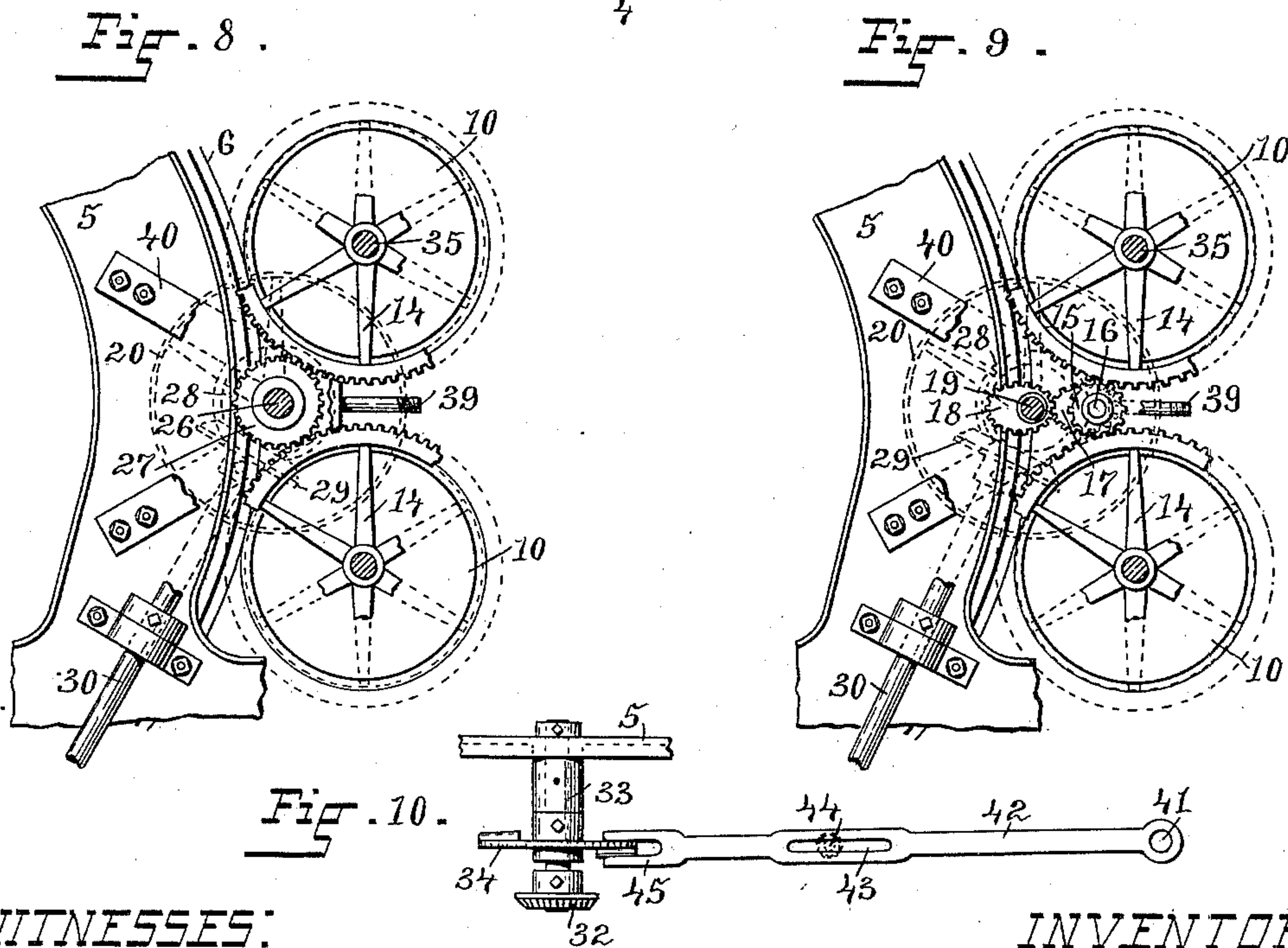
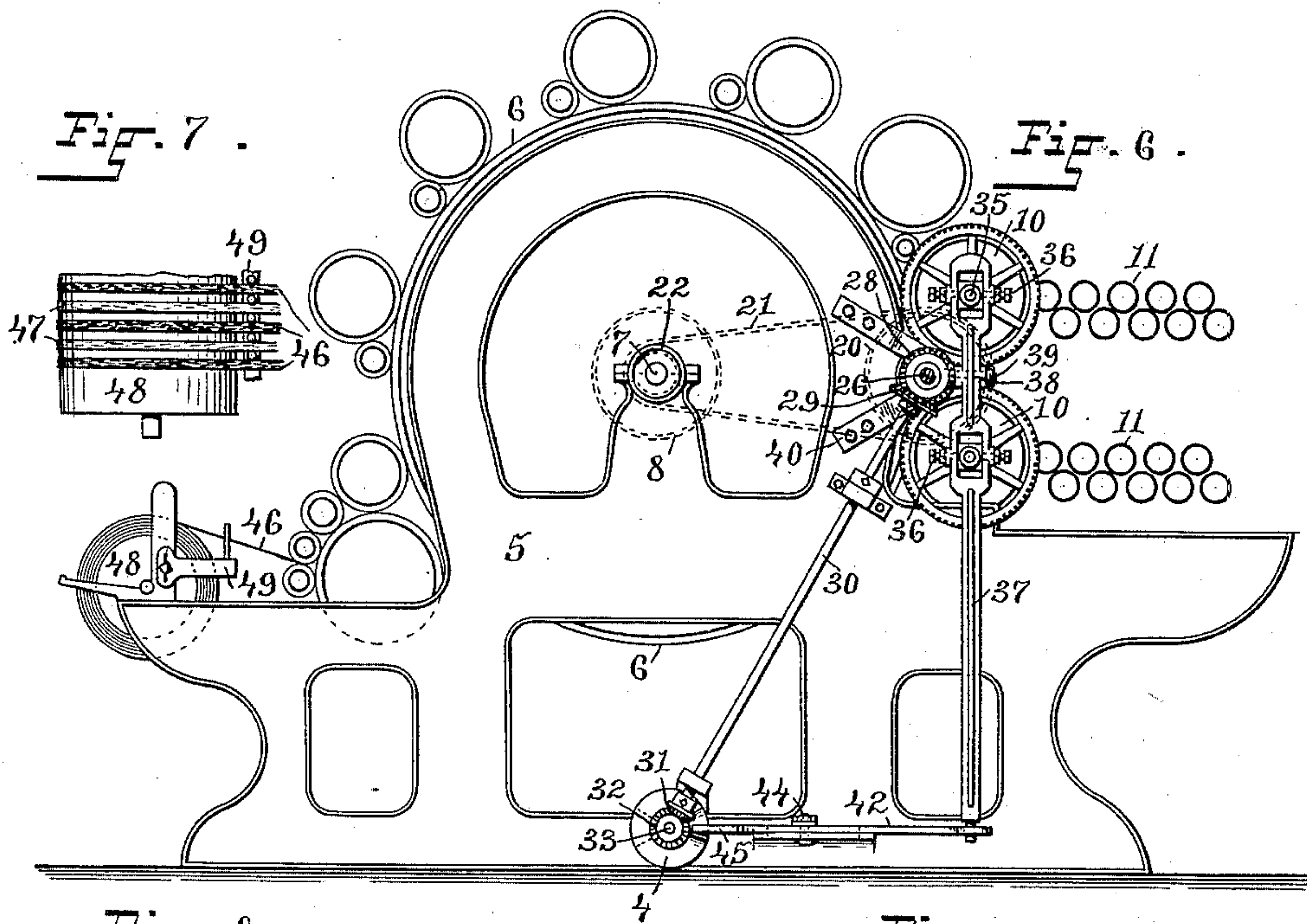
(No Model.)

2 Sheets—Sheet 2.

G. A. ALLISON.  
CARDING MACHINE.

No. 411,367.

Patented Sept. 17, 1889.



WITNESSES:

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# UNITED STATES PATENT OFFICE.

GEORGE A. ALLISON, OF PASCOAG, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO FRED. L. SAYLES, OF SAME PLACE.

## CARDING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 411,367, dated September 17, 1889.

Application filed August 29, 1887. Serial No. 248,134. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE A. ALLISON, of Pascoag, in the county of Providence, State of Rhode Island, have invented certain new and useful Improvements in Carding-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

10 This invention relates to carding-machines for drawing out and arranging the fibers of wool, cotton, or other staple in parallel order; and one object of the invention is to provide improved mechanism for running the doffers at a uniformly-variable speed for producing a roving having portions of alternate enlarged and reduced diameters of equal lengths; second, to provide improved mechanism for reciprocating the doffers, whereby a roving may be produced of different colored or kinds of materials, and, third, to so combine and arrange said mechanisms that a roving consisting of different colored or kinds of material, having portions of alternate reduced and enlarged diameters of equal lengths, may also be produced; and the invention consists in the features of construction and combinations of parts, as will be hereinafter more fully described, and pointed out in the claims.

30 In order that my invention may be fully understood, I have illustrated in the accompanying drawings, and will proceed to describe, the best forms thereof, as so far devised by me, with the knowledge that such forms may be variously modified, without, however, making a substantial departure from the spirit of the invention.

40 In the accompanying drawings, Figure 1 is a side view of an ordinary finisher-card provided with part of my improvements, together with the condenser or rub-rolls, the frame of the card being partly shown in broken lines, while the framing for the rolls as well as the actuating means for the rolls are omitted, since such parts are unnecessary in illustrating the use of my invention. Fig. 2 is an enlarged view of portions of the gear-wheels for driving the two doffers shown in Fig. 1, and my improved elliptical gearing for driving the doffers at a variable speed, the drive-shaft being shown in cross-section.

Fig. 3 is an enlarged view of portions of the doffer gear-wheels, geared up with a mutilated gear, which is another means by which I impart the desired uniformly-variable motion to the doffers. Fig. 4 is a view of a piece of the roving, which is formed with the alternately-disposed enlarged and reduced diameters to portions of uniform lengths, respectively, and which is also composed of sections of different-colored wools formed into a continuous roving or sliver. Fig. 5 is a view of another piece of the roving, the same being of uniform diameter and composed of sections of different-colored stock made into a continuous roving. Fig. 6 is a side view of an ordinary finisher-card provided with part of my improvements, the same consisting in the reciprocating means for the doffers and the mechanism for supplying the different-colored wools to the main cylinder. Fig. 7 is an enlarged top view of portions of the feed-drum and the adjacent guide-rack, together with the different-colored rovings or slivers passing thereover. Fig. 8 is an enlarged detail view of a portion of the mechanism shown in Fig. 6, with part of the inclined drive-shaft broken away. Fig. 9 is a similar view to that shown in Fig. 8 and of the same parts, with the addition of the elliptical gears. Fig. 10 is an enlarged plan view of a part of the cam-shaft and cam and the bevel-gear on the shaft and the cam-rocker and adjustable fulcrum-pin therefor.

In the said drawings like numbers of reference designate corresponding parts throughout.

Referring to the drawings, 5 designates the framing, and 6 the main cylinder, of an ordinary finisher carding-machine, above and to the left of which cylinder are disposed the different card-cylinders, the functions of which need not be here described. This main cylinder is rotated by the shaft 7, which is provided with a driving-pulley 8, about which takes the driving-belt 9, (shown in part in Fig. 1,) and which may derive its motion from any suitable source.

The doffers 10 are cylinders supported horizontally and extending across the width of the main cylinder 6. The doffers are rotated at a slower speed than the main cylinder and



in an opposite direction, so that they may raise and take off the fleece from the clothing of the main cylinder. The doffers may be provided with any character of card-clothing, though I preferably use the circumferential bands or rings of cards of well-known construction, which doff the fleece in narrow, ribbon-like slivers.

The slivers are delivered by the doffers to the condenser or rub-rolls 11, which are suitably supported in a manner well known, and have a peculiar rub-and-roll motion given them by means of mechanism not shown. After leaving the rub-rolls 11 in a condensed and compact form the slivers or rovings are wound onto rotating reels or drums, (not shown,) and from which the rovings are subsequently spun.

The doffers 10 are rotated by means of their respective gear-wheels 14, which are generally driven by a small cog-wheel which is fixed upon a shaft receiving its motion indirectly from the main-cylinder shaft.

The foregoing-described parts are old in the art and their respective functions and applications are well known. I therefore make no claim to the same.

There are many well-known and suitable ways in which the doffers may be geared in order to give to them a uniformly-variable speed, so as to quicken and slacken their motions and thereby doff the sliver having the desired uniformly-variable density.

I have shown two different ways of acquiring the uniformly-variable speed of the doffers—in Figs. 1, 2, and 9 by means of elliptical gears, and in Fig. 3 by the use of a mutilated gear.

The pinion 15, in Figs. 1, 2, and 9, is secured upon a suitably-mounted shaft 16 and runs in mesh with the respective doffer-gears 14 of the upper and lower doffers 10. On the shaft 16, beside the pinion 15, is fixed the elliptical gear 17, which meshes with a similar elliptical gear 18, which is located upon the drive-shaft 19, which is driven by the band-wheel 20, situated at the outer end of the shaft. The drive-shaft 19 receives its motion from the shaft 7 of the main cylinder through the medium of the belt 21 and the belt-pulley 22. It will be obvious that by the employment of these elliptical gears 17 and 18 the doffers 10 may be driven at a uniformly-variable speed, the motion being derived from the shaft 7, and that the variation in the speed may be regulated by changing the relation between the lengths of the major and minor axes of the ellipses of the said gears.

In Fig. 3 the doffer gear-wheels 14 are driven by the mutilated gear 23, which consists of an ordinary cog-wheel having a number of the teeth removed from opposite peripheral places. When the teeth of the mutilated gear 23 pass in mesh with the teeth of the doffer gear-wheels 14, the doffers will be driven faster than when the toothless portions of the mutilated gear pass over the teeth, since they

are driven positively; but when the blank portion of the gear reaches the gears 14 they are not moved by such portion, but revolve by their own momentum until the teeth are again brought into mesh with said gears 14. Thus the doffers will be run with a uniformly-variable motion. The mutilated gear 23 is mounted upon the drive-shaft 19, which is rotated as before described. It will now be evident that if the doffers are driven at a uniformly-variable speed the sliver produced thereby will be composed of alternately-arranged thick and thin places throughout its length, the thick places representing the low and the thin places the high speed of the doffers, and that the length of the areas of the thick and thin places, respectively, may be made equal or may be made proportionate, according to the proportion of the low and high speed of the doffers at each revolution—that is, if a revolution of a doffer is made three-fourths of the way with high speed and the remaining fourth at low speed, the thin or reduced places in the sliver will be to the thick or enlarged and more dense places as three is to one. The thick places will all be of equal lengths, and likewise the thin places will all be of the same lengths, thereby producing a sliver of uniformly-variable density, or a sliver having alternate thick and thin places symmetrically disposed.

When the sliver is passed through the condenser or rub-rolls 11, it is rounded and made compact, and thereby converted into a roving, and the fiber is slightly interlaced by the rub-roll action, which is like the effect produced by rolling the sliver between the hands, and the roving then appears like that shown in Fig. 4, and when this is spun for weaving the thick or enlarged places 12 will appear as bunches on the yarn, and these bunches may be made to stand out conspicuously in the woven fabric, according as the design or pattern calls for them. The bunches 12 being located at regular distances apart, the yarn can be used to carry out any design with accuracy.

By reciprocating the doffers endwise, as I will now proceed to describe, I produce a composite roving, which is made up into a continuous roving by bits or sections of different kinds or colors of staple being put together in a predetermined order of arrangement. In Fig. 5 the composite sliver is shown as formed of the sections 24 of white staple and the sections 25 of black staple, and the sliver is of uniform density and thickness, while in Fig. 4 the sliver is shown with the white sections 24 and the black sections 25, and also with the enlarged and reduced diameters 12 and 13, respectively, and this sliver is made by means of the reciprocating doffers, which are also equipped to run at a uniformly-variable speed, as shown in Fig. 9.

Referring to the several figures 6 to 10, the doffers 10 are supported near the main cylinder 6, and their gears 14 are driven by means



of the cog-wheel 27, mounted on shaft 26, (see Fig. 8,) which is provided with the band-wheel 20, receiving its motion from the axle 7 of the main cylinder 6 through means of the belt 21 and the band-pulley 22. The shaft 26 is also provided with the bevel-pinion 28, which meshes with the pinion 29 on the upper end of the inclined shaft 30, which is provided at the lower end with another bevel 31, driving the bevel-gear 32, located on the cam-shaft 33, which is mounted in the frame 5 of the machine and is provided with the rotary cam 34, for a purpose hereinafter described. The journals 35 of the corresponding ends of the doffers 10 are borne in the pivotal bearings 36 of the rocker-bar 37, which is itself journaled at 38 on the spindle 39, projecting from the forked bracket 40, which is attached to the side of the frame 5. The foot of the rocker-bar 37 takes in the eye 41, formed at one end of the cam-rocker 42, which is provided with a longitudinal slot 43, through which passes the fulcrum pin or bolt 44, which is mounted adjustably in a slot 43', formed in an extension 43<sup>2</sup> on the frame 5, so as to regulate the amplitude or sweep of the vibration of the cam-rocker 42, the forked end 45 of which embraces the rotary cam 34, by which the cam-rocker may be vibrated on its pin 44 in an obvious manner, the limit or extent of the vibrations being regulated by adjusting the bolt in the slot 43', so as to bring the fulcrum nearer to or farther from the cam 34. The vibrations of the cam-rocker serve to reciprocate the doffers 10 on their axial lines through means of the connected rocker-bar 37. In order to maintain the gears which drive the doffer-gears 14 in mesh with the same when the doffers are reciprocated, the said gears (27 in Fig. 8 and 15 in Fig. 9) are made of sufficient thickness to allow for the intermeshing reciprocating doffer-gears 14 to reciprocate the desired amount without moving laterally out of mesh therewith.

If preferred, instead of using the thickened gears with the doffer-gears, the latter may be constructed so as not to move laterally with the reciprocating doffers, and the journals 35, upon which the doffer-gears 14 are mounted, may be provided with splines, whereby the journals may be reciprocated endwise through the stationary doffer-gears.

The stock is supplied to the finisher-card in alternately-arranged ribbons, slivers, or rovings of two contrasted colors—for example, as shown in Fig. 7, the ribbon 46 of black wool and the ribbon 47 of white wool. These ribbons are led over the drum 48 and passed through the guide-rack 49 to the machine, and when the stock reaches the doffers it is in the form of a longitudinally-striped web or sheet.

The doffers are provided with the well-known forms of card-clothing arranged in circumferential bands about the doffer-cylinders, with suitable spaces between them, so that each doffer may doff the fleece from the cyl-

inder in parallel ribbon-like strips, the clothing of the two doffers being arranged so that the lower doffer will doff the strips of fleece left upon the main cylinder by the bare spaces between the bands of the upper doffer. It will be readily understood that if the doffers are not reciprocated the fleece will be doffed in solid-colored ribbons from the longitudinally-striped web on the main cylinder; but if the doffers be reciprocated on their axial lines in opposite ways, and say, for instance, the distance of one-half the width of the bands of clothing, the bands of clothing will each one at each complete reciprocation of the doffer doff a ribbon composed of longitudinal halves of white and black fleece, as shown in Figs. 4 and 5. As the doffers are quickly operated, the composite sliver formed will be of a checked character, caused by the bits or sections of the two different-colored wools being put together into a continuous sliver or roving. The doffers may be reciprocated any desired distance, and a different design of parti-colored sliver may be thus produced. For instance, if the doffers are reciprocated the distance equal to the width of the bands of clothing, the sliver produced will be composed of alternate sections of black and white wool, and if at the same time the doffers are run at a uniformly-variable speed the sliver produced will be made up of bunches, as 12 in Fig. 4, of one kind of wool and the intermediate reduced portions 13 of another kind of wool.

It is evident that a great variety of designs may be made in the composite sliver, and of course the invention contemplates the use of any number of different kinds or colors of wool, as may be desired.

In the construction shown in Fig. 9, wherein the variable speeded doffers are reciprocated, the bevel-gear 28, which meshes with the bevel 29 on the inclined drive-shaft 30, is mounted on the shaft 19, which is provided with the band-wheel 20, and also the elliptical gear 18, which communicates its motion to the doffer-gears 14 through means of the second elliptical gear 17, shaft 16, and pinion 15, as shown in Figs. 1 and 2.

It will be observed that the product in leaving the rub-rolls 11 has been condensed and slightly twisted or spun.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a carding-machine, the combination, with the carding-cylinder and the doffers having the gears 14, of the shaft 16, carrying the pinion 15, located between and meshing with the gears 14, the elliptical gear-wheel mounted on the shaft 16, the elliptical gear 18, the shaft 19, and the band-wheel 20 on the shaft 19, and the band-wheel 22 on the shaft of the carding-cylinder, connected to band-wheel 20 by a belt, all constructed to impart uniformly-variable speed to the doffers, as described.

2. The combination, with the card-cylinder



and the geared doffers, of a pinion engaging with the doffer-gears, the shaft 19, the elliptical gears 17 and 18, the shaft 30, provided with the gears 29 31, the rocker-arm by which the doffers are reciprocated, and intermediate connections constructed to impart reciprocating motion to the doffers, as described.

3. The combination, with the card-cylinder and the doffers having gears, of a shaft having a pinion engaging said gears, means for driving said shaft at a uniformly-variable speed, the beveled gear 28, the rocker-arm by which the doffers are reciprocated, the shaft 30, provided with the gears 29 and 31, the beveled gear 32, the cam-shaft 33, and connections between the cam-shaft and rocker-arm, whereby the latter is reciprocated, as described.

4. The combination, with the card-cylinder, the doffers, and means for revolving the doffers at a uniformly-variable speed, of the rocker-arm by which the doffers are reciprocated, the beveled gear 28, the shaft 30, provided with the gears 29 and 31, driven by the doffer-rotating mechanism, the shaft 33 and gear-wheel 32, the cam 34, and the cam-rocker connecting the cam with the rocker-arm, as described.

5. The combination, with the card-cylinder and the doffers, of means for rotating said doffers at a uniformly-variable rate of speed, and mechanism for simultaneously reciprocating the doffers, whereby a roving of different colored or kinds of material, and having uniformly-variable diameters throughout its length, is produced, substantially as described.

6. The combination, with the card-cylinder and the doffers, of the vertical rocker-arm by which the doffers are reciprocated, mechanism for imparting variable speed to the doffers, the beveled gear 28, the inclined shaft 30, provided with the gears 29 and 31, the beveled gear 32, the shaft 33, the cam 34, the cam-rocker 42, provided with the slot 43, and the adjustable fulcrum-pin 44, constructed to impart reciprocating motion to the doffers, as described.

7. The combination, with the card-cylinder having the doffers, and mechanism for imparting uniformly-variable speed to them, of the pinions 28 and 29, the shaft 30, pinions 31 and 32, the cam 34, the cam-rocker 42, and

the rocker-arm 37, constructed to impart reciprocating motion to the doffers, as described.

8. The combination, as hereinbefore set forth, with the main cylinder and the reciprocating doffers supported near thereto and provided with driving means, of a pivoted rocker-bar having the ends of the doffers journaled thereon, and a cam-rocker engaging and rocking the bar, a cam-shaft having a cam engaging the cam-rocker and provided with the pinion-wheel, and a shaft receiving its motion from the said driving means of the doffers and provided with a gear driving the pinion-wheel of the cam-shaft, substantially as and for the purpose herein set forth.

9. The combination, as hereinbefore set forth, with the main cylinder and the reciprocating doffers 10, provided with means for driving the same, and provided with the journals 35, of the pivoted rocker-bar 37, having the journals 35 mounted thereon, the cam-rocker 42, provided with a fulcrum having means of adjustment, the cam-shaft 33, provided with the cam 34 for actuating the cam-rocker, and provided with the bevel-gear 32, the shaft 30, provided with the bevel-gear 31, meshing with the gear 32, and said shaft receiving its motion from the driving means of the doffers, substantially as and for the purpose herein described.

10. The combination, as hereinbefore set forth, with the main cylinder 6, of the reciprocating doffers 10, provided with the journals 35, and having the gears 14, means for driving the doffer-gears, the rocker-bar 37, pivoted at 38, and the bracket 40, provided with the spindle 39 for the rocker-bar, the pivot-bearings 36 for swiveling the journals 35 to the rocker-bar, the cam-rocker 42, provided with eye 41 and slot 43, and the adjustable fulcrum pin or bolt 44, the cam-shaft 33, provided with the gear 32 and the cam 34 for oscillating the cam-rocker, the inclined shaft 30, provided with the bevel-gear 31, meshing with gear 32, and having the bevel-gear 29 mounted upon the upper end thereof, and the bevel-gear 28, driving the gear 29, substantially as and for the purpose herein described.

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