

No. 656,403.

E. GESSNER, Dec'd.

Patented Aug. 21, 1900.

D. GESSNER, Administrator.

CARDING ENGINE.

(Application filed Mar. 30, 1895.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.

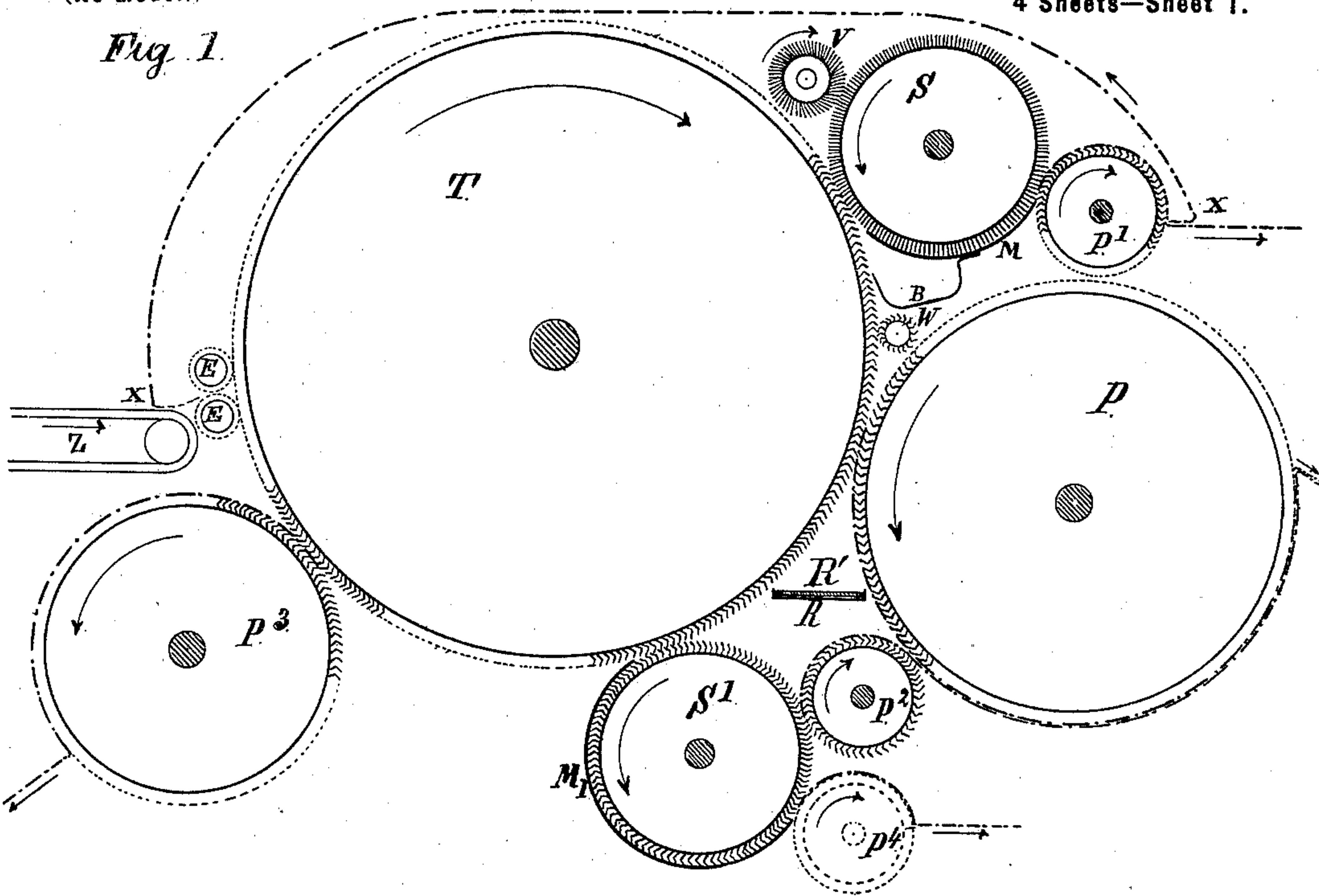
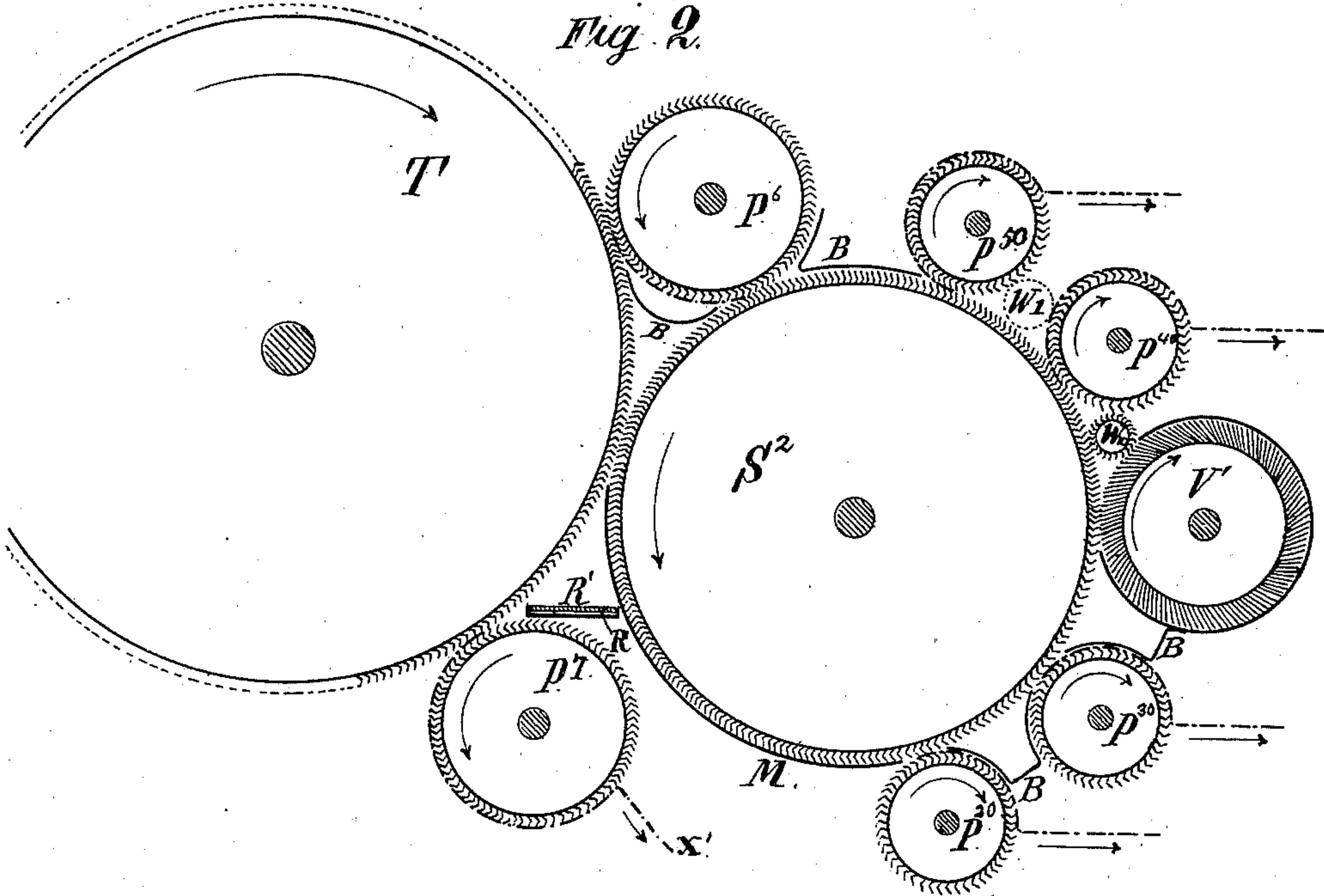


Fig. 2.



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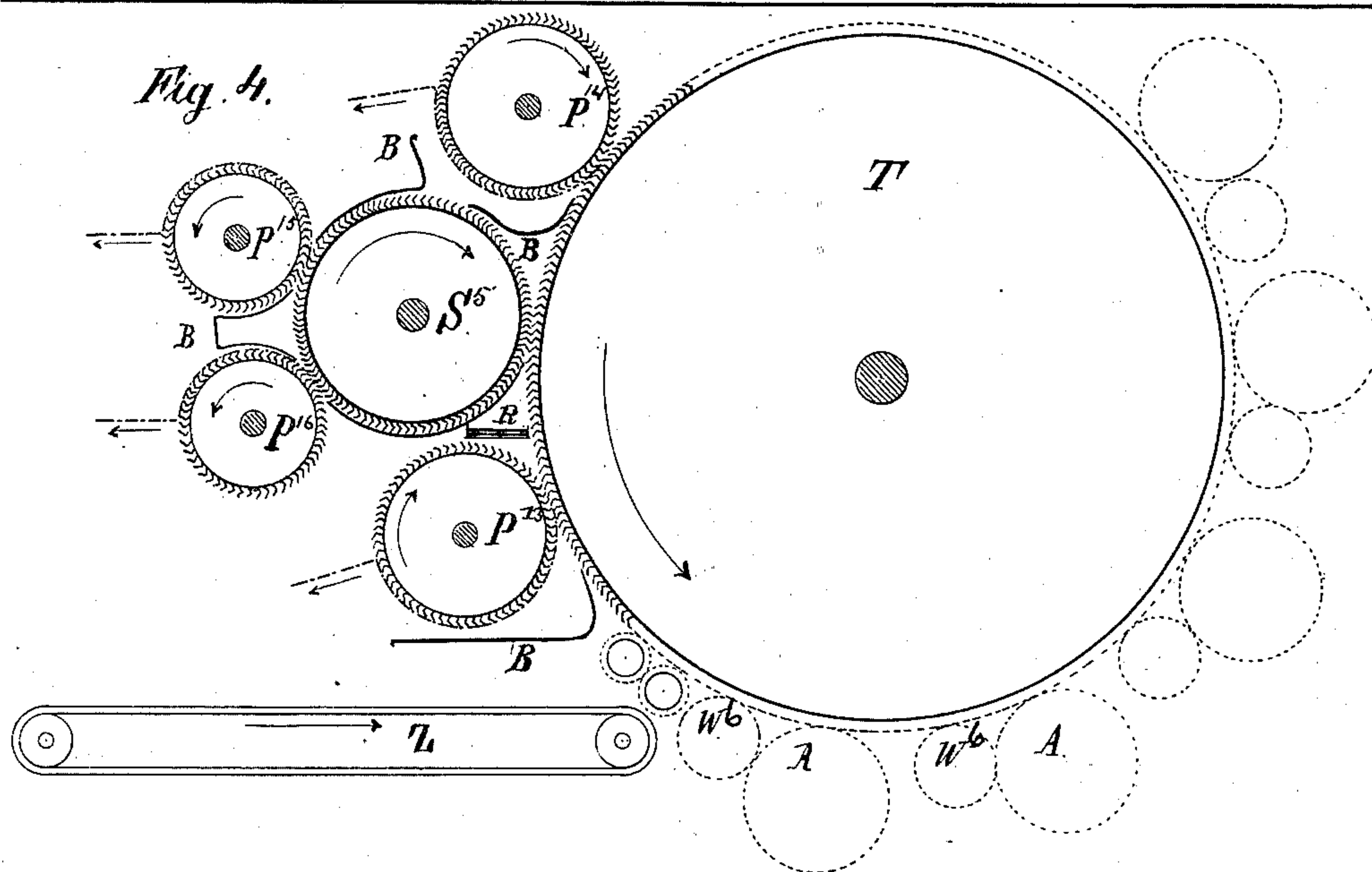
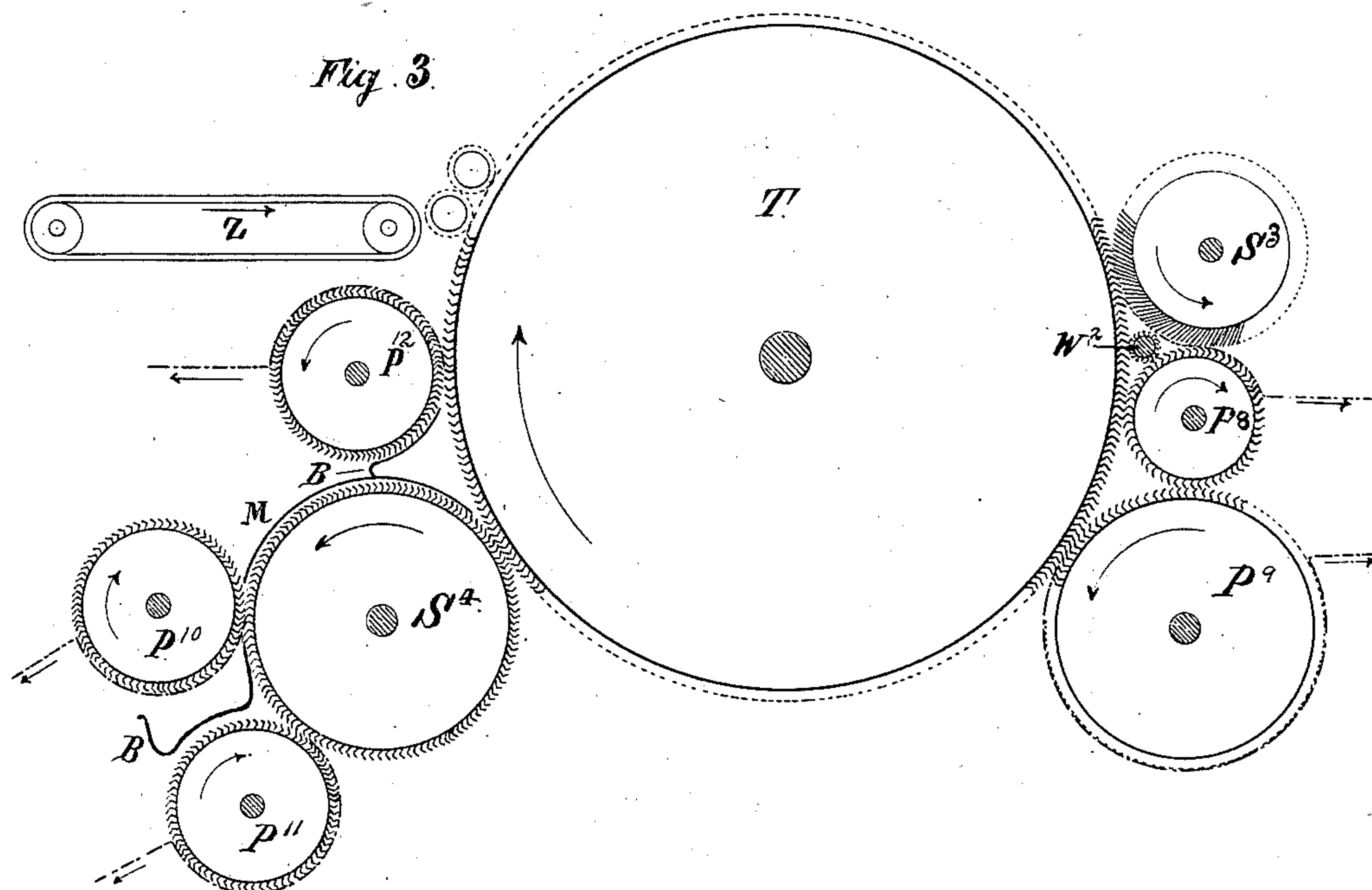
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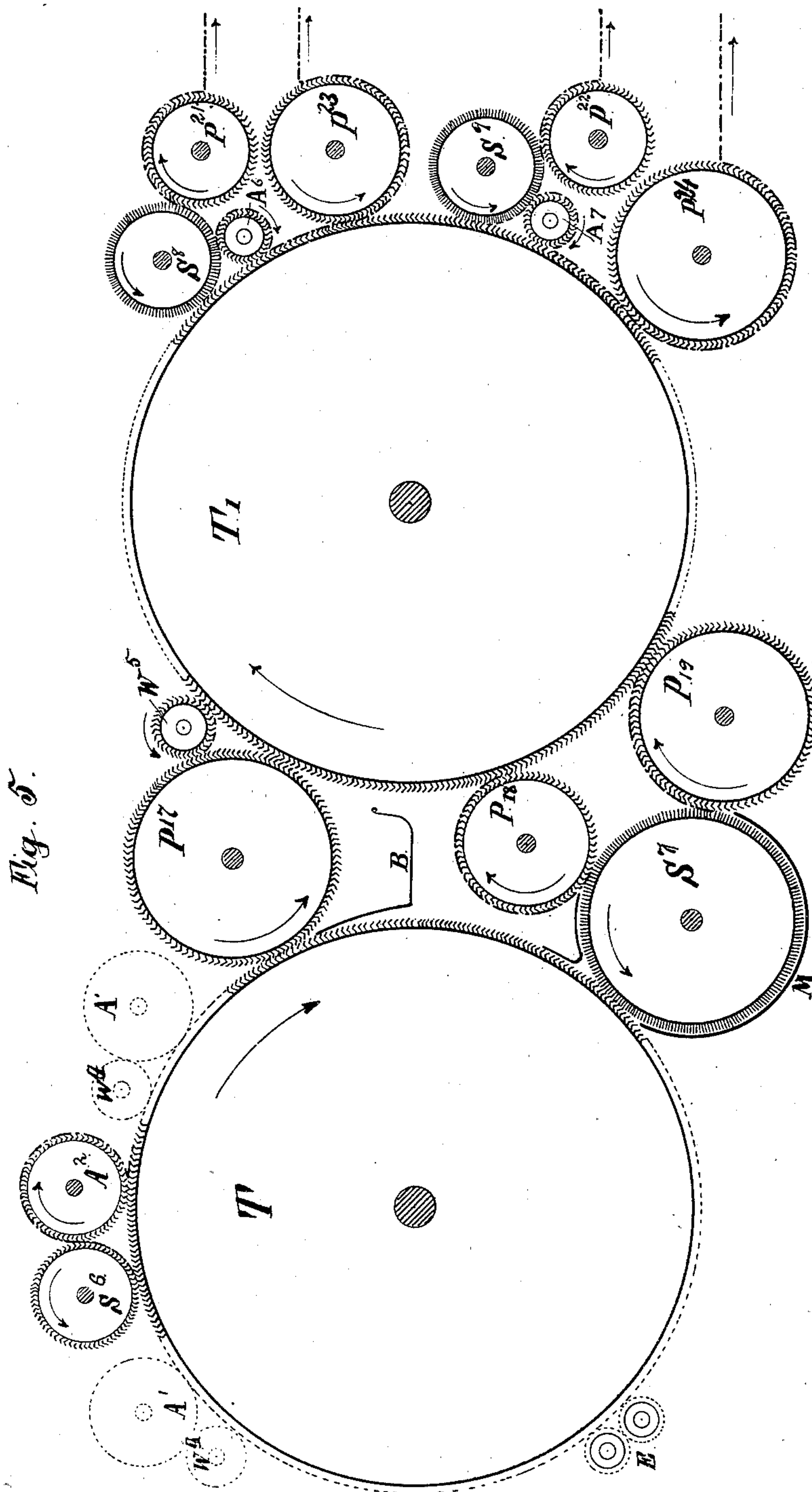
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4 Sheets—Sheet 3.



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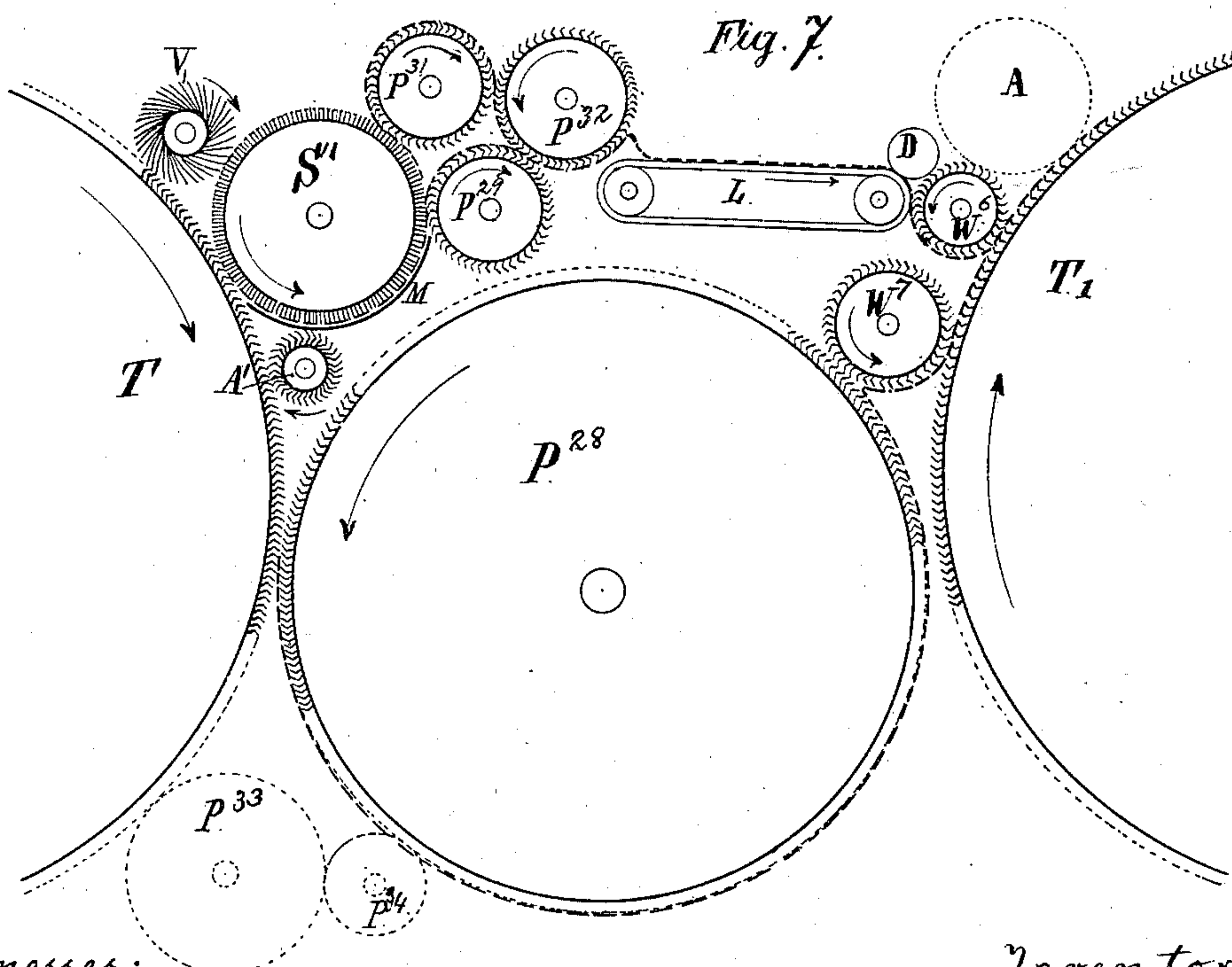
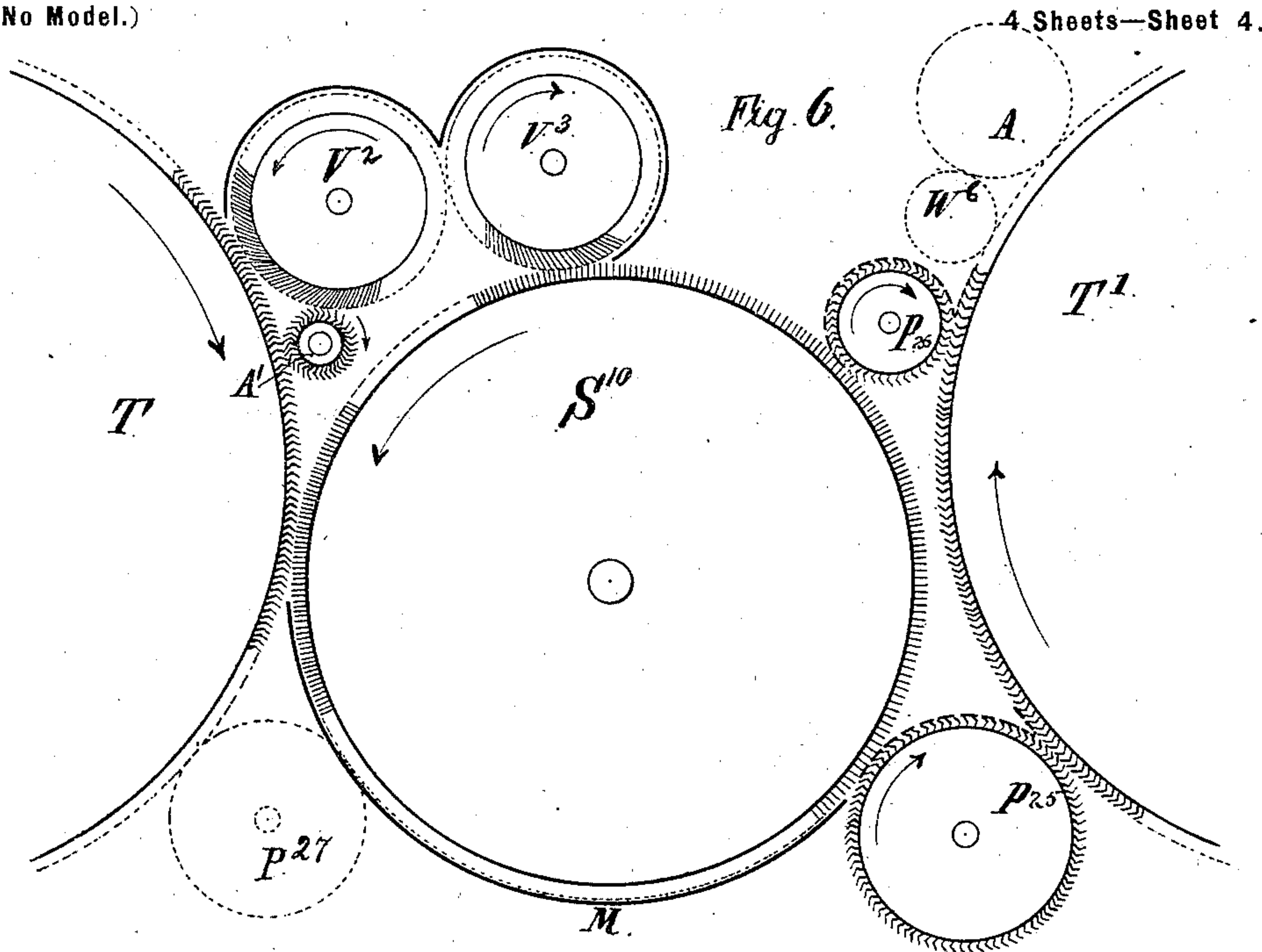
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CARDING ENGINE.

(Application filed Mar. 30, 1895.)

(No Model.)

4 Sheets—Sheet 4.



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UNITED STATES PATENT OFFICE.

ERNST GESSNER, OF AUE, GERMANY; DAVID GESSNER ADMINISTRATOR
OF SAID. ERNST GESSNER, DECEASED.

APPARATUS FOR CARDING WOOL.

SPECIFICATION forming part of Letters Patent No. 656,403, dated August 21, 1900.

Application filed March 30, 1895. Serial No. 543,787. (No model.)

To all whom it may concern:

Be it known that I, ERNST GESSNER, machine-builder, of Aue, in the Kingdom of Saxony, German Empire, have invented new and useful Apparatus for Carding Wool and other Fibrous Materials, of which the following is a full, clear, and exact description.

In carding-engines now devised the function of the "fancy" is to brush up or lift the fleece which has entered into the teeth of the main drum or swift, in order that it may be better transferred to the doffer which immediately follows the fancy. Besides, the fancy in thus operating usually takes up and throws away a certain quantity of wool technically known as "fly-waste," and this is regarded as a defect, and in order to remedy which a stripper has been provided to collect the "fly-wool" from the fancy and return it to the drum.

My improvement in carding consists in causing this peculiarity of the operation of the fancy—to take up and throw away a certain portion of the material—to be so increased that a new and useful result is obtained, and the fancy is caused to take off from the drum a more or less thick surface layer of fleece or wool, which is then, either singly or combined with other fleeces, carried away for further treatment by suitable means. This I accomplish by making the fly-roller replacing the fancy run at such speed that its surface adjacent to that of the swift or other card-carrying surface, although running in the same direction as the latter, has a sufficiently-greater velocity than that of the swift to either partially or entirely take or suck off the surface of the fleece material or stock from the swift, aided by the gust of air consequent on its own revolution, the roller being for this purpose clothed with a suitable covering. The fleece taken off by the said roller may be condensed or formed into one or more layers by suitable means and carried away for further treatment. As the characteristic feature of the new roller is that it runs at a quicker speed than usual and that it is in the nature of a fast-running fancy-roller, I will everywhere in this description designate it as a "fly-roller." Owing to its very high velocity, the new fly-roller would were its teeth to catch sufficiently deep

into the teeth of the card-carrier take up from the latter all the material contained therein in a simple and perfect manner; but the material would be drawn through the teeth of the card-clothing, torn asunder, and damaged, and therefore only a very subtle contact of the teeth of the card-clothing is permissible, such as now executed by the common doffer; but it will be still far better for the material and its fibers will be better preserved from being torn if the teeth of the clothing of the new fly-roller do not touch the card-teeth at all and if the material is taken up or sucked off from the swift or other card-clothing, either partially or entirely, merely by the gust of air, which is determined by or depends on the revolution of the fly-roller itself, its position with regard to the surface of the swift and, finally, by the nature of its surface, which may be furnished with any suitable covering adapted to produce the gust of air required. Several such fly-rollers may be employed in the same carding-engine, and they may run at the same or different speeds. The new fly-roller may be employed in combination with now-existing fancy-rollers and doffers, and it may be made of smaller or greater diameter. Furthermore, one or more card-clothed working-rollers for the purpose of transferring the fleece may be employed between the new fly-roller and the swift.

The new fly-roller has preferably a brush-like clothing, the teeth of which are set in radial direction, and in running each of these teeth will act in a manner analogous to the wing of an exhaust-fan. When the teeth of the two clothings of the swift and the fly-roller are coming in contact with one another, the sucking effect of the gust of air will be considerably supported or assisted. Owing to the very high speed of the new fly-roller, the great number of its card-teeth produce a stratum of rarefied air about its surface or circumference, whereby, corresponding to the velocity of the fly-roller and to its position nearer to or farther from the swift, the fleece resting in the teeth of the drum will be sucked off, either partially or entirely, in order to be carried farther and formed into one or more layers by suitable means—as, for instance, by sucking it onto a roller, as in cotton-bat-

ting machines or by stripping it at a doffer in the usual way.

Reference is to be had to the accompanying drawings, forming part of this specification, wherein I have in the several views illustrated several modifications of the machinery for carrying my invention into effect which cannot be definitely described by the short description of the figures usually occurring at this place in patent-specifications.

In Figure 1, T is the swift or drum of a carding-engine, and S is the new fly-roller operating according to my present invention, its surface speed and position with regard to the swift being such that it takes therefrom a certain portion of the surface of the material sufficient for forming a fleece, which is delivered to the doffer P', from which it is then either removed in the direction of the arrow, or, as shown by dotted lines *x*, carried back above the carding-engine by any suitable means to the feed table Z and rollers E E in order to be worked again. It is a matter of experience that the portion of material lying uppermost on the surface of the drum is the least worked and therefore requires to be more carefully worked over. This bringing back of the uppermost and least-worked portion of material can be performed in all the arrangements hereinafter described in the same or in a similar manner. In order to insure that the material taken off from the drum shall be safely and entirely carried forward to the point where it is delivered to the doffer P', the lower surface of the fly-roller is surrounded with a cover or mantle M, whereby the inside floating gust of air is separated from the outer air, so that the material can be carried along with it. The teeth of the drum and the fly-roller by coming in contact with one another at the high speed of the fly-roller will become worn, whereby the teeth of the fly-roller S will be blunted or dulled in the direction of its movement, while those of the drum will be ground or sharpened. When the teeth of the fly-roller S do not come in contact with those of the drum, then the teeth of the fly-roller, which are set in a radial direction, can be sharpened by the fancy-like roller V, which sharpening will in certain cases compensate for the contact of the teeth in so far as the teeth so sharpened are very well qualified for seizing and carrying farther the material, whereby the effect of the gust of air will be considerably sustained and increased. In such case it will be of advantage to have the fly-roller S supplied with a fancy-like roller V, arranged above and entering by its clothing into the teeth of the fly-roller S, the teeth being sharpened, owing to the greater speed of roller V, this latter at same time lifting or brushing up from the teeth of the fly-roller S those portions of material left therein, the consequent waste being thrown by the gust of air onto the surface of the revolving drum. As before mentioned, the radial position of the teeth of the fly-roller's clothing allows of

the parts being adjusted so that the teeth on the fly-roller may or may not be made to touch those of the drum. When the teeth do come in contact, the teeth of the fly-roller may be inclined in a tangential and somewhat backward direction similar to the clothing of a fancy, in which case the transportation of the material is performed by the gust of air only, sustained by a mantle surrounding the fly-roller, and the teeth of the fly-roller are thereby continuously sharpened and the clothing does not clog with waste. When the teeth do not touch each other, the radial teeth of the fly-roller may be set in a somewhat-forward direction, so as to act similarly to the common carding-teeth of working rollers, whereby the fleece will be retained and carried farther without requiring a mantle, as before described. The teeth of the fly-roller, whether set in the forward or backward direction, may also be made with knees like those of ordinary card-clothing, as shown in Fig. 2. The teeth of the fly-roller, whether set forward or backward, act, as above mentioned, like the wings of an exhaust-fan in sustaining and increasing the production of a gust of air moving with the revolving fly-roller, which is equally effective if the teeth are bent in the forward or backward tangential direction. I therefore preferably employ such kind of clothing for the fly-roller, although any other suitable rough surface will suffice which will similarly bring along with it a gust of attenuated air and to which the fleece will adhere. The fly-roller, besides taking the fleece from the drum T, lifts or brushes up a certain portion of the remaining material to the points off the teeth of the drum, so that it may be fully taken off from the same by the next following doffer P, from which this portion of material or fleece is taken off again and carried farther. For collecting and removing the dirt a small trough B is arranged above the doffer, and a small roller W for taking up and distributing the arising waste. Another trough R, arranged below the doffer, is traversed by a running belt R', so as to remove the dirt to the side of the machine, all of which will be well understood without further illustration. The material which still remains on the drum is then partially taken off by the second fly-roller S', surrounded with the mantle M' operating similarly to the fly-roller S, and the remainder of the material is lifted up to the teeth of the drum. The clothing of the fly-roller S' has its teeth bent in the forward direction like ordinary card-clothing. The fleece taken off by the fly-roller S' is deposited on the doffer P², from which it is delivered to the doffer P, whereon two fleeces will thus be united. By making the fly-roller S' run at a correspondingly-higher speed a second doffer P⁴, as shown in dotted lines, may be applied to the same. The above-mentioned remainder of material lifted up by the fly-roller S' will then be removed from the drum directly by the doffer

P³, from which it is then carried farther in the direction of the arrow. In this manner the drum will be fully cleared from all material by means of the two fly-rollers S S' and two doffers P and P³, so that it may be fed with or receive a corresponding quantity of new material, which is fed in the usual well-known manner by the feed-table Z and feed-rolls E E. Any suitable number of fly-rollers S and doffers P may be employed and the machine varied to suit requirements.

In Fig. 2 there are only one fly-roller S² and two doffers P⁶ P⁷. The fly-roller S², as regards the form of its teeth and its position with respect to the drum, is similar to the fly-roller S. (Shown in Fig. 1.) The fly-roller S² has a greater diameter than that shown in Fig. 1, so that more doffers for taking off the fleece may be arranged around its circumference. In this figure four doffers P²⁰ P³⁰ P⁴⁰ P⁵⁰ and a fancy V' are arranged around the fly-roller S² for lifting up the fleece and at the same time for grinding or sharpening the teeth of the clothing. Troughs B and small rolls W¹⁰ W' are located below or behind the doffers, the fancy, and fly-roller, as shown in the drawings, for collecting the waste and dirt. The lower part of the fly-roller S² is surrounded by a mantle M, and in the free space between the drum T, the fly-roller S², and doffer P⁷ a trough R is arranged, traversed by a movable belt R' in order to remove the dirt to the side of the machine. The two doffers P⁶ P⁷, arranged close to the drum, take off from the same certain portions of fleece material. The fleece taken off by doffer P⁶ is deposited on the surface of the fly-roller S². The fleece which has been taken off by doffer P⁷ is carried along in the direction of the arrow x'; but the doffer P⁷ can also be arranged close to the fly-roller S² in order to deposit its fleece on the surface of S².

In Fig. 3, T is the swift, and S³ S⁴ are two fly-rollers. In this case the fly-roller S² has a long brushlike-clothing and its teeth may come in contact with the teeth of the swift, and its velocity may be such that a certain portion of fleece will be sucked off from the drum in order to be transferred to the doffer P⁸. No mantle is here applied to the fly-roller S³, but between the doffer P⁸ and the swift T a small roll W² is located for taking up and distributing the fly-wool. The further portion of material loosened by the fly-roller is then taken off from the drum by the second doffer P⁹. At the other side of the drum, below the feed-table Z, a second fly-roller S⁴ with usual knee-bent card-clothing takes a fleece from the swift without coming in contact with the same and transmits it to the two doffers P¹⁰ P¹¹, between which a sheet-iron trough B is located for receiving the dirt. The fly-roller S⁴ is partly surrounded with a mantle M for the purpose before mentioned. The remaining fleece is removed from the swift by doffer P¹². The fly-rollers and doffers

may be employed in a greater or smaller number.

In Fig. 4 the swift T runs in the opposite of the usual direction, ordinary workers A and strippers W³ being arranged below and at the rear side of the swift, as shown in dotted lines, a fly-roller S⁵ and doffers being arranged at the front of the machine, above the feed-table Z. The fly-roller S⁵, clothed with ordinary card-clothing, is located between the doffers P¹⁴ and P¹³ at the front of the swift. Sheet-iron troughs are applied, as shown at B and R, for taking up and removing the waste and dirt. The fly-roller S⁵ takes a superficial layer of fleece from the swift T and gives it up to the doffers P¹⁵ and P¹⁶, from whence it is carried along for further treatment in the direction of the arrow. Several such fly-rollers and doffers may be employed, as mentioned in reference to Fig. 3.

Fig. 5 shows a two-cylinder carding-machine comprising two swifts T T', whereof the first is provided with usual workers A' and strippers W⁴, (shown in dotted lines,) in combination with the fly-roller S⁶, which replaces the fancy and which, by means of its card-clothing furniture, lifts up the material lying on the surface of the drum and takes off a certain portion of the fleece. This is then deposited upon the worker A², serving as a stripper for the fly-roller, from which it is returned to the swift to be further worked by rollers W⁴ A' and taken off by doffer P¹⁷ and partially transmitted, by means of stripper W⁵, to the surface of the second swift T'. The fly-roller S⁷, partly surrounded with a mantle M, for the purpose above described, and having brush-like clothing, takes from the swift T a second fleece, which is transferred by the two doffers P¹⁸ P¹⁹ to the surface of the second swift T'. The teeth of the fly-rollers S⁶ S⁷ do not come in contact with those of the drum. From the second swift T' the fleece is taken away by means of two fly-rollers S⁸ S⁹, each having one adjacent doffer P²¹ P²² and workers A⁶ A⁷, respectively. The fly-rollers S⁸ S⁹ have brush-like radially-set clothing, and their velocity is regulated so as to take away a certain fleece of wool from the swift T'. That portion of wool which lies uppermost on the surface of the fly-rollers S⁸ S⁹ and which is less worked will therefore be returned by workers A⁶ A⁷ to the swift to be worked once more and from the swift transferred to the succeeding doffers P²³ and P²⁴, which are arranged close to the swift. The better-worked material is taken away from the fly-rollers S⁸ S⁹ by doffers P²¹ P²², so that the fleece is thus taken away by four doffers altogether. The number of doffers and workers may be greater or less in various arrangements, and the number of swifts comprised in a carding-engine may also be increased in so far as to be of advantage. Such carding-engines, comprising two, three, or more swifts, are preferably used in England, in which succeeding

each swift a doffer of great diameter is arranged for taking off the fleece from the first swift and transmitting it onto the second. Such cylinders of great diameter are shown in Figs. 6 and 7.

In Fig. 6 the great roller S^{10} , with radially-set brush-like clothing and mantle M, acts as a fly-roller in doffing a portion of the stock from the swift T to the second swift T', with the aid of the two doffers P^{25} and P^{26} . Another doffer P^{27} , as shown in dotted lines, can be established between the swift T and the fly-roller S^{10} to doff the remaining stock there-to. On the upper side of the swift T and the fly-roller S^{10} two fancys V^2 and V^3 are respectively arranged; but the fancy V^2 may be omitted if V^3 is located close to the swift.

In Fig. 7 the great cylinder P^{28} , arranged between the two swifts T T', is employed in the usual manner as a doffer, while the fly-roller S^{11} with the mantle M and radially-set brush-like clothing is arranged at the swift T, preceding the doffer P^{28} . The fly-roller S^{11} is rotated at a speed which will enable it to take off from the swift a portion of wool sufficient to cover the two doffers P^{29} P^{31} with fleeces, these latter being transmitted to a third doffer P^{32} , rotating at a lower speed. From P^{32} the doubled fleece is then deposited upon a feed-apron L, and by means of pressing-roll D and stripper W^6 transmitted to the second swift T'. That portion of material which has been left in the first swift and loosened by the fly-roller S^{11} is then taken off in the usual manner by doffer P^{28} and transferred, by means of stripper W^7 , to the second swift T'. As shown in dotted lines, a further doffing arrangement P^{33} and P^{34} may succeed the doffer P^{28} for the purpose of taking off the remainder of fleece from the swift and transmitting it, by means of doffer P^{28} and stripper W^7 , to the second swift T'. The taking off and transmission of several fleeces from the first doffer to the second may be otherwise accomplished.

All fly-rollers herein described may be covered with any other card or brush-like clothing, or they may be made with any other suitable rough surface, as described.

I claim—

1. In a carding-engine, the combination of a drum or swift adapted to carry a stock of fleece to be carded, with means for effecting the removal of the surface of said stock, comprising a superficially-operating fly-roller operating to remove the fly-wool in a fleece with means for driving said fly-roller at a considerably-greater surface speed than the surface speed of the drum and effective to remove the surface only of the stock from the drum in a fleece substantially greater in amount than the fly-waste thrown off by the ordinary fancy, and a doffer arranged to subsequently operate upon the said stock whereby a plurality of layers of fleece may be separately removed from the drum for subsequent manipulation.

2. In a carding-engine, the combination of a swift or drum, a plurality of doffers one of which works in and receives the fleece directly from the drum, and a superficially-operating fly-roller operating to remove the surface only of the stock on the drum in a fleece substantially greater in amount than the fly-waste thrown off by the ordinary fancy and to transfer the said surface-layer to the other doffer.

3. In a carding-engine, the combination of a main drum or swift with fancy rolls and workers therefor, a plurality of doffers, some of which doffers work in and receive the fleece direct from the drum, and a superficially-operating fly roller or rollers operating to remove the surface only of the stock on the drum in a fleece substantially greater in amount than the fly-waste thrown off by the ordinary fancy and to transfer the same to certain of the doffers.

4. In a carding-engine, the combination of a traveling card-carrying surface adapted to carry a stock of fleece to be carded, with means for effecting the removal of the surface of said stock, comprising a superficially-operating fly-roller with means for driving the same at a greater surface speed than the surface speed of the card-carrying surface, the said fly-roller being effective to remove the surface only of the stock from the said card-carrying surface in a fleece substantially greater in amount than the fly-waste thrown off by the ordinary fancy.

5. In a carding-engine, the combination of a card-carrying surface with means for moving the same, of a fly-roller coöperating therewith and means for driving the fly-roller at such a high rate of speed as to suck from the card-clothed surface by the gust of air produced by the rotation of the said fly-roller a fleece substantially greater in amount than that thrown off by the ordinary fancy as fly-waste.

6. In a carding-engine, the combination of a card-carrying surface with means for moving the same, a fly-roller coöperating therewith and driven at a greater surface speed than the card-carrying surface and a mantle M coöperating with the said fly-roller, whereby a gust of air is produced capable of sucking off the fleece from the card-carrying surface and depositing it upon the fly-roller.

7. In a carding-engine, the combination of a drum or card-carrying surface with means for driving the same, the said drum or card-carrying surface having its teeth forwardly directed with respect to its direction of rotation, a fly-roller and a mantle therefor, whereby an air-current is produced capable of sucking off a fleece from the drum or card-carrying surface.

8. In a carding-engine, the combination of a drum or card-carrying surface with means for driving the same, the said drum or card-carrying surface having its teeth forwardly directed with respect to its direction of rotation, a fly-roller and a mantle therefor, where-

by an air-current is produced capable of sucking off a fleece from the drum or card-carrying surface and a plurality of doffers cooperating with the drum or card-carrying surface,
5 whereby the outer layer or fleece will be sucked off by the fly-roller and the fleece will be lifted after the manner of an ordinary

fancy and subsequently removed in layers by the plurality of doffers.

ERNST GESSNER.

In presence of—
EMANUEL PRESUHN,
ERNST KEHR.