

Nov. 14, 1939.

R. E. RUNDELL

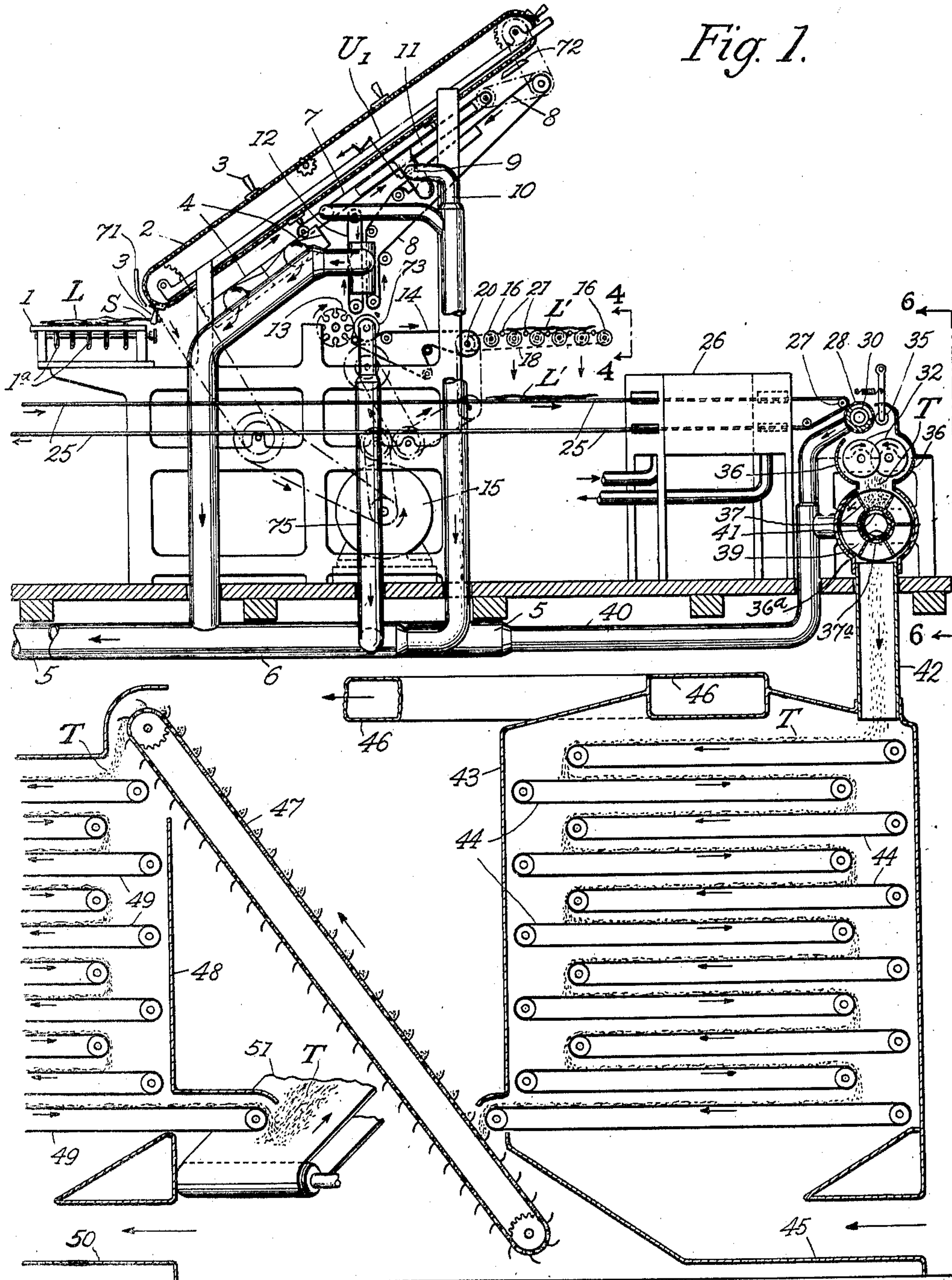
2,179,644

TOBACCO HANDLING AND PREPARING

Filed Nov. 23, 1934

3 Sheets-Sheet 1

Fig. 1.



INVENTOR
Robert E. Rundell
BY
Sydney B. Prescott
ATTORNEY

Nov. 14, 1939.

R. E. RUNDELL

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3 Sheets-Sheet 2

Fig. 2.

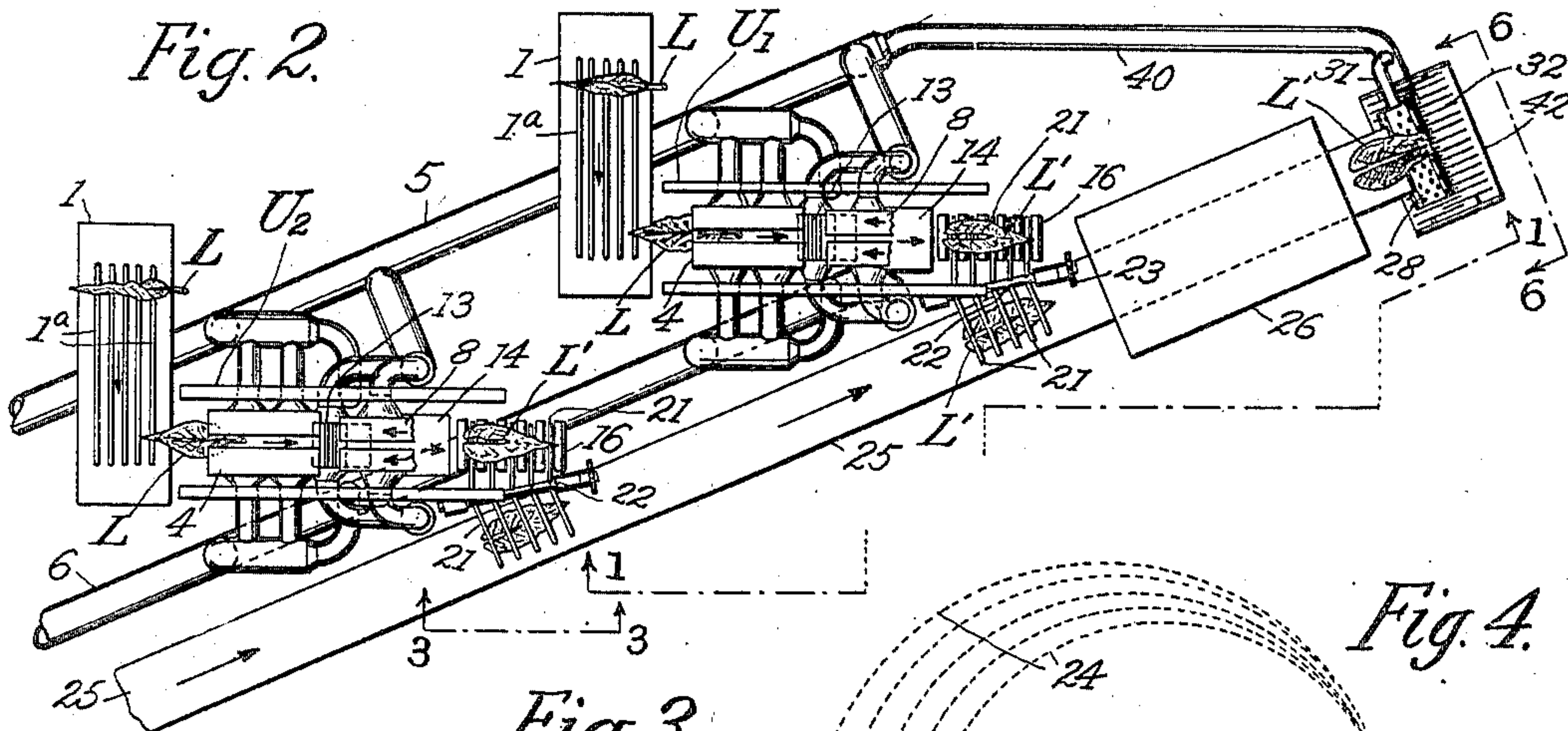


Fig. 3.

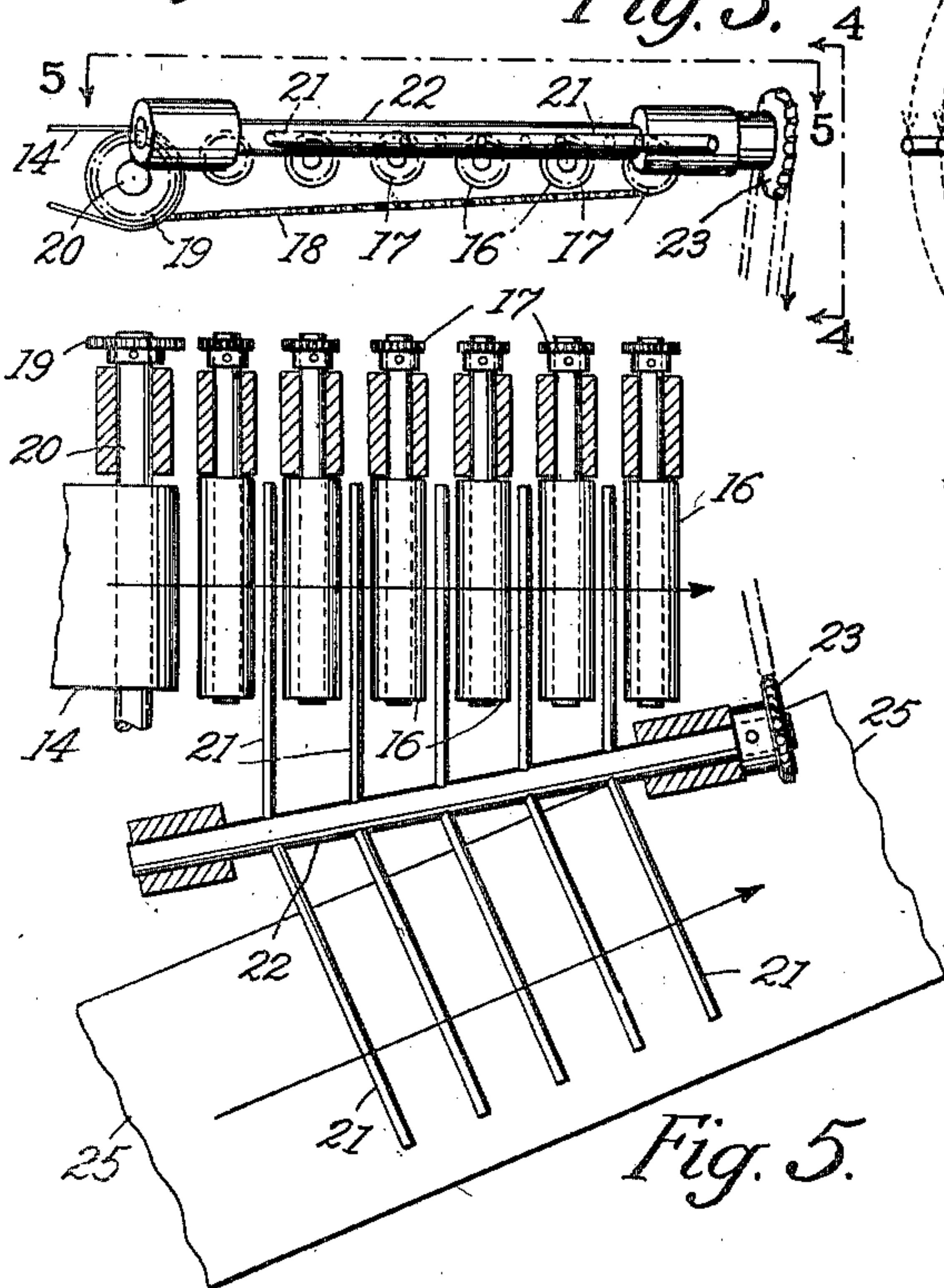


Fig. 4.

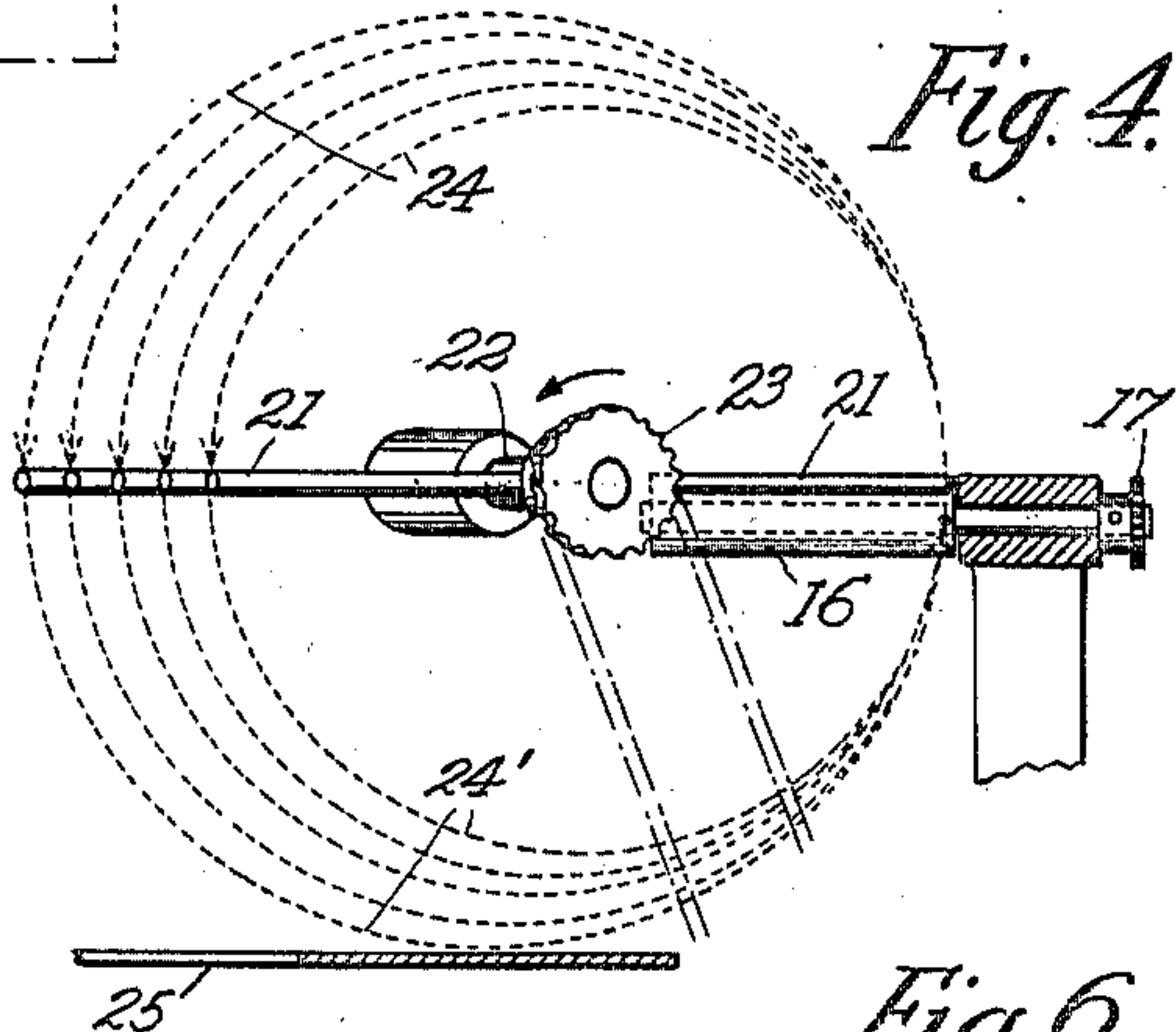


Fig. 6.

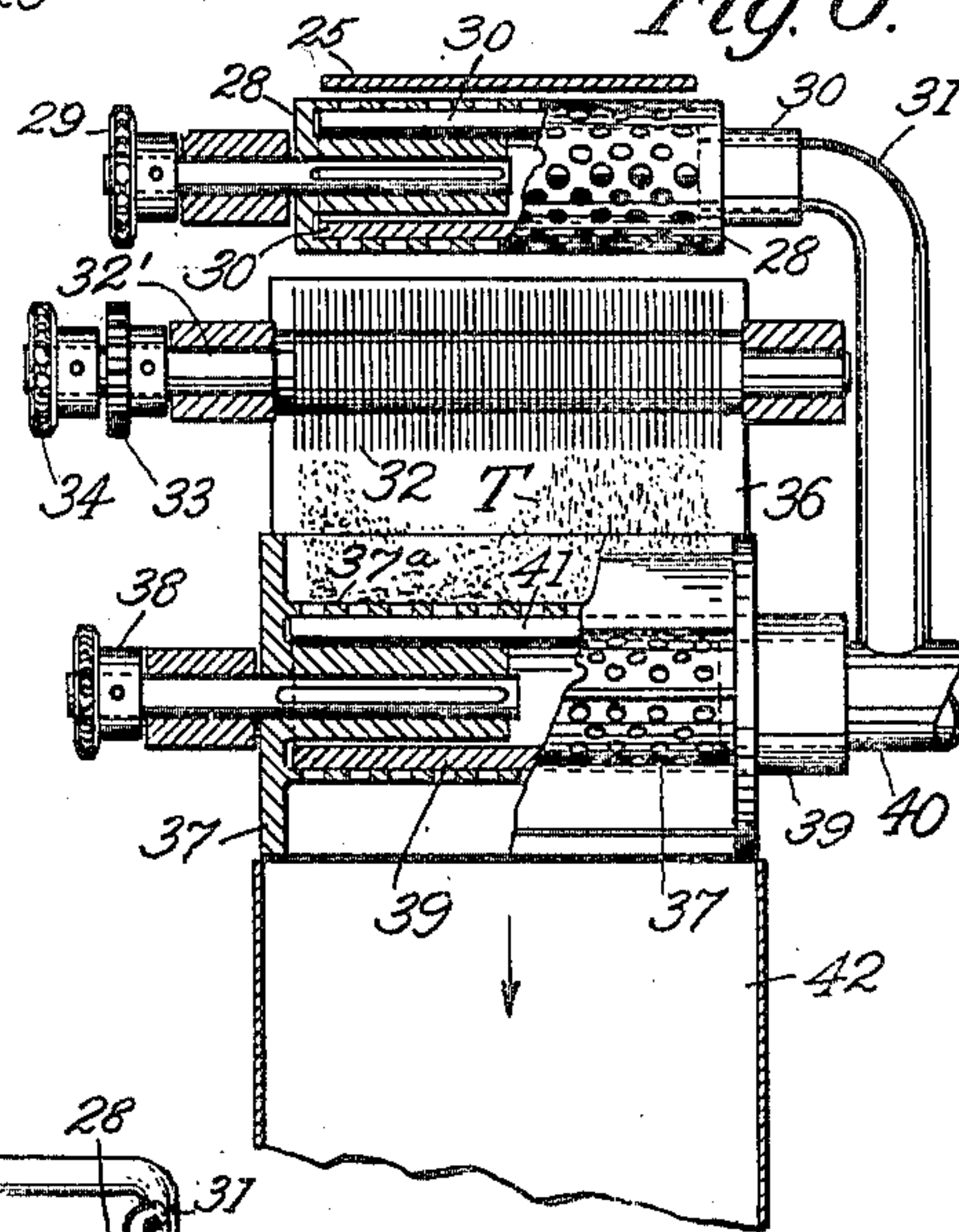
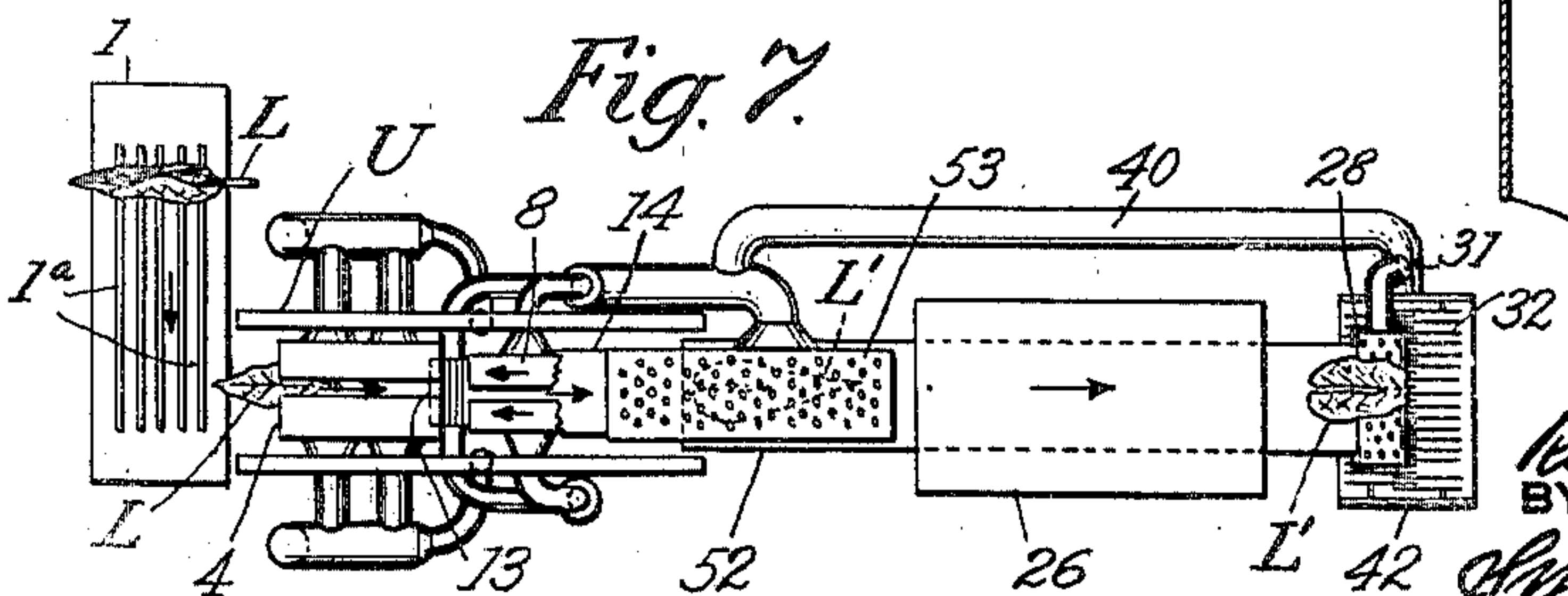


Fig. 7.



INVENTOR
Rupert E. Rundell
BY
Sydney H. Prescott
ATTORNEY

Nov. 14, 1939.

R. E. RUNDELL

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3 Sheets-Sheet 3

Fig. 9.

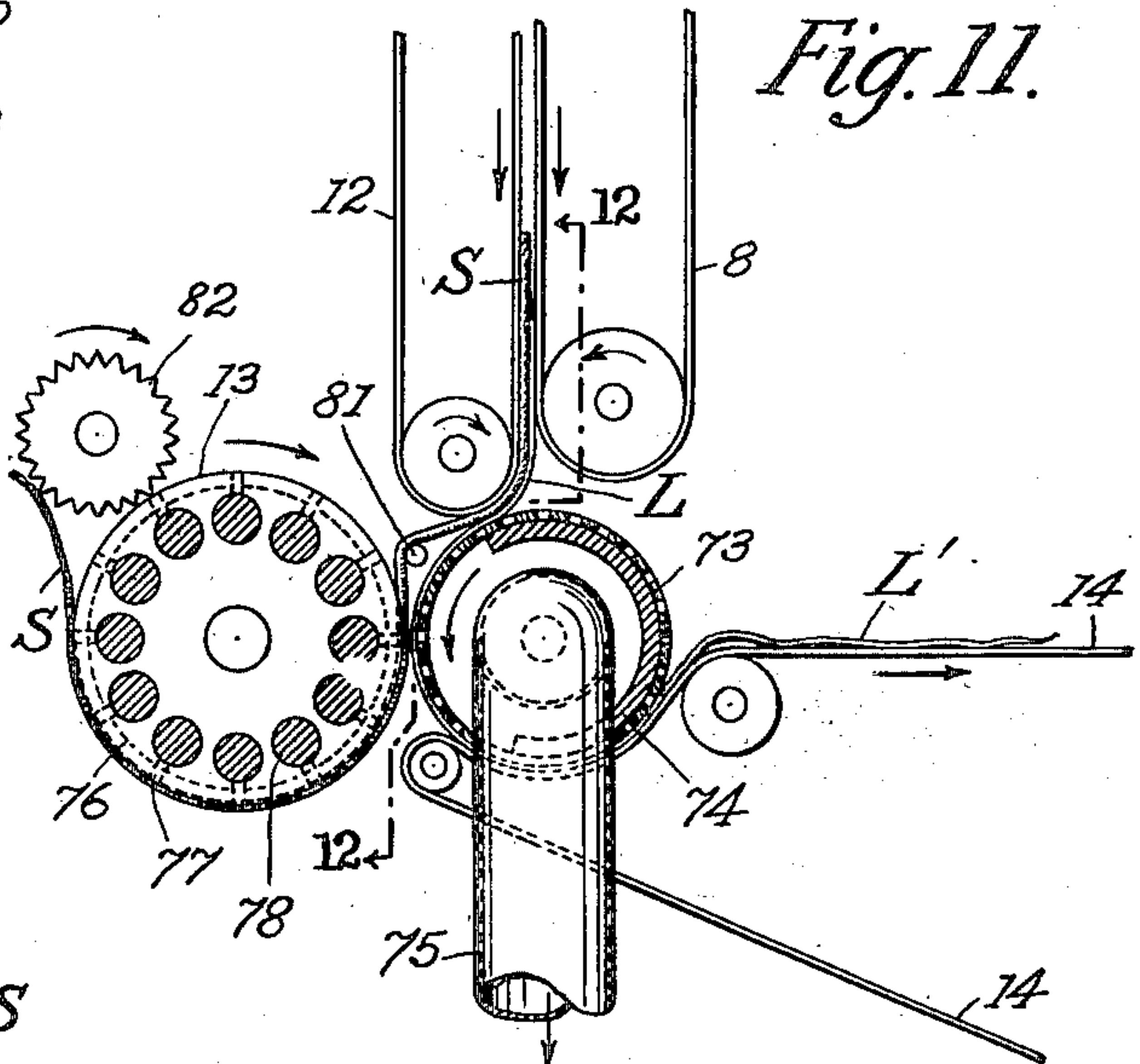
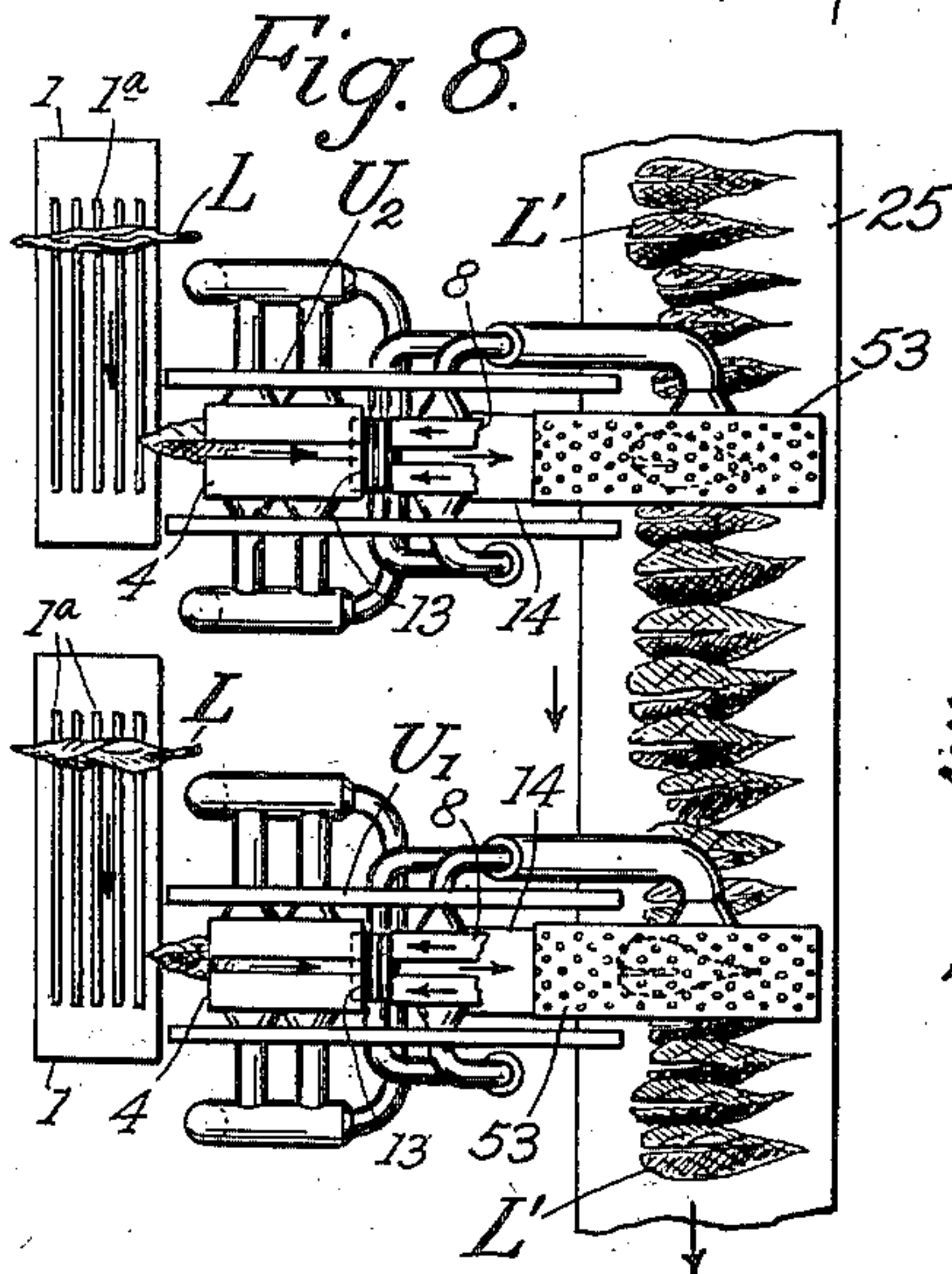
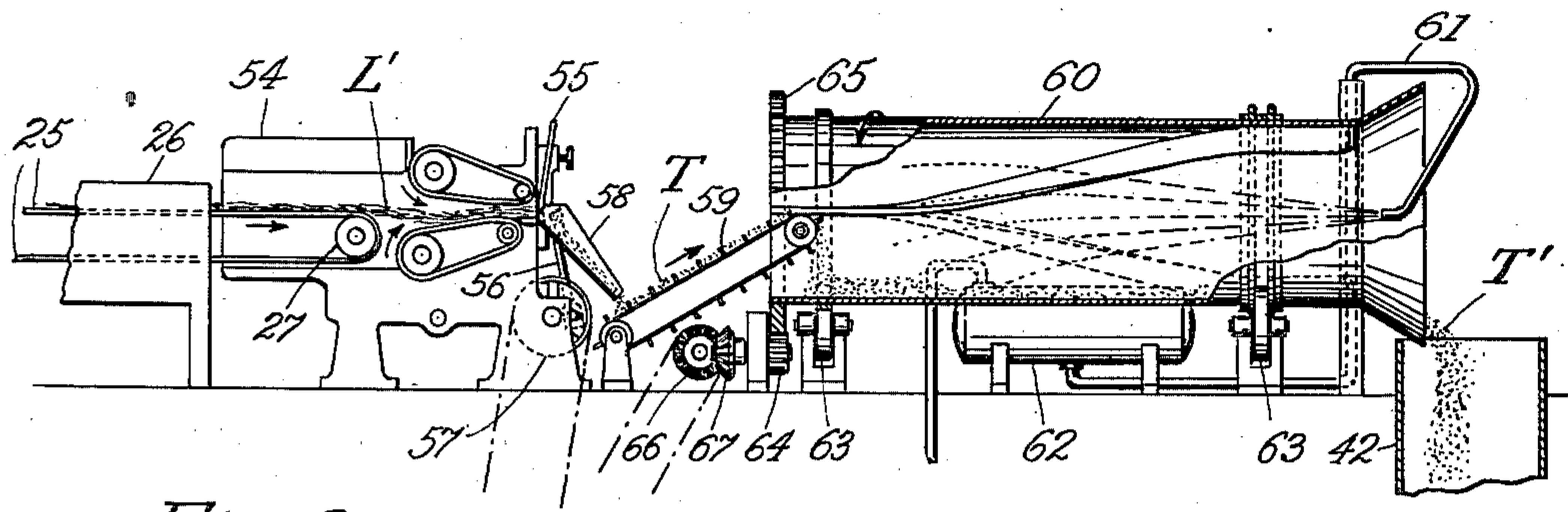


Fig. 12.

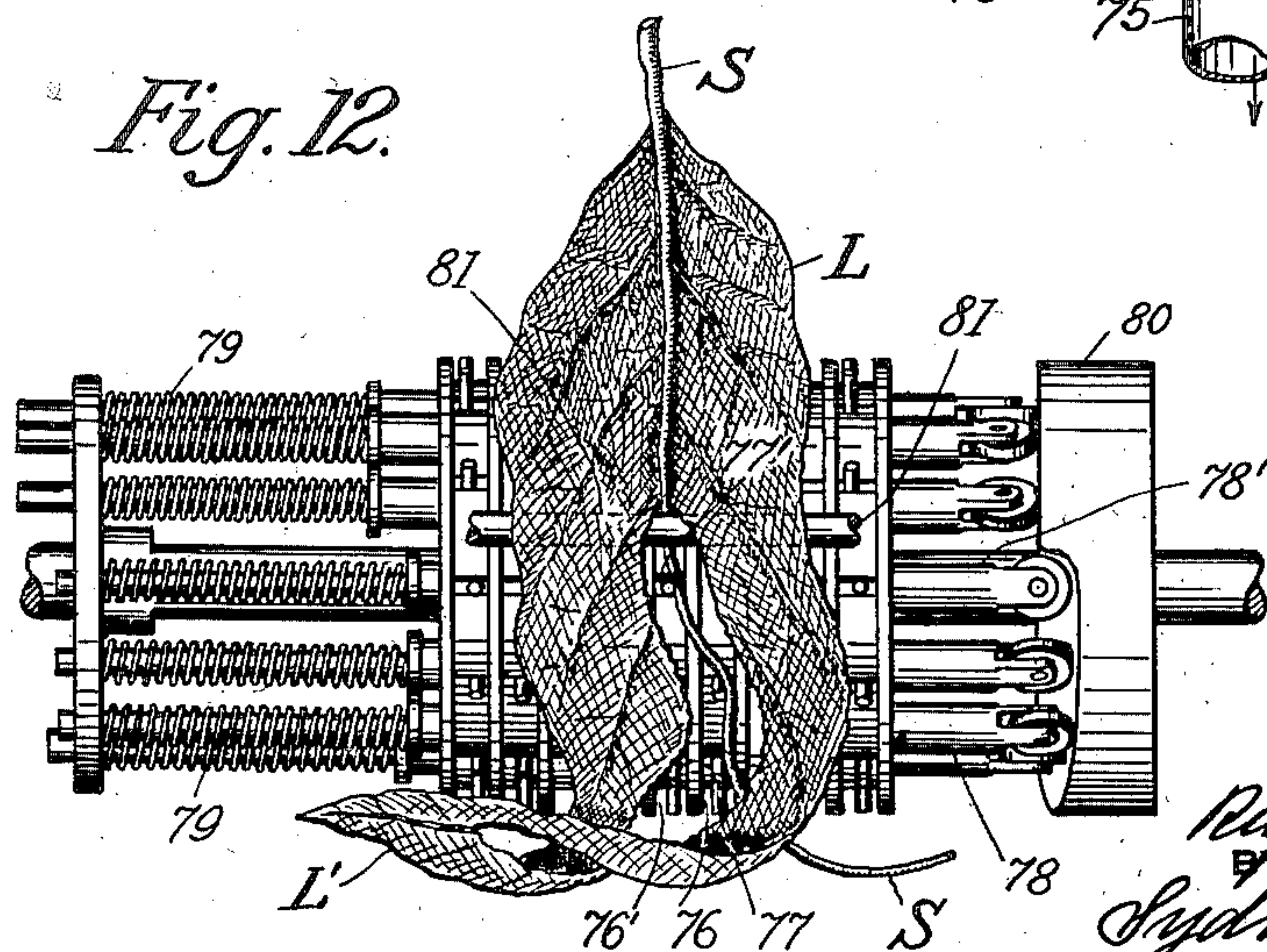
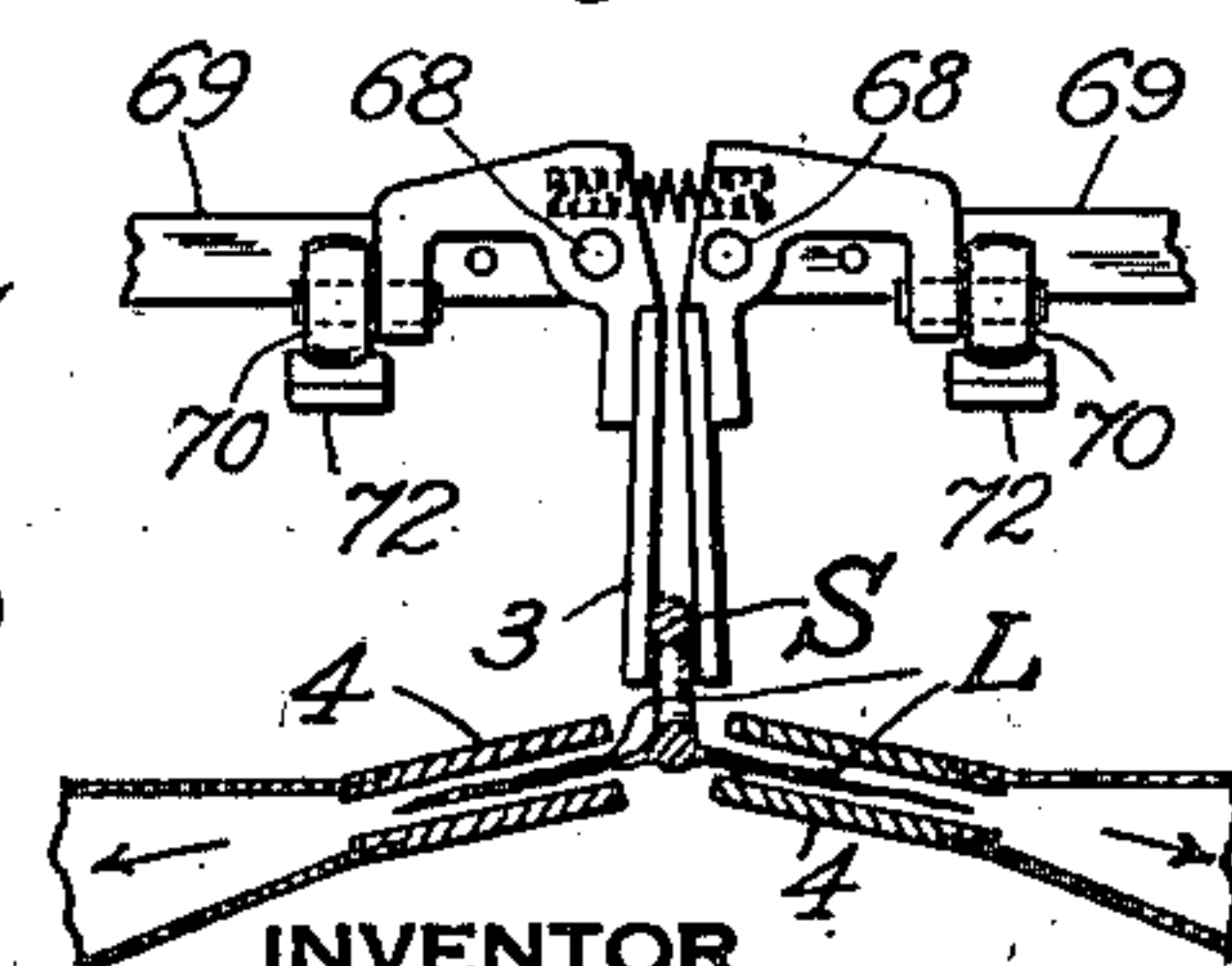


Fig. 10.



INVENTOR
Rupert E. Rundell
BY
Sydney S. Prescott
ATTORNEY

UNITED STATES PATENT OFFICE

2,179,644

TOBACCO HANDLING AND PREPARING

Rupert E. Rundell, Rockville Centre, N. Y., assignor to American Machine & Foundry Company, a corporation of New Jersey

Application November 23, 1934, Serial No. 754,496

46 Claims. (Cl. 131—57)

This invention relates to tobacco handling and preparing, particularly to various steps in the preparation of shredded tobacco ready for manufacture into cigarettes, from whole tobacco leaves.

Heretofore in preparing cigarette tobacco, the tobacco leaves have usually been stemmed without spreading or uncurling the laminae of the leaves and the bunched and crumpled leaves, having their lengths extending in various directions have subsequently been fed into a cutter of the guillotine type, in which the tobacco is compressed to a more or less solid column or cake from which a thin slice is cut to make the desired shreds. Since the leaves before being compressed are crumpled up and sometimes doubled on themselves and sometimes tangled or ropy and because their lengths lie at random rather than parallel to the cutter blade, the shreds are relatively short, frequently sharply kinked and are more easily broken. In the finished cigarette this sometimes results in short shreds which may spill out of the end of the cigarette and cause loose ends as well as crumbs in the mouth of the smoker.

Because the leaves are compressed, the tobacco may lose volume and resiliency so that the shreds do not occupy the volume they would otherwise occupy and more tobacco by weight is required to get a cigarette of the same feel or density, than is required of uncompressed tobacco. Also the compressing of the damp leaves often renders them darker in color.

It is therefore one of the main objects of the present invention to combine with the shredding operation a leaf opening and/or stemming operation, in such a manner that the leaves are delivered in optimum condition and position for best results in shredding and particularly shredding without compression by inter-engaging gangs of rotating shearing disks.

The invention however is applicable to the guillotine type of cutter for the purpose of improving the cutting thereby through improved feeding of the leaves thereto, since it has been found that proper spreading and positioning of the leaves also results in better shreds with the guillotine type of cutter.

Thus, a principal purpose of the invention is to deliver the leaves to the cutter relatively flat and outspread or open as compared with the crumpled and uniform condition in which domestic tobaccos are ordinarily fed to cutters.

It is also an important object of the invention to make improved use of an intermeshing disk

type of cutter through which the loose tobacco leaves are fed in a thin stream, without compression, for the purpose of delivering long loose resilient shreds which will have maximum cigarette filling effect for a given quantity of tobacco.

One of the principal difficulties in using a cutter of this type lies in feeding the leaves to the cutter at a reasonably uniform rate without bunches which choke the gang disk cutter and without substantial intervals during which few or no leaves are cut, decreasing the efficiency and output of the cutter, and in feeding the leaves into this cutter in a condition and position which will retain and add to the advantages of this type of cutter.

For this purpose one of the features of the invention is the opening and/or cleaning of the leaves prior to cutting. Another related feature is the delivery of the leaves to the cutter in a flat outspread and in certain circumstances, booked or shingled condition to provide optimum feeding conditions for this type of cutter. This type of feeding is particularly valuable for the intermeshing disk type cutter because of the need for a thin relatively uniform stream of tobacco, a condition difficult to attain with the bunched and tangled domestic leaves delivered from the conventional stemmer. So far as I am aware, the present arrangement affords the first practical one for feeding large leaf American type stemmed tobaccos to this type of cutter.

It is also one of the principal objects of the invention to provide for more efficient and uniform feeding of the stemmed leaves to the cutter, one of the purposes of the present invention being to make only one hand feeding necessary for cleaning, stemming, cutting and blending.

An important feature of the invention lies in the cleaning from the leaves of sand, dust and grit prior to cutting. This avoids one of the main causes of wear on the cutters.

Another important object of the invention relates to the manufacture of blended cigarette tobacco, this object being to blend tobacco leaves automatically and more systematically and uniformly than heretofore to produce a continuous supply of uniformly blended tobacco shreds in the proper condition for use in cigarette machines from unstemmed leaves of the different kinds of tobacco to be blended.

One of the most important objects of the invention is to so prepare cigarette tobacco that by reason of the greater fluffiness and volume of the shreds per unit of weight, more and better cigarettes can be made from a pound of tobacco

than hitherto. Since cigarettes are judged by their firmness or plumpness of filling or "feel" rather than their weight, by so treating the tobacco as to produce the same or greater plumpness or firmness with less tobacco, it is possible to save an appreciable percentage by weight of tobacco over that previously used. The importance of a saving of even a small percentage of the tobacco used will be appreciated when it is considered that the value of the tobacco used in the United States yearly is in the tens of millions of dollars, and that in some countries the cost of the prepared tobacco at the factory is over three dollars a pound. The fluffier, more resilient tobacco also results in a more even burning cigarette.

Because of the longer and fluffier shreds, firmer ends will result and there will be less tendency for "shorts" to fall out and less likelihood of annoying crumbs of tobacco coming out in the mouth of the smoker.

Another important object of the invention is to prepare tobacco efficiently by utilizing one manual feeding operation of a plurality of the tobacco preparing operations as for instance two or more of the following preparing operations—spreading and cleaning, stemming, blending and shredding—as well as the additional conditioning, casing, or flavoring and cooling operations. The importance of this will be realized when it is pointed out that the initial feeding of the individual leaves is the main labor consuming operation in connection with tobacco treatment in accordance with the invention.

The stemming machines herein used are of an improved design, disclosed in U. S. Patents Nos. 1,864,765, June 28, 1932, and 1,916,018, June 27, 1933, both to R. E. Rundell and G. E. Hagquist, and a co-pending application #677,336, filed June 22, 1933, by R. E. Rundell and G. E. Hagquist, now Patent 1,981,470, granted Nov. 20, 1934; reference to which is made for further details, the leaf handling mechanisms of which are such that the stemmed leaves on their individual delivery belts are freed of dust, etc., opened flat and are traveling endwise. Certain features illustrated herein, relating to the combination of stemming and blending mechanism, not claimed specifically in this patent, have been made the subject-matter of a divisional application, Serial No. 271,959, filed on May 5, 1939.

One of the main features of the invention is based on the discovery that the leaves as delivered from this type of stemmer are ideally conditioned and arranged for shredding.

With the above and other objects not specifically mentioned in view, the invention consists in certain constructions and combinations which will be hereinafter fully described and then pointed out in the claims hereunto appended.

In the accompanying drawings:

Fig. 1 is an enlarged side elevation, partly in section, taken on line 1—1 of Fig. 2 showing a system for carrying out the invention;

Fig. 2 is a plan view of an assembly of certain parts of the system shown in Fig. 1;

Fig. 3 is an enlarged detail side elevation partly in section on line 3—3 of Fig. 2, showing a transfer device;

Fig. 4 is an end elevation on line 4—4 of Fig. 3;

Fig. 5 is a plan view on line 5—5 of Fig. 3;

Fig. 6 is an enlarged detail end elevation on line 6—6 of Fig. 2, showing the delivery of the stemmed

leaves to the shredding machine and the delivery of the shredded tobacco to the drying tower;

Fig. 7 is a plan view showing the arrangement of the system when a single stemming unit is employed;

Fig. 8 is a plan view showing a modified arrangement of a number of stemming units for crosswise delivery of the stemmed leaves onto the collector belt;

Fig. 9 is a side elevation of a modification of the improved system employing a guillotine cutter and casing apparatus;

Fig. 10 is an enlarged detail view partly in section of the gripping and cleaning means shown in Fig. 1;

Figs. 11 and 12 are details in sectional side and front elevation respectively, of the stemming unit employed in connection with the improved system.

Generally stated, in carrying the invention into effect by the apparatus and method selected for illustration, there is provided a tobacco leaf shredder together with means for feeding outspread leaves thereto in predetermined position relative to their direction of movement into the cutter and preferably this cutter consists of rotating gangs of intermeshing disks and the outspread leaves are delivered thereto edgewise and endwise and without compression to produce long uniform shreds. Preferably a stemmer is provided, together with mechanism for advancing the stemmed leaves to said shredder. Preferably also a leaf conditioner for varying the moisture content of the leaves acts on the stemmed leaves before shredding. Preferably also, means are provided for cleaning, and/or spreading the leaves and for retaining the outspread condition of the leaves until shredded. In one preferred form of the invention, means are provided for systematically blending the leaves including a plurality of stemmers delivering the desired proportions of the leaves to be blended, and a common collecting conveyor receiving said leaves and forwarding the same in a single blended row or stream. In the best form contemplated, shredded tobacco drying and/or casing, and/or cooling units are combined with the aforesaid means to form a unitary tobacco treating system.

Referring now to Figs. 1 and 2 of the drawings, a number of stemming units U1, U2, etc., are arranged in a group and the unstemmed leaves L of each kind of grade of tobacco to be used in a given blend are fed to one or more of these units according to their proportion in the blend. Thus, if five parts of one kind of tobacco are to be blended with two parts of a second kind and with one part of a third kind, eight stemming machines would form one group, five of which would handle the first kind of tobacco, two the second kind and one the third kind, or certain of the machines might be operated at a different speed to produce the desired proportioning of the different varieties of leaves.

In the machines shown, which are of the improved type described in the patents and co-pending application above referred to, the crumpled, curled up leaves L as received from the hogshead are placed upon a table 1.

The operator of the machine lays the leaves side by side with the butts on the right (Fig. 1) and the lengths all extending approximately in the same direction on the side delivery belts 1a, which belts may be arranged to feed the leaves in synchronism with the movement of grippers 3 to deliver the leaf butt to each gripper, as illus-

trated in Patent No. 1,916,018, above referred to.

From the table 1 the leaves are carried by chains 2 having spaced grippers 3 advancing the leaves by their butt ends between them through suction chambers 4 wherein a stream of air is directed from the stem outwardly toward the edges of the leaves to spread, straighten out and clean the same. The suction chambers of all machines of the group are connected to suction pipes 5 and 6.

The outspread, cleaned and relatively flat leaves are forwarded on the bottom loops of suction belts 7 and are then dropped upon belts 8 running in the opposite direction to deliver the leaves tip first to the stemming unit. A valve 9 in suction pipe 10 periodically shutting off the suction in chambers 11 of belts 7 at the proper moment, effects the transfer. The belts 8 together with companion belts 12 guide the leaves into the stemming mechanism 13 which removes the stems and permits the stemmed leaves L' to be carried away, tip first, by an endless delivery belt 14 running in the forward direction on which the leaves are delivered in outspread condition. The chains 2, and belts 7, 8, 12 and 14 of each stemming unit are synchronously driven in any suitable manner as by a motor 15.

To collect the stemmed leaves from the different stemming units U1, U2, (Fig. 2), the leaves are delivered by the belt 14 of each unit onto a row of spaced rollers 16 driven in the direction of the delivery belt by sprockets 17 connected by a chain 18 with a sprocket 19 on drive shaft 20 of belt 14, see Figs. 3 to 5. Between these rollers two rows of parallel fingers or prongs 21 mounted diametrically on a horizontal shaft 22 are intermittently revolved one-half turn by a sprocket 23. The shaft 22 of the fingers 21 is set at such an angle that the leaves picked up by a row of fingers from the rollers 16, upon one-half revolution of shaft 22, in which the ends of the fingers describe the paths 24 shown in Fig. 4, point in the direction of the collector belt 25. As the fingers 21 dwell in their turned position, the leaf drops upon the collector belt 25, which is at a distance below the rollers 16 sufficient to clear the return paths 24' of the fingers, and thus the leaves are forwarded endwise in a single stream to the shredder unit, presently to be described.

The speed of collector belt 25 may be adjusted so that the leaves deposited upon it by the fingers 21 form a single layer with spaces between the leaves, or a continuous overlapping layer, or separate books of stacked leaves, as desired. In each case if blending is desired, by proportioning the output of the different stemmer units, fed with different varieties of leaves, the leaves will be blended in the desired proportion after the belt has passed all stemming units, in an exact and systematic fashion instead of being pitch-forked together in a more or less haphazard fashion, as has been the common practice.

It should be understood that the blending arrangement may be dispensed with in some cigarette factories or be unnecessary when unblended tobacco is used, in which case the arrangement just described is employed with the same kind of leaves to feed from more than one stemming unit into a single stream for delivery to the cutter, or that illustrated in Fig. 7 may be employed.

The leaves are carried endwise by belt 25 through a chamber 26 in which they are conditioned by steam or by dry or moist air, according to requirement. Ordinarily dry air is used because somewhat less moisture is generally re-

quired for disk cutting than for stemming. From the end roller 27 the leaves are delivered outspread and flat as received from the stemmer endwise and edgewise, to the shredder. While the leaves might be delivered otherwise, as directly from belt 25 into the cutters, to insure greater control of the leaves as they pass into the cutters, the leaves pass over a perforated suction roll 28 (Fig. 6), rotated by sprocket 29 around a stationary suction chamber 30 connected to a suction pipe 31 and having a peripheral opening towards the leaf delivered from belt 25.

The drum 28 guides the oncoming leaves into the shredding mechanism which consists of two gangs of inter-engaging or inter-meshing circular shearing disks 32 rotating in opposite directions on parallel shafts 32' by means of intermeshing gears 33 driven by a sprocket 34. While the leading portions of the leaves are being shredded, the leaves are held somewhat taut and straight by a roller 35 bearing against drum 28 and holding back the trailing portion of the leaves.

The shredding unit is not shown in detail since details thereof do not form a part of the present invention but is of the general type disclosed in the patent to Korbuly #1,485,418, March 4, 1924. This type of shredder has a number of advantages some of which have also been referred to in connection with the statement of objects of this invention, in that the leaves are not compressed so as to lose their resiliency as well as their color, and if the leaves are properly fed thereto, can produce long uniform, relatively fluffy shreds. This type of shredder requires uniform feeding of the tobacco in a very thin layer for best results. Hitherto so far as known to me, no feed supplying leaves in condition to take advantage of the capabilities of this type of shredder has been available for feeding the large American type tobacco leaves which come to the stemmery or tobacco factory in a tangled, crumpled mass, generally in hogsheads. When leaves in this condition are fed into a shredder of this type, the disks cut across so many doubled, folded and crumpled leaf portions that relatively short shreds are produced, and moreover the leaves ordinarily pass into the cutters crosswise so that shreds can be no longer than the width of the leaf. Owing to the condition of the leaf referred to, shreds are ordinarily much shorter and, due to the kinks therein, often broken. Also the tangled and crumpled leaves tend to go through the disks in bunches which choke the disks and reduce the output of the cutter.

I have discovered that the leaves in the condition in which they issue from stemmers of the type referred to in the patents and application above identified, are in ideal condition for shredding in this type of shredder and result in a quality of shreds not hitherto obtainable from American type leaves.

Thus the leaves delivered by the belt 25 and roll 28 into the disks 32 of the shredding unit, are cleaned by the suction boxes 4 so that the disks are not subject to wear from grit and sand on the leaves, and the leaves are in flat outspread condition and are delivered edgewise and preferably, though not necessarily, endwise relative to the plane of nip of the disks. Since the leaves are delivered endwise and there are few folds or doubled-over portions to the leaves, the majority of the shreds are as long as the portion of the leaf from which they are cut, that is they average in length about the same as the average length of the leaves. Moreover, as compared with shreds

ordinarily produced, being relatively free from kinks and sharp angles, the shreds are less liable to break into shorts. Since the leaves are fed loose in uncompressed condition, as compared with the compressed cake of leaves fed into the conventional guillotine cutter, the shreds are more resilient and of greater volume than the same weight of shreds from guillotine cutters, with most types of leaves.

As a result of this greater volume and resiliency, cigarettes of greater firmness or plumpness, i. e. which "feel" better and firmer can be produced with less tobacco, an exceedingly important item in view of the immense quantities of tobacco used in cigarettes, valued at many tens of millions of dollars. One percent saving in the quantity of tobacco in cigarettes will therefore result in the saving of hundreds of thousands of dollars and the savings are particularly great in countries where import duty and shipping raise the price to several dollars per pound. In this connection it should be noted that cigarettes are mainly judged so far as quantity of tobacco is concerned by their appearance and feeling of firmness and by their plumpness rather than their actual weight, and by the firm appearance of the ends and the resistance of the ends to the dropping of shreds and crumbs of tobacco. Also in modern packers detectors having spring pressed pins such as disclosed in U. S. Patent No. 1,682,464 to Arelt are used which engage the ends of the cigarettes and firmness of the ends in resisting these detectors results in fewer cigarette packages being rejected because of cigarettes having loose ends, all desirable results enhanced by the present method and apparatus for preparing and handling tobacco.

The leaves may be aided in their progress through the cutter disks by suction from below the disks, drawing a current of air from above through the casing 36 and into one of the peripheral compartments of a suction drum 37 rotated by a sprocket 38 around stationary suction chamber 39 connected to a suction pipe 40. This suction may be dispensed with in some forms of the invention and the shreds dropped by gravity.

The chamber 39 has an opening 41 registering with the radial partitions of one of the compartments of drum 37 when in its receiving position facing the shredding knives. The bottom of radial wall 37a of the compartments is of perforated or sieve construction to pass air but not tobacco. After a half-turn of drum 37, the contents of each compartment drops into a chute 42 which empties into a drying tower 43 on the floor below. The partition walls of drum 37 constitute locks against the heated air rising from the drying tower into chute 42, and said drum serves to separate the tobacco from the air current through the disk blades, and also to remove dust. A cylindrical casing 36a communicating with chute 42 surrounds the drum 37 to prevent loss of tobacco from the filled compartments of the drum 37.

In tower 43, Fig. 1, the tobacco shreds T are carried over a series of superimposed horizontal perforated belts 44, exposed to the drying action of heated air admitted by the inlet 45 and leaving by outlet 46. Alternate belts have their ends projecting beyond and travel in opposite directions from the remaining belts so that one delivers to the next one.

The lowermost of the belts 44 discharges the dried shreds into the pockets of a conveyor 47 which carries them to a cooling tower 48 in which on similarly arranged belts 49 they are exposed

to conditioned air entering at the inlet 50. The lowermost of the belts 49 deposits the shreds, which now contain the proper amount of moisture for use in cigarette making, upon an endless bent 51 which carries them to trucks or a conveyor system for transporting the tobacco to the cigarette machines.

Thus, a continuously operating unitary tobacco handling and preparing method and system for supplying shredded cigarette tobacco from whole tobacco leaves is provided. It is particularly noted that the one feeding operation of laying out the leaves from hands of tobacco, approximately parallel with their butts toward the stemming unit is the only manual operation on the leaves required for cleaning, spreading out, stemming, blending, conditioning for cutting, feeding to the shredder, drying and cooling. Also, that only one main conditioning or moistening operation prior to feeding to the stemming unit is required, the conditioning operation at 26 being merely a supplementary one for varying more or less slightly the moisture content to that found best for cutting, as hereinafter pointed out. Casing or flavoring units may also be included in this unitary system.

While the several units and operations above referred to have been described by way of example in combination, it is obvious that some of these units are useful in lesser or sub-combinations, or by themselves, and such use is contemplated. Moreover, some manufacturers will want to arrange some of the units in a different order or to eliminate some. Accordingly, the invention is not to be understood as being limited to any particular combination of units or operations except insofar as specified in the claims.

When machine blending is not desired or when operating on a smaller scale, a modified arrangement (Fig. 7), utilizing single stemming units may be employed to produce the desired leaf arrangement and condition on the feed belt of the shredding machine. The leaves in this case are transferred to the collecting belt 52, Fig. 7, by means of an auxiliary suction belt 53, arranged as shown in the patent application above identified, which transfers the leaf from the under side of a suction belt 53 to belt 52, under said suction belt in the same manner as transfer is made from belt 7 to belt 8. The belt 52 then carries the blended leaves flat and outspread in an endwise direction through the conditioning chamber 26 and delivers them to the shredding knives 32, in the same manner as belt 25 above.

In Fig. 8, a number of stemming units U1, U2, etc., each provided with an auxiliary suction belt 53, are grouped side by side and the collecting belt 25 is run at right angles below the individual auxiliary belts 53. The belt 25 may then carry the leaves into a guillotine type cutter as shown in Fig. 9, wherein the crosswise arrangement of the leaves arranges the same parallel to the cut of the transversely extending conventional guillotine knife 55 which cuts transversely across the stream of compacted tobacco fed thereto, to make long, more uniform shreds than the usual guillotine cutter to which crumpled leaves are fed more or less at random.

In the modified arrangement shown in Fig. 9, the leaves L' emerging from the conditioning chamber 26, either lengthwise from the arrangement of Fig. 2 or crosswise as in Fig. 8, but preferably crosswise, are carried by the end roller 27 of collector belt 25' into a reciprocating tobacco cutter 54 of the guillotine type in which the ver-

tical knife 55 having its edge transverse to the stream of leaves L' actuated by a pitman 56 driven by an eccentric on drive pulley 57, shreds them horizontally.

5 The shreds T dropping from a chute 58 are carried by a conveyor 59 into a casing drum 60 in which they are sprayed by a pipe 61 connected to a tank 62 containing the usual casing fluid or a suitable flavoring liquid or both. The drum 10 60 rests on rollers 63 and is rotated by gears 64 and 65 driven by bevel gears 66 and 67. From the drum 60, the flavored shreds T' are discharged into chute 42 through which they drop into the drying tower 43, whence they are carried by the conveyor 47 to the conditioning tower 15 48 and are finally delivered to the conveyor belt 51 as before.

It will be obvious from the above that many of the advantages resulting from the cleaned 20 outspread flat and uniformly positioned leaves will be of value in cutting leaves with the guillotine type cutter for the same reasons.

While it is preferred to feed the leaves endwise to the cutter disks so that the disks may 25 shear or slit the leaves lengthwise of their length and direction of movement, many of the advantages other than extreme length of shreds will be retained if the outspread leaves are fed crosswise, so that it is contemplated that the simpler arrangement of Fig. 8 may deliver to the disk type cutter shown in Fig. 2; also the casing or flavoring unit shown in Fig. 9 may be positioned with its feed belt 59 under the drum 37 30 to receive shreds therefrom.

35 In connection with the delivery of the leaves to the gangs of disk knives, it is noted that the disks rotate with much higher surface speed at the cutting parts than the conveyor 25 and rolls 28 and 35, all less than a leaf length from the nipping point where the disks come together and 40 thus these parts 25, 28 and 35 act to retard the trailing part of the leaf while the leading part is passing into the disks and thereby straighten the leaf and hold it taut and flat.

45 The gripper mechanism of the type of stemming unit selected for illustration, though other types may be used, is illustrated in Fig. 10. The leaves are fed by their butts through the cleaning and leaf spreading and straightening chambers. 50 As shown in the figure, a current of air is directed from the stem portion of the blades or laminae toward the edges thereof, effectually spreading, straightening and cleaning the leaves. The crumpled and sometimes ropy leaves L on table 1 are picked up, one by one as they arrive 55 in position, by the grippers 3, Fig. 10, the jaws of which are pivoted on pins 68 attached to bars 69 fastened at spaced intervals across the chains 2, the holder of each jaw carrying a roller 70. The grippers 3 are periodically held open for a short 60 time by cam pieces 71 and 72, Fig. 1, with which the rollers 70 engage near the ends of the lower loops of chains 2 to allow the stems S of the leaves L to pass into the jaws, and again at the upper ends of the chains to release the leaf butts. 65

As shown in Figs. 11 and 12, the straightened and cleaned leaves L carried by the belts 8 and 12, are stemmed by tearing the stem from the leaf blade from tip to butt and for this purpose 70 are received by a perforated drum 73, Fig. 11, revolving on a stationary suction chamber 74 connected to suction pipe 6 by a pipe 75. Upon being carried by the drum 73 into contact with the co-acting drum 13, the stem S of the leaf L is 75 pressed into one of a series of annular grooves

76 into which the periphery of drum 13 is divided, whereupon a pin or gripper element 77, Fig. 12, projecting into that groove through a radial slot in drum 13 from a horizontal plunger 78, 5 clamps it against a partition of groove 76.

The drum 13 carries plungers 78 about its circumference, the plungers having pins 77 in the groove 76 so that, as the drums 13 and 73 advance together, the stem S gripped by the respective pins 77 acting against the opposed wall of 10 the grooves 76, the plungers 78 being forced axially by springs 79 when released by a stationary cam 80 which holds the grooves open until the stems have entered. As soon as a sufficient length 15 of stem S has been inserted into the grooves 76 to be securely held therein, the drums 13 and 73 momentarily draw apart to permit a stripping roller 81 to enter between the stem and the leaf which by this time is held on drum 73 by belt 14. 20 The rapidly rotating roller 81 aids in cleanly separating the stem from the leaf as they are drawn forward in unison by the drums 13 and 73. The stemmed leaf L', still outspread, since this type of stemmer maintains the leaf spread, is carried away by belt 14 while the stem S is ejected from 25 the drum 13 by an oppositely revolving star wheel 82.

The means and steps above referred to may be widely varied in construction within the scope 30 of the claims, without departing from the invention, for the particular means and steps and combinations thereof selected to illustrate the invention are but few out of many possible concrete embodiments of the same; furthermore, 35 certain of the means and steps referred to are useful by themselves or in separate sub-combinations from the general combination illustrated and such separate use is contemplated. The invention therefore is not to be restricted to the particular structure and steps shown and 40 described.

In connection with the conditioning chamber 26, it is noted that it is sometimes quite important that the leaves be dried before shredding. 45 This is because certain of the operations on the tobacco leaves, prior to shredding, particularly stemming, require quite moist condition of the leaves. It has been found that the same moisture content does not result in satisfactory shredding because of too great a tendency to gum up 50 the shredder disks. With the construction illustrated therefore the leaves may be stemmed at the proper moistness, and then shredded when relatively dry, without the interposition of any manual ordering operation. 55

Since the operation of the mechanisms and methods disclosed has been fully described in connection with the description of the several parts or steps thereof, for brevity, and to avoid repetition additional description of the operation 60 is omitted.

What is claimed is:

1. Tobacco treating apparatus comprising in combination, cooperating means for stemming 65 leaves and means for outspreading and cleaning both faces of the leaves before stemming, means for withdrawing said leaves from the cleaning means and for feeding said leaves positively, while outspread, to said stemming means, mechanism to transfer the stemmed leaves from said 70 stemming means to a shredding station, and means to receive and shred the cleaned and stemmed leaves while still outspread.

2. Tobacco treating apparatus comprising in a unitary machine structure cooperating means 75

for stemming leaves and means for outspreading and cleaning the leaves with the web portions thereof extended on both sides of the stems before stemming, means for receiving and shredding the outspread and stemmed leaves, and coordinated mechanism for successively forwarding tobacco leaves from said outspreading means into the range of action of said stemming means, and from said stemming means into the range of action of said shredding means.

3. Tobacco treating apparatus comprising in combination cooperating means for stemming leaves and having automatic means for blending leaves of different characteristics, means receiving and shredding the blended and stemmed leaves, and cooperating mechanism for successively forwarding tobacco leaves into the range of action of each of said means.

4. Tobacco treating apparatus comprising in combination cooperating means for stemming leaves and having means for reconditioning the stemmed leaves, means receiving and shredding the stemmed and reconditioned leaves, and cooperating mechanism for successively forwarding tobacco leaves into the range of action of said means.

5. Apparatus combining in a unitary system means for the continuous treatment of initially unstemmed tobacco leaves to convert the same into stemmed shreds suitable for tobacco filler, said apparatus comprising cooperating means for stemming leaves, means receiving and shredding the stemmed leaves, means for adding casing fluid to the shreds, means for reconditioning said cased shreds, and mechanisms coordinated with said several means for respectively forwarding tobacco leaves into the range of action of said stemming means, and from said stemming means to said shredding means, from said shredding means to said casing means, and from said casing means to said reconditioning means.

6. Tobacco treating apparatus comprising in combination cooperating means for stemming leaves, and means receiving and shredding the stemmed leaves, said stemming means having multiple stemming devices and a coacting collecting device arranged in receiving position with respect to said devices for blending leaves of different characteristics.

7. Tobacco treating apparatus comprising in combination cooperating means for stemming leaves, and means receiving and shredding the stemmed leaves, said stemming means having multiple stemming devices arranged in echelon and a coacting obliquely arranged collecting belt arranged in receiving position relatively to said devices for blending leaves of different characteristics.

8. Tobacco treating apparatus comprising in combination cooperating means for stemming leaves, means receiving and shredding the stemmed leaves, said stemming means having a leaf conditioning chamber through which the stemmed leaves pass on their way to said shredding means, and cooperating mechanism for successively forwarding tobacco leaves into the range of action of each of said means.

9. Tobacco treating apparatus comprising in combination cooperating means for stemming leaves, mechanism for spreading tobacco leaves and delivering them to said stemming means in outspread condition, with the laminae extended on both sides of the stem, means receiving and shredding the stemmed leaves, said stemming means being arranged to deliver and said shredd-

ding means being arranged to receive the stemmed leaves in outspread condition, and cooperating mechanism for successively forwarding tobacco leaves into the range of action of each of said means.

10. Tobacco treating apparatus comprising in combination cooperating means for stemming leaves, means receiving and shredding the stemmed leaves, said shredding means having a suction drum controlling the delivery of leaves thereto, and cooperating mechanism for successively forwarding tobacco leaves into the range of action of each of said means.

11. Tobacco treating apparatus comprising in combination cooperating means for stemming leaves, and means receiving and shredding the stemmed leaves, said stemming means having a belt positioned to receive the leaves from said stemming means and deliver them to said shredding means, whereby the stemmed leaves are delivered to said shredding means.

12. Tobacco treating apparatus comprising in combination cooperating means for stemming leaves, means receiving and shredding the stemmed leaves, said shredding means having means for producing a down current of air there-through, and cooperating mechanism for successively forwarding tobacco leaves into the range of action of each of said means.

13. Tobacco treating apparatus of the class described, having the features claimed in claim 5, in which said reconditioning means includes drying means for said fluid-cased shreds having a plurality of superposed horizontal perforated belts discharging shreds one to another, and cooperating mechanism for passing air successively upward through said perforated belts and the shreds in course of transfer downward thereon.

14. Tobacco treating apparatus having the features claimed in claim 3, in which said means for shredding leaves is combined with a pneumatic leaf spreader presenting leaves thereto in outspread condition.

15. Tobacco treating apparatus combining in a unitary system cooperating means for stemming leaves, means for blending said stemmed leaves, mechanism for transferring said stemmed leaves to said blending means, said blending means including a plurality of leaf forwarding devices for successively forwarding tobacco leaves; shredding means; and mechanism for receiving said blended stemmed leaves and transferring them to said shredding means, including a single conveyor extending past the delivery ends of said forwarding means to receive and combine a plurality of streams of tobacco leaves to mechanically blend the same and deliver a blended stream into position to be shredded.

16. Tobacco treating apparatus combining in a unitary system adapted to operate continuously means for stemming tobacco leaves, coordinated with means for blending leaves, means receiving and shredding the blended leaves, means for receiving and drying the blended shreds, and coordinating mechanisms for successively forwarding tobacco leaves into the range of action of each of said means.

17. Tobacco treating apparatus comprising means and mechanisms combined in a unitary system and coordinated for continuous operation, including means for blending leaves, means receiving and shredding the blended leaves, means for receiving and drying the blended shreds, means for cooling the dried shreds, and cooper-

ating mechanisms for successively forwarding tobacco leaves into the range of action of each of said means.

18. The continuous process of preparing tobacco which comprises stemming and spreading tobacco leaves, cleaning both sides of said leaves, forwarding the outspread, stemmed leaves in succession to a shredding station, and shredding said stemmed leaves while still in outspread condition.

19. The process of preparing tobacco which comprises stemming and spreading tobacco leaves, shredding the outspread stemmed leaves, and drying the outspread stemmed leaves before shredding.

20. The combination with a tobacco stemmer from which the stemmed leaves are delivered in a predetermined relative position with respect to their direction of movement, of a tobacco shredder, and a traveling conveyor means for receiving the stemmed leaves from the stemmer in said predetermined relative position and acting to transport the stemmed leaves into said shredder while retaining said relative position.

21. The combination with a tobacco stemming unit, of a shredder unit, means for feeding leaves endwise through said stemming unit, traveling conveyor mechanism receiving said endwise moving leaf and delivering it endwise to said shredder, and rotary means for inserting the leaves under control endwise into the shredder.

22. The combination with a tobacco leaf stemming unit, of a tobacco shredder unit comprising interengaging gangs of disks, traveling means coacting with said units to advance the stemmed leaves from said stemming unit, said traveling means including a rotary device to insert the stemmed leaves directly into said shredding unit while maintaining the length of the leaves in the same position relative to their direction of movement as received.

23. The combination with a stemmer for tobacco leaves, a tobacco shredder, means cooperating with said stemmer to clean the leaves, and traveling conveyor means for receiving the cleaned and stemmed tobacco directly from said stemming and cleaning means, said traveling conveyor means including a rotary device for inserting said leaves directly into said shredder.

24. The combination with a tobacco cutter having intermeshing rotating shredding disks, of mechanism feeding leaves to said disks including means retarding the movement of the traveling portion of the leaf relative to the leading portion as the same passes into the cutting disks to straighten the leaves, said means comprising a leaf conveyor extending to within less than a leaf length from the cutting location, and having a surface speed less than that of the disks, and a leaf presser holding the leaves against said conveyor as they pass into said cutter.

25. The combination with a leaf shredder, of traveling feeding means for feeding leaves to said shredder, and a leaf spreader, including means for directing a stream of air from the midportion of each leaf toward opposite edges thereof, so that the web portions on both sides of the leaf stem are fully extended away from said stem and both faces of each web portion are subjected to the cleaning action of said air stream, said feed means including a traveling gripper for gripping the leaves by one end and drawing them floatingly through said air stream prior to shredding.

26. The combination with a leaf shredder, of

stemming means, means to subject said leaf to an air blast operating to clean each face of the leaf and to spread each web thereof symmetrically outward from the stem, traveling feeding mechanism for feeding leaves from said stemmer to said shredder, so that the web portions thereof on both sides of the leaf stems are fully extended away from said stems and are advanced floatingly by said feeding means while being outspread, cleaned and stemmed.

27. The combination with pneumatic means for spreading leaves by extending both web portions thereof away on both sides of the stem floatingly and cleaning both extended faces thereof, of a rotary disk shredder, and means for inserting said spread and cleaned leaves directly into said shredder under pneumatic control.

28. The combination with means for spreading wrinkled or ropy tobacco leaves, with their webs extending on both sides of their stems, of a rotary intermeshing disk cutter, and rotary mechanism transferring said leaves directly into said cutter while still outspread.

29. The combination with a tobacco shredder, of means for spreading tobacco leaves with their webs extended on both sides of their stems, means for stemming said tobacco leaves, mechanism for delivering them butt first with lengths uniformly arranged to extend substantially in one direction, traveling mechanism supporting and conveying the stemmed webs of said leaves from said stemming means in parallel disposition to said shredder, and rotary means for inserting said parallel webs of the leaves into said shredder while preserving said uniform arrangement.

30. The combination with pneumatic means for spreading tobacco leaves with their webs extending from both sides of their stems, floatingly in an air flow acting to clean said tobacco leaves the latter being uniformly arranged with their lengths extending in one direction, of a rotary disk shredder, and traveling means for feeding said spread and cleaned leaves to said shredder, said means including rotary mechanism for maintaining said webs in parallel uniform arrangement up to the shredder and also during passage into and through the shredder.

31. The combination with a tobacco stemmer, of a leaf shredder for shredded tobacco, conveyor means for transporting tobacco from said stemmer to said shredder, and a leaf conditioner for varying the moisture content of the stemmed leaves on their way to the shredder.

32. A stemming and blending mechanism for cigarette tobacco leaves comprising a plurality of stemming units for stemming the different varieties of tobacco leaves to be blended, means coacting with said units to receive the stemmed leaves from each of said stemming machines and forward them in a single stream of blended leaves, and a tobacco shredder cooperating with said means to shred said stream.

33. A stemming and blending mechanism for cigarette tobacco leaves comprising a plurality of stemming machines for stemming a plurality of different varieties of tobacco leaves to be blended, having delivery conveyors, and a main leaf conveyor extending past said delivery conveyors to successively receive and carry away the different varieties of leaves whereby the leaves are blended on said conveyor in the proportions in which they are delivered from said stemmers, and a plurality of rotating gangs of intermeshing disks arranged to shred said blended tobacco.

34. A unitary cigarette tobacco leaf preparing

mechanism, comprising in combination a tobacco leaf stemmer, a cutter for cutting tobacco leaves into shreds for cigarette making, and a drier for drying the stemmed and shredded tobacco, means for feeding stemmed tobacco leaves from the stemmer into the cutter, and the shredded tobacco from the cutter into the dryer, and means for applying flavoring to the tobacco intermediate said cutter and dryer.

35. A unitary cigarette tobacco leaf preparing mechanism, comprising in combination a leaf cutter for cutting tobacco leaves into shreds for cigarette making, and a dryer for drying the shredded tobacco, rotary means for inserting the tobacco directly into the cutter elements, and means for discharging the shredded tobacco directly from the cutter into the dryer, said dryer comprising a chamber adapted to receive a drying medium and a series of conveyors arranged one under the other, alternate conveyors traveling in the opposite direction from the remaining conveyors and delivering thereon to give the shredded tobacco a zigzag path through the chamber with a minimum tumbling of the tobacco.

36. The combination with devices for feeding tobacco leaves by the butts, of means for directing a stream of air transversely along the surface of said leaves during said forwarding, to spread webs out floatingly from the stem, conveyor mechanism receiving the webs from said devices and advancing the same in parallel side-by-side disposition, and tobacco shredding means arranged in the path of advancing movement of said webs, including a knife movable transversely of the said path.

37. The combination with means for individually spreading out crumpled tobacco leaves and arranging them in substantially the same plane with the web portions of the leaves extending from both sides of said stem, of a tobacco shredder, and rotary mechanism for inserting the spread and arranged leaves edgewise directly into the cutting members of said shredder under control.

38. The combination with a tobacco leaf shredder having interengaging rotating gangs of spaced disks between which the leaves are shredded, of means for feeding leaves in outspread condition to said shredder including a traveling suction leaf feeding means arranged to hold the leaves outspread as they pass into the shredder.

39. The combination with a tobacco leaf shredder having interengaging rotating gangs of spaced disks between which the leaves are shredded, of means for feeding leaves in outspread condition to said shredder including a rotating suction leaf feeding roll arranged to hold the leaves outspread as they pass into the shredder, and mechanism for cutting off the suction on said roll on the side facing the cutting position.

40. The combination with a tobacco leaf shredder, of leaf cleaning means, means for gripping tobacco leaves by their butts and carrying them through said cleaning means, and conveyor mechanism for advancing the cleaned leaves tip first to said shredder.

41. The combination with a leaf feed for feeding tobacco leaves by their butts, of a leaf stemmer, a leaf shredder to which leaves are delivered from said stemmer, and means receiving the leaves from said feed and delivering them tip first to said stemmer.

42. The combination with a cigarette tobacco shredder comprising gangs of spaced rotating shearing disks, of conveying means for advancing leaves to said shredder, and a leaf conditioner operating on the leaves on said conveying means to vary the moisture content thereof, said leaf conditioner including means for heating said leaves to dry the same.

43. The combination with a tobacco stemmer, of a tobacco leaf feed acting to feed leaves one by one to said stemmer, means coacting with said leaf feed to spread the leaves out flat for stemming and shredding, a tobacco shredder having opposed rotating gangs of disks with the disks of one gang in interengaging shearing contact with the disks of the other gang and arranged to finely shred tobacco for filling cigarettes, and traveling conveyor means for receiving tobacco leaves from said stemmer and delivering them edgewise into said shredder while retaining the leaves in flat outspread condition.

44. The combination with a tobacco stemmer, of a tobacco leaf feed acting to feed leaves one by one to said stemmer, means coacting with said leaf feed to spread the leaves out flat for stemming and shredding, a tobacco shredder having opposed rotating gangs of disks with the disks of one gang in interengaging shearing contact with the disks of the other gang and arranged to finely shred tobacco for filling cigarettes, traveling conveyor means for receiving tobacco leaves from said stemmer and delivering them edgewise into said shredder while retaining the leaves in flat outspread condition, and a leaf drying device coacting with said conveyor means to reduce substantially the moisture content of the leaves intermediate stemming and shredding.

45. The combination with a tobacco stemmer, of a tobacco leaf feed acting to feed leaves one by one to said stemmer, means coacting with said leaf feed to spread the leaves out flat for stemming and shredding, a tobacco shredder having opposed rotating gangs of disks with the disks of one gang in interengaging shearing contact with the disks of the other gang and arranged to finely shred tobacco for filling cigarettes, traveling conveyor means for receiving tobacco leaves from said stemmer and delivering them edgewise into said shredder while retaining the leaves in flat outspread condition, and a leaf drying device coacting with said conveyor means to reduce substantially the moisture content of the leaves intermediate stemming and shredding, said leaf spreading means including devices for subjecting said leaves to air currents directed along the surface of the leaves to clean and spread the same.

46. The combination with a tobacco shredder having opposed rotating gangs of disks with the disks of one gang arranged in interengaging shearing contact with the disks of the other gang to finely shred tobacco into condition for filling cigarettes, of a tobacco leaf feed for feeding leaves one by one, means coacting with said leaf feed to spread the leaves out flat for shredding including devices for subjecting said leaves to air currents directed along the surface of the leaves to clean and spread the same, and traveling conveyor means coacting with said feed and said shredder to deliver cleaned and outspread leaves edgewise into the nip of said disks.