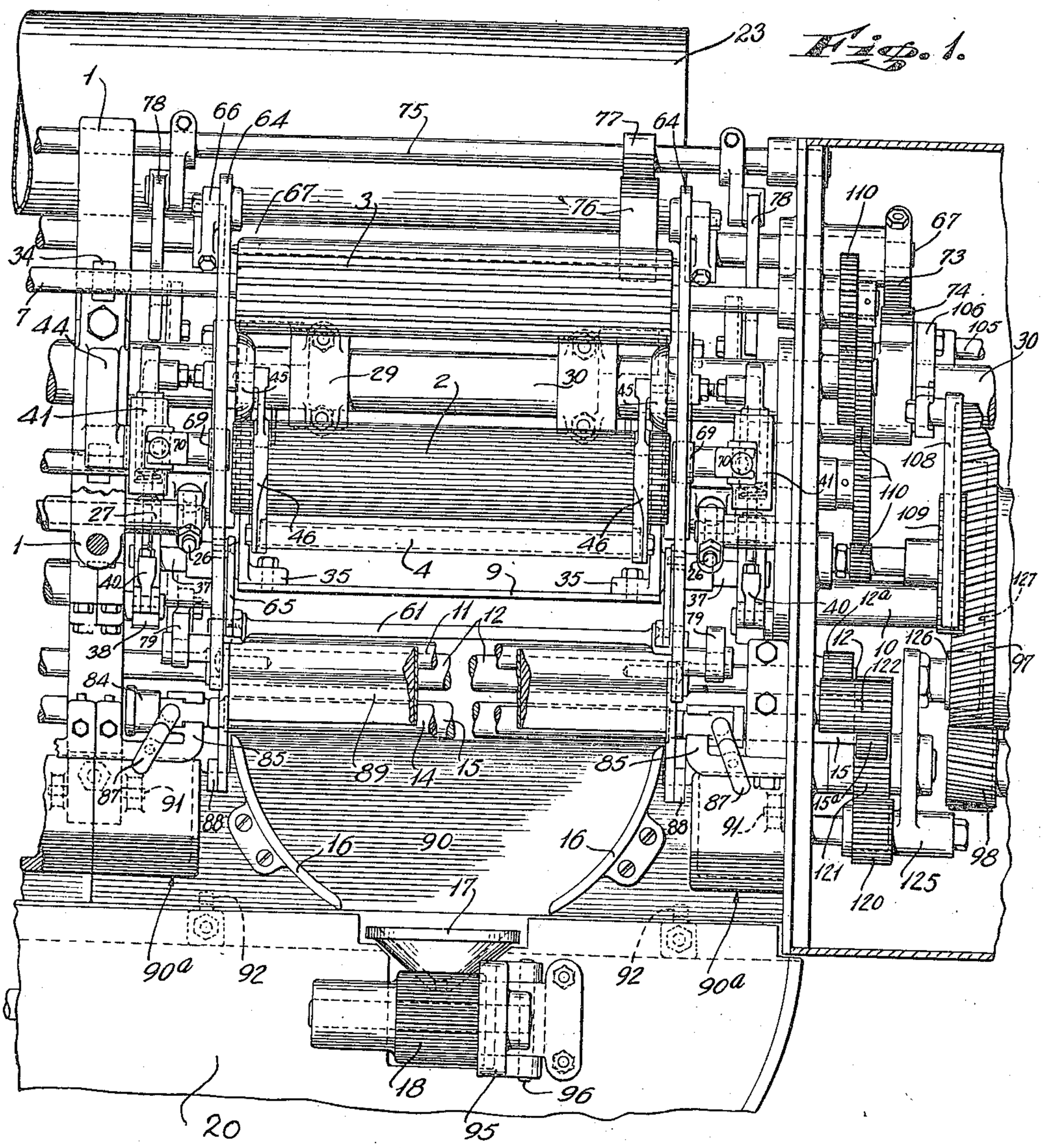
July 6, 1948. F. L. CROCKETT 2,444,554

DETACHING SYSTEM

Original Filed Oct. 2, 1940 3 Sheets-Sheet 1

Fig. 1.



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3 Sheets-Sheet 2

Fig. 3.

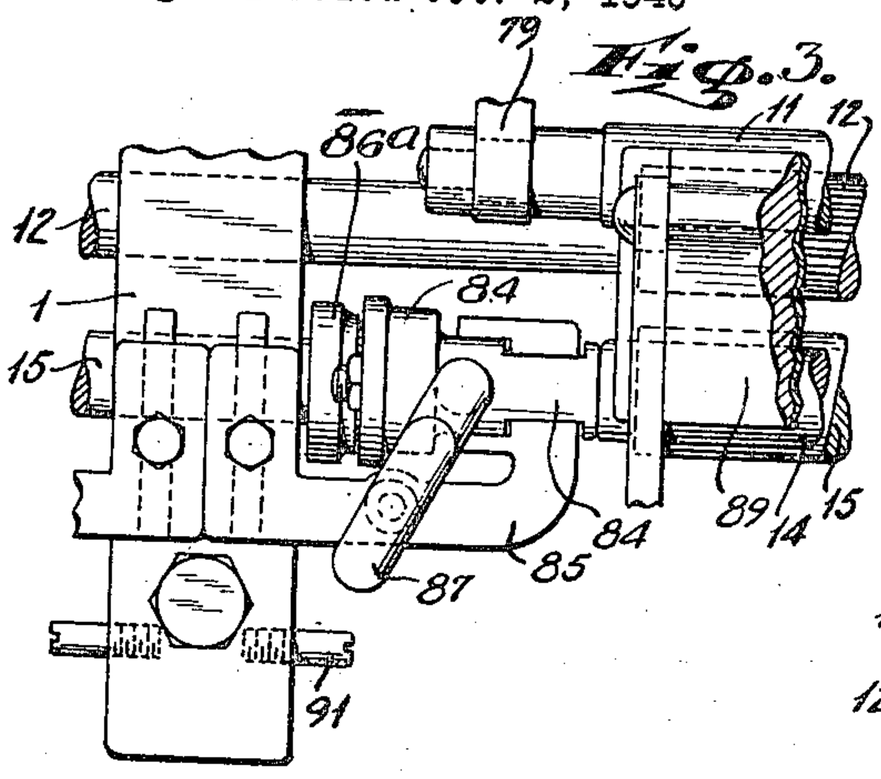
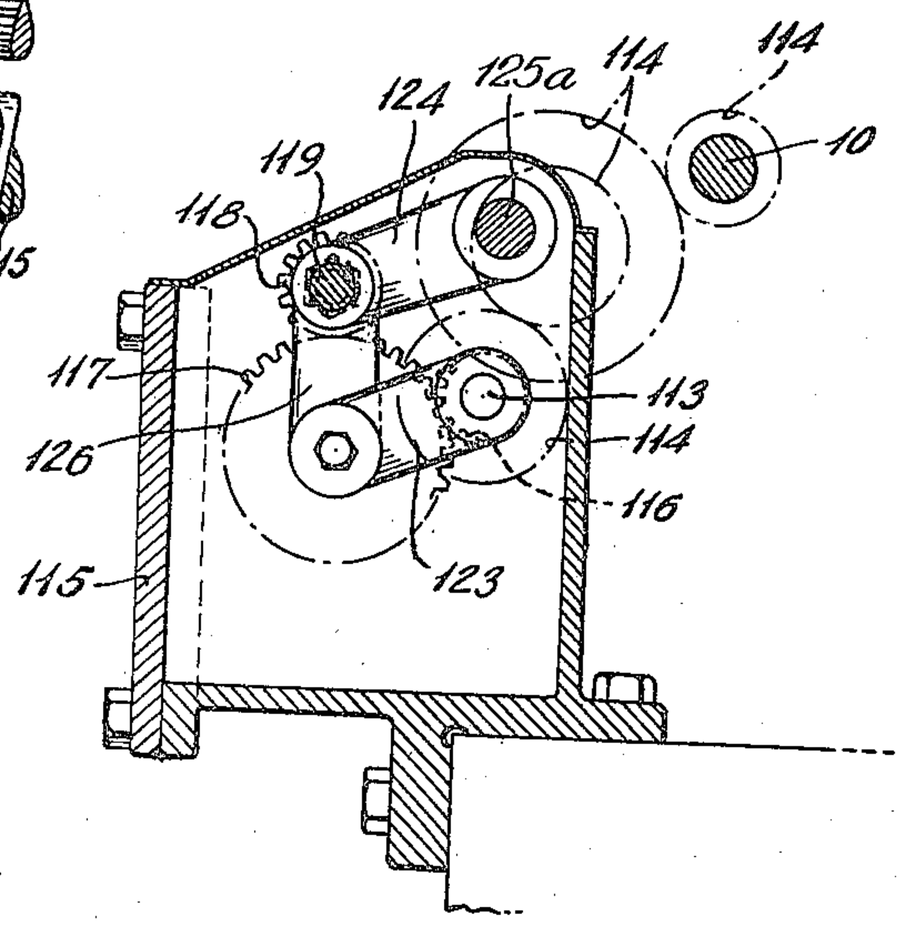


Fig. 7



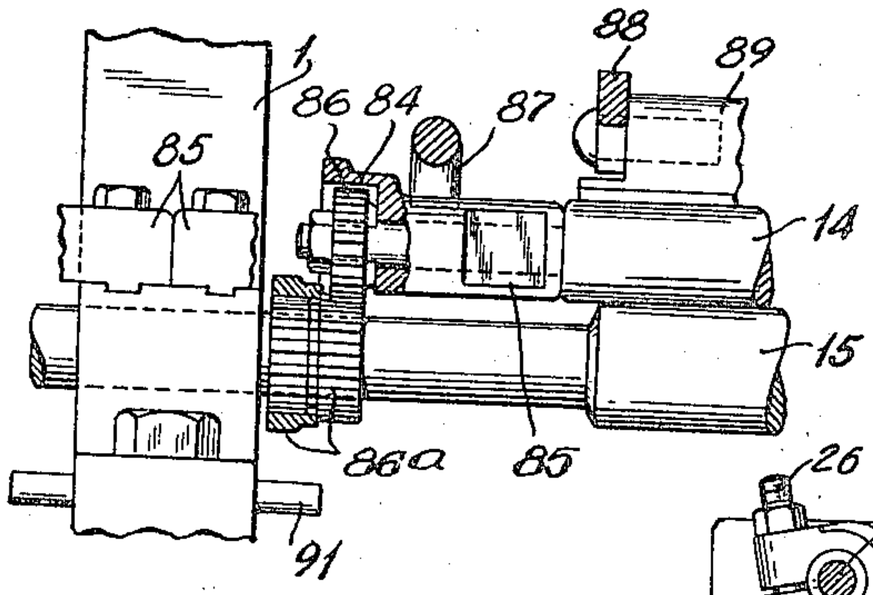


Fig. 2.

Fig. 5.

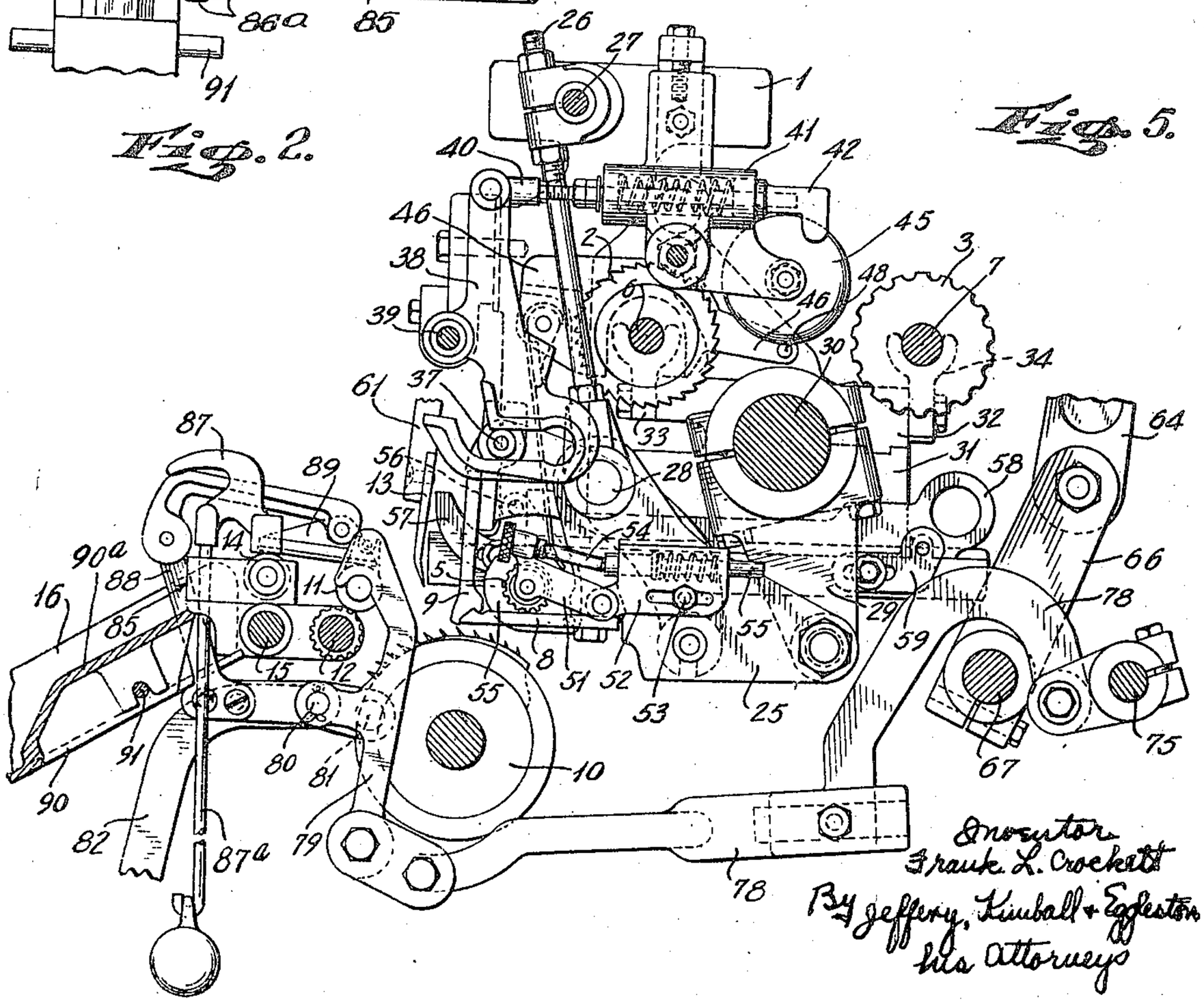


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Fig. 4.

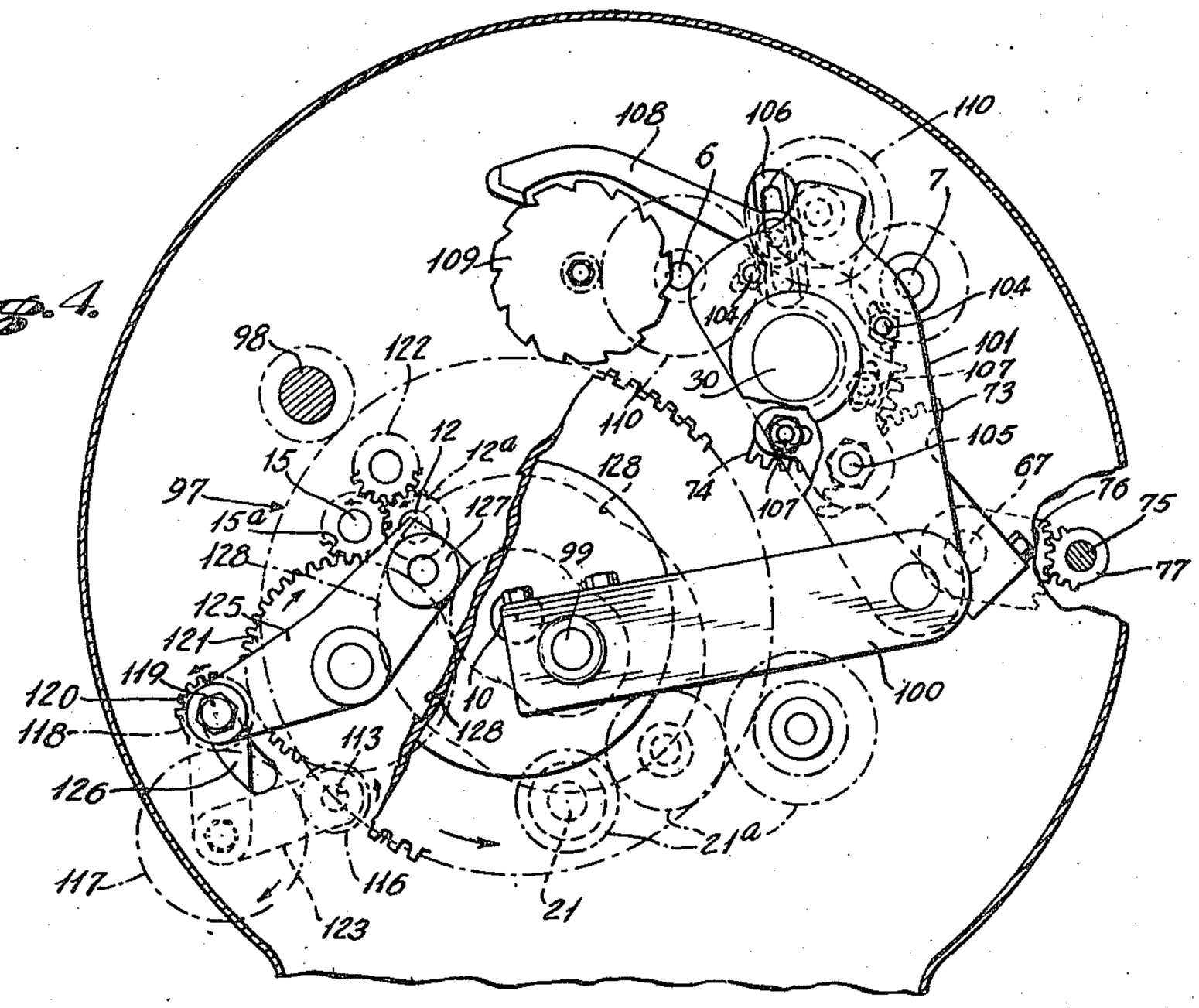
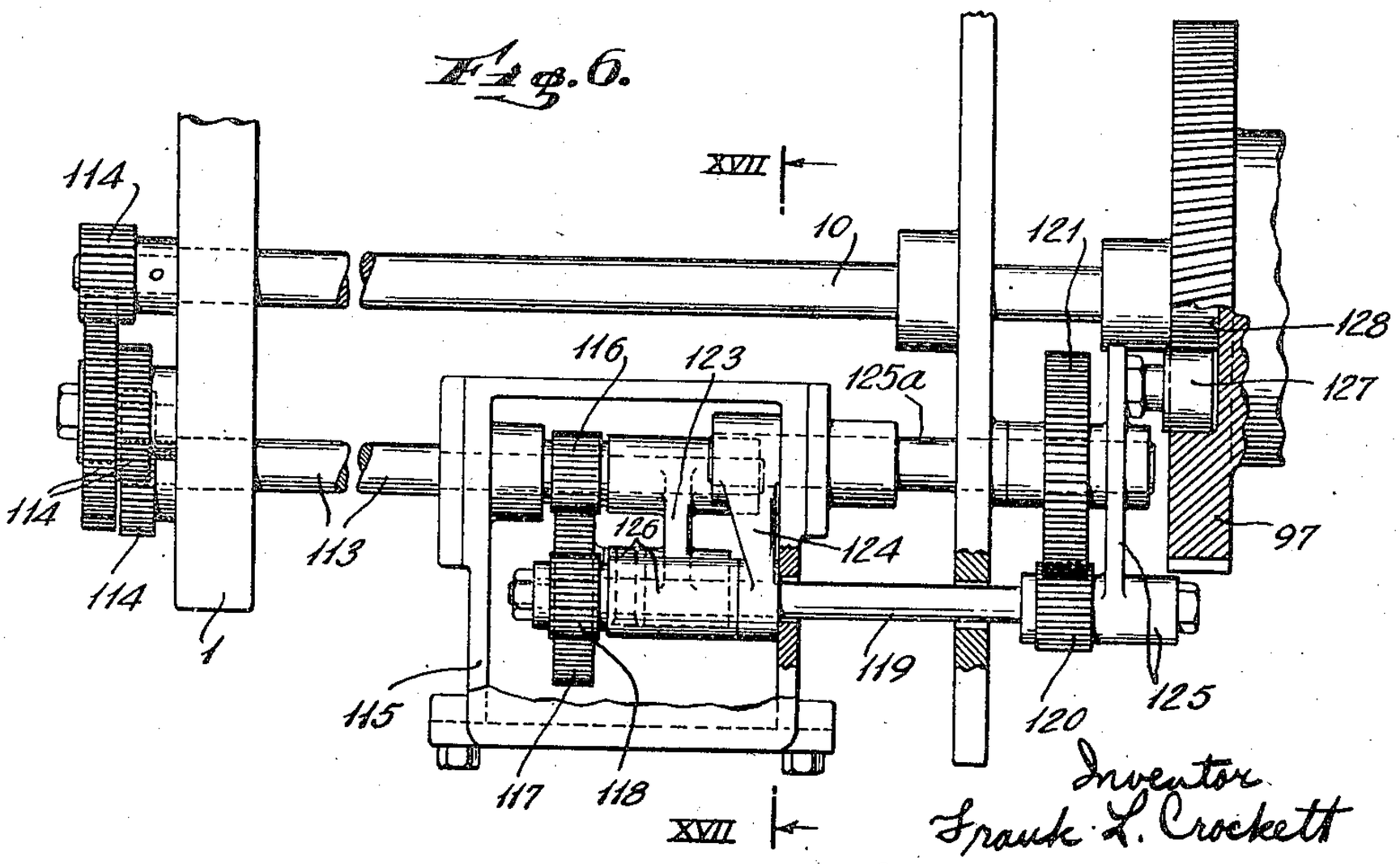


Fig. 6.



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UNITED STATES PATENT OFFICE

2,444,554

DETACHING SYSTEM

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Original application October 2, 1940, Serial No. 359,385, now Patent No. 2,353,812, dated July 18, 1944. Divided and this application August 13, 1942, Serial No. 454,751

6 Claims. (Cl. 19—121)

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This invention relates to comber detaching systems, being a division of my application Serial No. 359,385, filed October 2, 1940, Patent No. 2,353,812, dated July 18, 1944, to which reference may be had for all matter herein disclosed but not described.

The object is generally to improve the piecing of the lap and to do it by mechanism of easy action and quiet operation, and therefore to this end the invention specifically concerns the piecing rollers themselves and the means by which they are driven with an alternate forward and backward motion.

In the drawings

Fig. 1 is a top plan of one of the combing heads of a Heilmann type cotton comber, including part of the drive head and showing the detaching and piecing rollers.

Fig. 2 is a detail of the front roller.

Fig. 3 is a top plan of Fig. 2.

Fig. 4 is a diagram of the drive head.

Fig. 5 is a vertical section of the combing head.

Fig. 6 is an elevation of the epicyclic system, and

Fig. 7 is a section thereof on line XVII—XVII.

It will be understood that the row of combing heads are driven by the drive head at the end of the machine by means of various longitudinal shafts journalled in the intermediate frame uprights 1. The roll of cotton lap is supported on the creel rollers 2 and 3, on longitudinal shafts 6 and 7, and by them the lap is delivered downwardly to the nipper feed roller 5 which feeds it into the nipper jaws 8 and 9 by which its forward end is held while being combed by the comb cylinder 10.

After such forward ends have been thus cylinder-combed, the nipper jaws 8 and 9 moving forwardly, deliver the terminal tuft of combed fibers to the detaching mechanism, opening at the same time, so that the tuft may be drawn away from the body of the lap.

The detaching mechanism includes a pair of back rollers 11 and 12 of which the lower roller 12 is formed on a through shaft driven from the drive-head. They seize the front ends of the combed fibers presented to them by the nippers, and by their forward rotation separate the tuft from the lap still held by the feed roller 5 and pull it through the teeth of the top comb 13 which has been lowered for that purpose. The top comb combs the tail ends of the fibers constituting the tuft as they are drawn forward by the detaching rollers.

The detaching rollers receive the front end of

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the tuft on top of the tail end of the preceding tuft, with an appropriate overlap, thus piecing the tufts together to form a continuous fleece composed of a succession of imbricated tufts. For this purpose the rollers are given an alternate forward and backward rotation, referred to as the piecing motion. In their forward motion they detach the tuft, as just stated, and in their backward motion they return and expose a considerable length of the rear ends of the fibers in position to be overlapped by the next-arriving tuft. Preferably, though not necessarily, the axis of the top roll 11 is traversed forwardly and backwardly over the top of the bottom roll 12, in synchronism with the intermittent rotation, so as to faciiltate the overlapping process.

In the present case, the detaching mechanism includes also a pair of front rolls 14 and 15 of which the latter is a through shaft driven from the drive-head. These rotate on fixed axes and their function is to compress or consolidate the pieced fleece produced by the back rolls. They partake of the same alternating movement as the back rolls and deliver the consolidated fleece between the sliver-pan walls 16 to the trumpet 17 by which it is converted to round or sliver form and from which it is pulled by the action of the calender rolls 18, the latter rolls being on a through shaft. From the calender rolls the sliver is drawn along the sliver table 20 in the usual manner to the drawhead, not shown because it constitutes no part of the present invention. All of the foregoing is according to the standard design of this type of comber.

The top detaching roll 11 receives its traversing motion, above mentioned from the wagshaft 75 at the rear of the machine which is connected by the goose-necked link connection 78 with the stirrups 79 of that roll, which stirrups are formed as levers supported on the fulcrum axis 80. This fulcrum is a floating fulcrum carried on a short link pivoted to the frame upright at 81 (see Fig. 5) and is subject to the downward pull of a curved lever or link 82 connected to a weight not shown, thereby providing the appropriate pressure for the top detaching roll in all of its positions.

This top back roll 11 is leather-covered as usual, the bottom roll 12 being fluted also as usual, but the front detaching rolls 14 and 15 differ from all prior practice in that both are smooth-surfaced, hard, metal rollers and both are positively driven, the lower roll 15 being on a through shaft as already stated and the upper roll being geared to it. As shown by Figs. 2 and 3, the left-hand gudgeon of the top roll 14 is journalled in a

bushing 84 slabbed to fit in the straight-sided slot of an L-shaped frame bracket 85 and thereby held directly over the bottom roll 15. This gudgeon carries a small spur gear 86 fast thereon and normally covered and concealed by the belled end of the bushing. This gear meshes with an equal gear formed on or attached to the roll shaft 15 as indicated at 86*a*. Thus the top front roll 14 is positively driven by the lower roll 15. Both gears are sufficiently protected by the bell of the bushing so that their lubrication is safely isolated and kept from contact with the fiber.

Pressure is applied to the gudgeon at each end of the top roll 14 by means of a stirrup 87 (see Fig. 5) attached to the top of a weighted rod 87*a* which passes down through a guiding hole in the bracket 85. By lifting these stirrups and turning them to one side, the top roll 14 is free for removal. A common clearer cover 89 is applied to both top rolls 11 and 14, the same being link-connected to the posts 88 on the stirrups 79, so as to move with the back roll.

The novel feature of the roll assembly just described is the hard, smooth-surfaced, front rolls, both positively driven. Heretofore it has been the practice to use a steel fluted roll for the bottom roll and a soft or leather-covered top roll held on it and driven by pressure contact therewith, the theory being that since these rolls have to receive a succession of regularly overlapped tufts from the front rolls the soft grip of flutes on the leather would be least conducive to disarrangement of them. I have found that two smooth, polished rolls produce a better interlocking of the heads and tails of the freshly-laid tufts and deliver a much smoother and firmer fleece, weight for weight, provided the top roll is positively driven and this discovery is part of this invention. Only moderate weighting is required for such roll.

The two bottom roll shafts 12 and 15 are provided with pinions 12*a* and 15*a* located in the driving head or compartment, and they are geared to each other by a long-tooth idler 122 on top of them. Forward and backward rotation is imparted to the pinion 15*a* by the larger gear 121 which is itself an idler or intermediate and the drive of which is effected as follows:

As shown by Fig. 6 the end of the comb cylinder shaft 10 is connected, at the draw-head end of the machine, to drive a through counter-shaft 113 through a train of change-gears represented generally by 114. By substituting gears in this train the shaft 113 can be driven at a selected speed and such adjustment changes the ratio of the forward and backward motions of the detaching rolls as will presently appear. This shaft 113, termed the slow-motion shaft, extends through the several combing heads and terminates in a gear box 115 located in the first combing head, next to the frame-wall separating that head from the drive-head.

Within the gear box 115 the slow motion shaft 113 carries, fixed on it, a spur gear 116 which drives a somewhat larger gear 117 and which in turn drives a smaller gear 118 fast on one end of a short shaft 119. This shaft extends through a slot in the partition wall into the drive-head space where it carries a pinion 120, fast on it, meshing with the larger gear 121 above referred to as driving the pinion 15*a*.

The gear 117 is journalled in a link 123 swinging from the slow-motion shaft as a center and the shaft 119 is journalled, at one end, in a link 124 (in the gear box) and at the other end in

the arm of a cam lever 125 (in the drive-head), both link and arm being fast on the axle 125*a* of gear 121 as a center. The gear 121 is free on this shaft. The shaft 119 and the axis of gear 117 are held in fixed relation by a link 126 connecting them. The cam lever 125 is oscillated by its bowl 127 in a cam-groove 128 carried on the inner face of the main gear 97 (on comb shaft 10) and its rocking movement raises and lowers the two axes just referred to, thereby causing gear 117 to roll as a planetary gear on gear 116, on the slow-motion shaft, and gear 120 to roll as a planetary gear on the gear 121. This action, as will be understood, constitutes the orbital motion of the system and adds to the motion of gear 121 in one direction of oscillation of lever 125 and subtracts from it in the other. The degree of addition and subtraction depends on the angular velocity of the lever 125 with respect to the selected angular velocity of the slow-motion shaft 113 and the gearing is commonly so organized as to give the detaching rolls about two-thirds revolution forward and one-third revolution backward on each nip, thus providing for the overlap of the tufts, above described.

As can be observed from analysis of Figs. 4 and 7, taking note of the arrows, the backward motion of the detaching rolls occurs when the planetary gears are rocked downwardly from the position there shown and the reversal to forward direction occurs when they are swung upwards again. From the shape of the cam groove 128 it will be observed that when the planetary gears have completed one orbital excursion they remain stationary, being so held by the concentric part of the cam groove then having control of the cam-bowl 127. While this condition continues, the slow motion of shaft 113 is transmitted unmodified through the gear train to the detaching rolls, driving them slowly forward, the same as if the system were not planetary.

Thus it will be seen that the detaching rolls reverse and recover their motion in one portion of the cycle and continue in slow forward rotation at constant velocity during the rest of the cycle. Preferably the reversal and recovery take place in less than half of the cycle as indicated by the cam-groove 128, being timed to accommodate the overlap without risk of snatching of the tail end by the cylinder half-lap.

That such quick reversal of the heavy masses of the detaching mechanism can be made without shock or noise is due to the fact that the planetary system includes more than a single planetary couple. As above pointed out, gears 117 and 116 (sun-gear) constitute one couple, and gears 120 and 121 (sun-gear) constitute another. Also since link 123 and lever arm 125 are of unequal radius, the gear 118 can be regarded as planetary to planet gear 117, although its orbital path is short. These couples have their respective sun-gears on different axes and they therefore work in tandem relation, each affecting the next in the series, and the effect of thus distributing the work amongst two or several couples, is to permit a lower orbital velocity of the planet gears and hence an easy curvature for cam groove 128 such as would not otherwise be attainable in a cam element of admissible size, and this in turn makes speeds of 110 nips, or more, continuously practical and with heavy laps.

The main gear 97 above mentioned is driven by the drive-pinion 98 in the drive-head of the comber. This gear, through its crank-pin 99, the connecting rod 100 (Fig. 4) and the crank arm

101 fixed to the wag-shaft 30, rocks the latter to impart the appropriate rocking motions to the various wag-shafts of the machine.

The other numbered parts appearing in the drawing and which have no direct relation to the present invention are as follows: 4 is the sliver plate; 21 and 21a (Fig. 4) represent the gear-train for driving the scavenger mechanism of which the waste conduit appears at 23 in Fig. 1; 25 and 26 are parts of the swinging nipper frame pivoted at 27 and jointed at 28; 29 is the crank-arm of the wag-shaft 30 for swinging the nipper; 31, 32, 33 and 34 are supporting parts for the two creel shafts 6 and 7; 35 are the nipper knife arms; 37 being the nipper knife actuating stud, and 38, 39, 40, 41 and 42 being the cam-track mechanism to control the knife action; 44 is the horn-support for the knife controlling mechanism; 45 are the end guides for the lap-roll; 46 being the selvage guide for the lap; 48 is a cross-pin supporting the selvage guide; 51, 52, 53, 54 and 55 represent the parts of the lap feed-roller support and adjustments, 56 and 57 being the parts by which the feed-roller is oscillated and 58 and 59 the means whereby such parts are controlled or adjusted; 61 is a top-comb subframe supported on top-comb arms 64 and controlled by links 65; 66 and 67 are the wag-shaft members for oscillating the top comb; 69 is the roller support for the top-comb arms; 70 is the top comb adjuster; 73 and 74 are the segment gear drive for the top comb wag-shaft; 76 and 77 are segment gears for driving the nipper motion wag-shaft 75 from the top-comb wag-shaft 67; 90, 90*a*, 91 and 92 are parts of the panel structure bridging the space between the detaching rollers and the sliver apron 20; 95 and 96 are the mounting for the calender roll; 104 is the adjustment of crank arm 101 to wag-shaft 30; 105, 106, 107, 108, 109 and 110 constitute the pawl drive for rotating the creel-shafts 6 and 7. The action of the above parts is fully described in the parent specification.

It will be understood that the detaching system above described is representative only of the form of the invention as at present preferred and that there is no intentional limitation of its principles to any specific form of structure or arrangement except as specially defined in the claims.

I claim:

1. In a comber, a detaching motion comprising an operating gear train, including tandem arranged planetary couples with means for imparting orbital movements to the planets thereof and two pairs of detaching rolls driven by said train, the front pair of rolls being geared to each other and having smooth hard surfaces.

2. In a cotton comber having a back pair of detaching and piecing rolls operated to produce an imbricated fleece and a front pair of rolls receiving such fleece therefrom, the improvement which consists in said latter rolls having hard, smooth surfaces, spur gears connecting said latter rolls and a detaching motion for driving both pairs of said rolls.

3. In a comber, a detaching motion and front and back pairs of piecing rolls driven thereby, the rolls of the front pair being respectively provided with intermeshing gears and a bushing in which the top roll is journalled having a belled formation protecting said gears.

4. In a comber comprising a series of combing heads each containing a rotary comb, a top comb, forwardly and backwardly rotating detaching rolls, and nipper mechanism functioning to present the end of a fiber lap first to said rotary comb and then to said detaching rolls for tuft detachment in completion of a combing cycle, an operating gear train for driving said detaching rolls including two tandem-related planetary couples having their sun gears on different centers, means for oscillating the planets thereof to complete their orbital excursions in about one-half the combing cycle, and a slow motion drive means imparting constant forward angular motion to the gears constituting said operating train during the remainder of such combing cycle.

5. In a comber comprising combing heads each containing a rotary comb, forwardly and backwardly rotating detaching rolls, and nipper mechanism functioning to present the end of the lap first to said comb for combing it and then to said rolls for tuft detachment thus completing a combing cycle, an operating gear train for said detaching rolls comprising two tandem-related planetary couples having sun-gears on different centers, a cam for swinging the planets thereof and acting to complete their respective orbital excursions in about one-half said combing cycle, and driving means rotating at constant forward velocity acting independently of said cam and constantly connected for driving the gears constituting said operating train.

6. In a comber comprising a comb cylinder, forwardly and backwardly rotating detaching rolls, and nipper mechanism functioning to present the end of the lap first to said comb cylinder for combing it and then to said rolls for tuft detachment thus completing a combing cycle, an operating gear train for said detaching rolls comprising a slow-motion shaft having a constant angular motion and operatingly constantly connected with the gears constituting said train, tandem-related planetary couples included in said train having their sun gears on different centers, and a separately driven cam for oscillating the planets of said couples back and forth about their respective sun-gears and adapted to reverse the motion imparted by said slow motion shaft on each of said cycles.

FRANK L. CROCKETT.

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