Aug. 3, 1943. G. I. HOHL 2,325,774

PACKAGING MACHINERY FOR RAZOR BLADES AND LIKE ARTICLES

Filed July 28, 1942 6 Sheets-Sheet 1

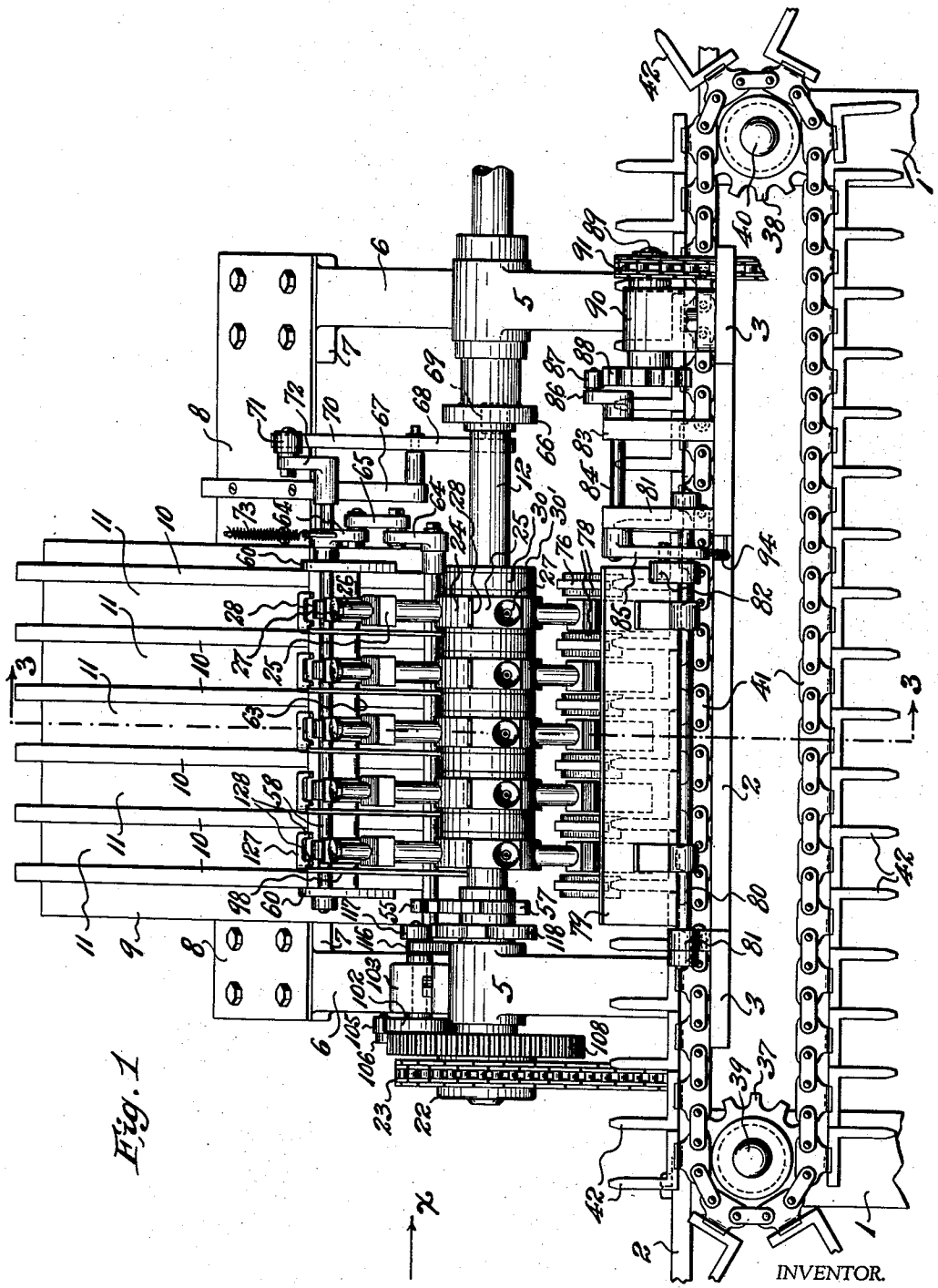


Fig. 1

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PACKAGING MACHINERY FOR RAZOR BLADES AND LIKE ARTICLES

Filed July 28, 1942 6 Sheets-Sheet 2

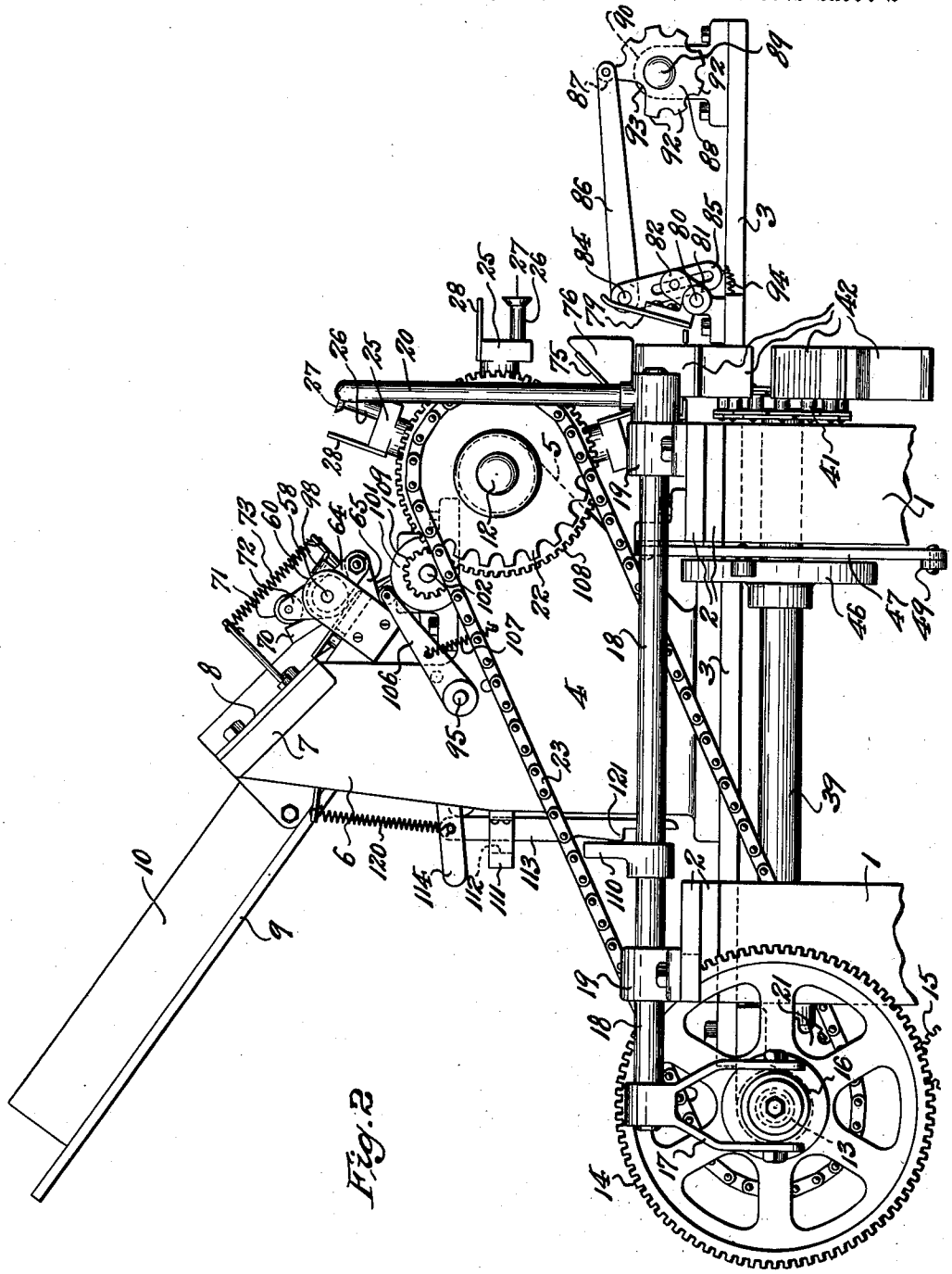


Fig. 2

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PACKAGING MACHINERY FOR RAZOR BLADES AND LIKE ARTICLES

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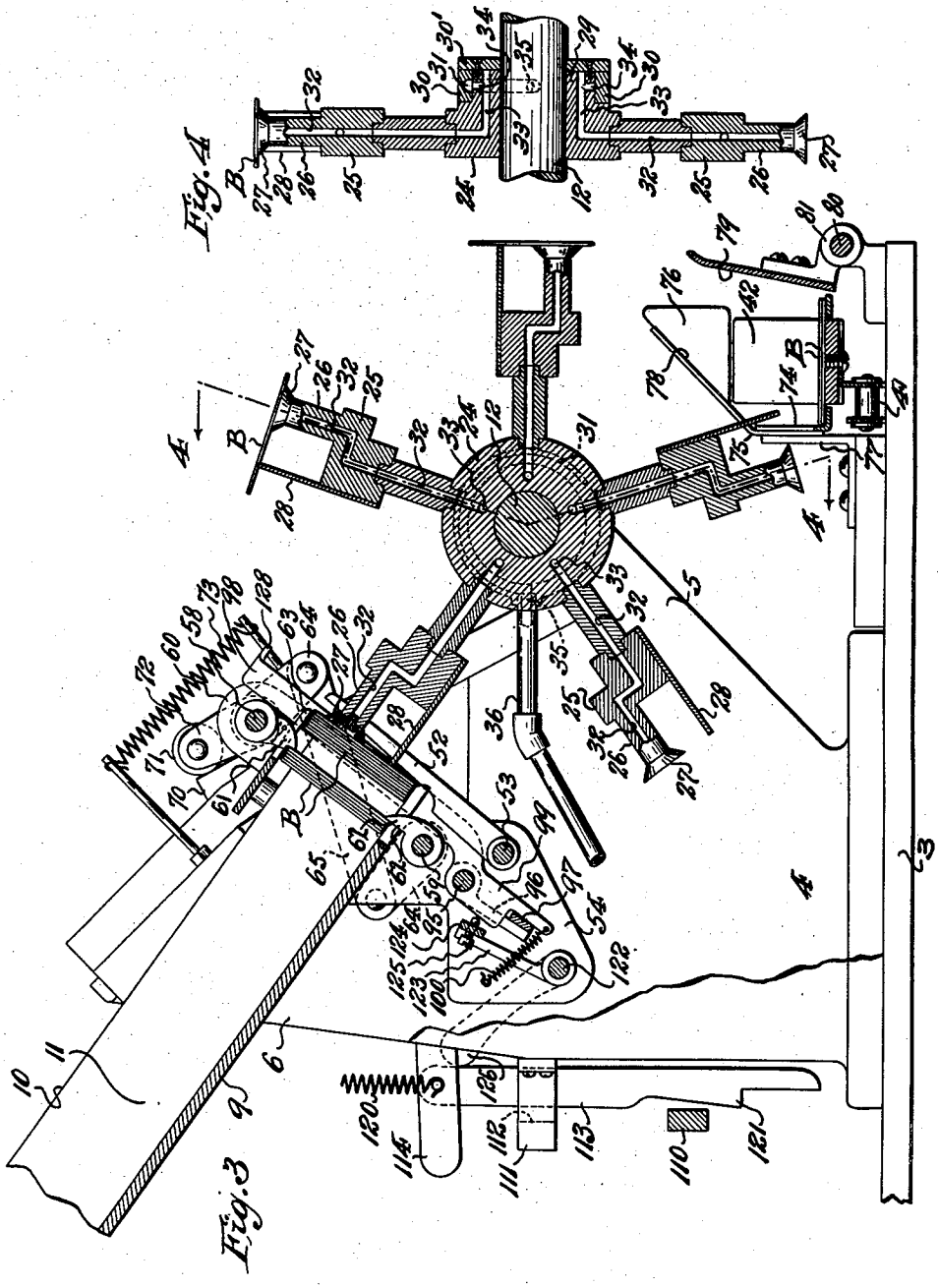


Fig. 4

Fig. 3

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PACKAGING MACHINERY FOR RAZOR BLADES AND LIKE ARTICLES

Filed July 28, 1942 6 Sheets-Sheet 4

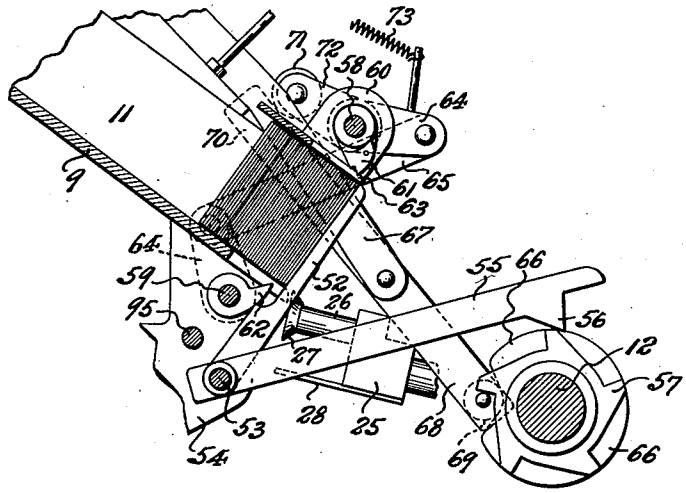


Fig. 5

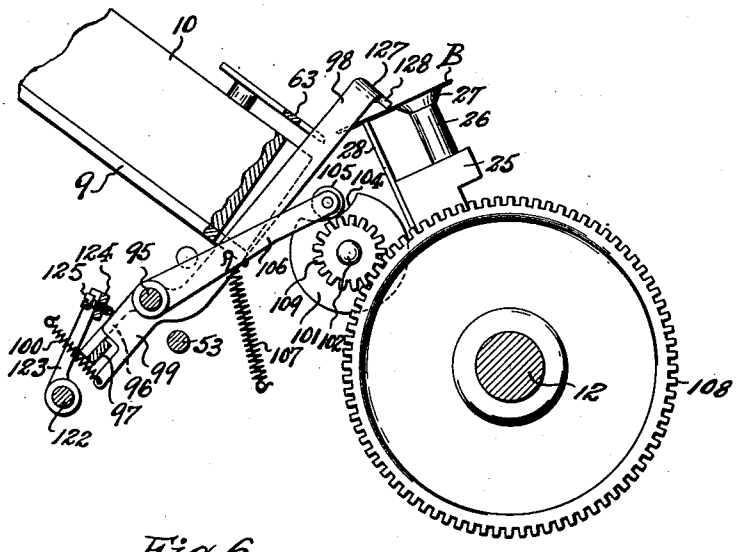


Fig. 6

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PACKAGING MACHINERY FOR RAZOR BLADES AND LIKE ARTICLES

Filed July 28, 1942 6 Sheets-Sheet 5

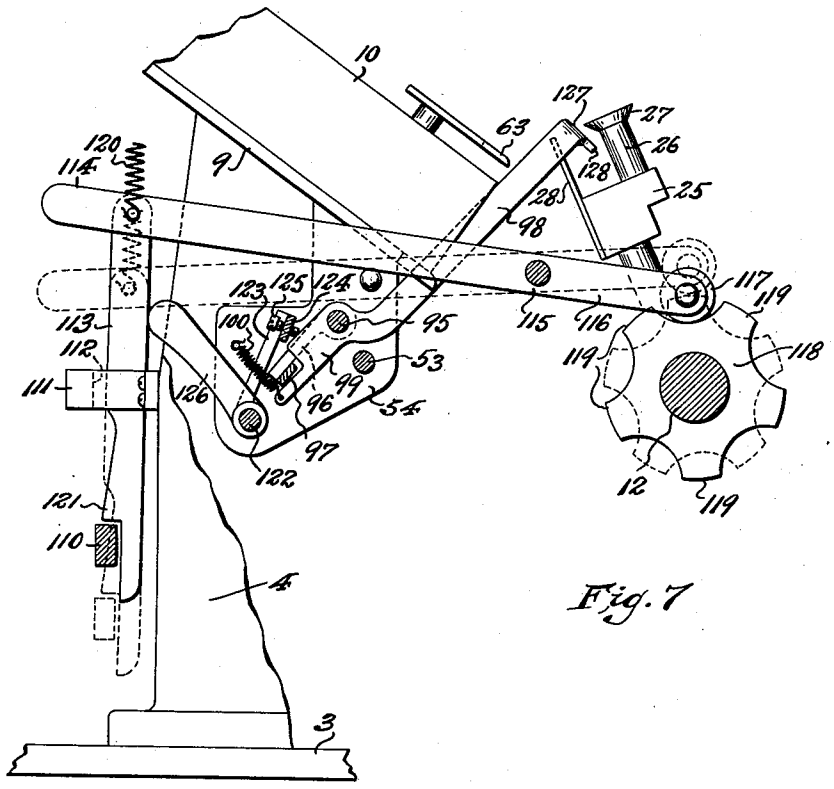


Fig. 7

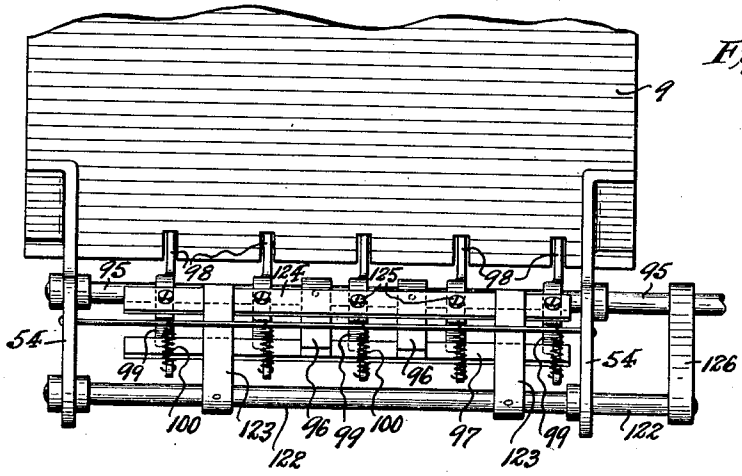


Fig. 8

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PACKAGING MACHINERY FOR RAZOR BLADES AND LIKE ARTICLES

Filed July 28, 1942 6 Sheets-Sheet 6

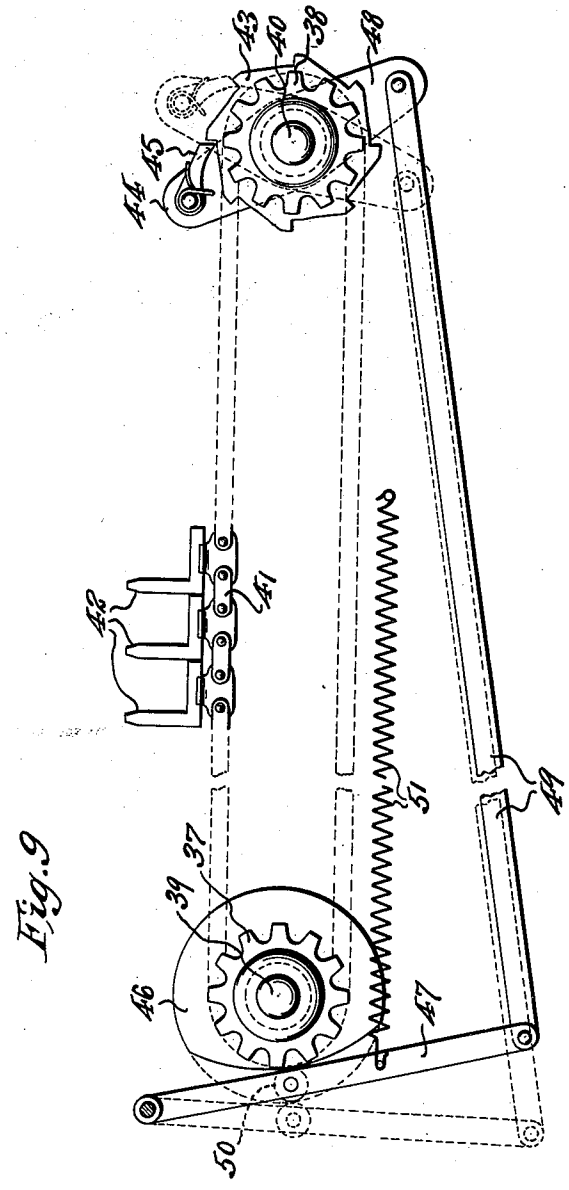


Fig. 9

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Patented Aug. 3, 1943

2,325,774

UNITED STATES PATENT OFFICE

2,325,774

PACKAGING MACHINERY FOR RAZOR BLADES AND LIKE ARTICLES

George I. Hohl, East Orange, N. J.

Application July 28, 1942, Serial No. 452,590

15 Claims. (Cl. 271—12)

This invention relates, generally, to automatic packaging machinery; and the invention has reference, more particularly, to improvements in machines for assembling articles ready for wrapping or insertion into receptacles, such as boxes, cartons, or the like, and especially for collecting and assembling a desired predetermined number of superimposable flat articles, such e. g. as enveloped or wrapped razor blades, ready for wrapping or boxing.

The present invention deals with that part of machinery of the kind above stated which perform the operations of collecting the articles (hereinafter illustratively referred to as razor blades) from a source of supply thereof and forming the same into piles of desired predetermined number in conveying means for transport to wrapping or boxing means, to the operation of which the assembled groups or piles of blades are desired to be subjected.

This invention, therefore, has for an object to provide a high speed, accurate and compact razor blade collecting and assembling mechanism operative to form the blades into piles containing a desired predetermined number thereof, such groups or piles being formed in successive pockets of a conveyer means by which the same, when completed, are transported to and subjected to the action of suitable wrapping or boxing mechanism.

The invention has for another object to provide a plurality of rotatable pick-up wheels or drums equipped with pneumatic blade gripping and carrying means, said wheels or drums corresponding in number to a plurality of magazines adapted to supply the blades thereto by gravity; the blades being stacked in said magazines, and novel means being provided for segregating from the blade stacks minor quantities of blades, together with means for manipulating such minor quantities thereof so as to apply lowermost blades to the pneumatic gripping devices of the pick-up wheels or drums, for removal by the latter with a minimum of frictional resistance and unimpeded by the weight of the major portions of said blade stacks.

Another object of this invention is to provide improved means, cooperative with the pick-up wheels or drums, for detecting a faulty blade or failure of a pneumatic gripping device to grasp and hold a blade, said means being arranged to actuate means for promptly stopping the operation of the machine upon either said occurrence, so that correction of the fault may be quickly made, and occurrence of miscount or reduction of the number of blades desired to be assembled for wrapping or boxing is prevented.

A further object of this invention is to provide a pocketed conveyer means to collect and receive the blades, together with a simple means for intermittently moving said conveyer means, step by step, adjacent to and across the path of rotary movement of the pick-up wheels or drums, and to provide means intermediate said conveyer and said pick-up wheels or drums for stripping the blades from the latter for deposit in the pockets of the former, said pick-up wheels or drums being provided with automatically acting valve means for bringing the pneumatic blade gripping means thereof into and out of action, whereby to release the blades subject to the action of said stripping means.

Other objects of this invention, not at this time more particularly enumerated, will be understood from the following detailed description of the same.

An illustrative embodiment of the present invention is shown in the accompanying drawings, in which:

Fig. 1 is a front elevation of those portions of a razor blade packaging machine which involve the improved blade collecting and assembling means according to this invention; Fig. 2 is an end elevation thereof, viewed in the direction of the arrow x in Fig. 1; Fig. 3 is a transverse vertical sectional view, taken on line 3—3 in Fig. 1, certain parts being shown in elevation; Fig. 4 is a fragmentary sectional view through a pick-up wheel or drum, taken on line 4—4 in Fig. 3; Fig. 5 is a schematic view in part section, showing the magazine blade stack load lifting means and the control cam therefor and also the blade clearance means and its control cam; Fig. 6 is a schematic view, in part section, of the blade detector means and its release cam; Fig. 7 is a schematic view, in part section, showing the blade detector means, the power clutch release means controlled thereby, and the cam means for actuating the latter; Fig. 8 is a fragmentary rear face elevation of portions of the blade detector controlled power clutch release means; and Fig. 9 is a schematic view of the pocketed blade assembling conveyer and means for actuating the same.

Similar characters of reference are employed in the above-described views, to indicate corresponding parts.

The frame-work of the machine comprises leg standards 1, upon which are supported longitudinal frame plates 2 and transverse frame

plates 3. Upstanding from the transverse frame plates 3 are suitably spaced end brackets members 4 provided with forwardly extending bearing extensions 5, and upwardly extending supports 6. Said supports 6 terminate in inclined flanges 7, to and between which is affixed a bridge frame 8, to which, in turn, is affixed the downwardly and forwardly inclined bed plate 9 of the blade supply magazines. Formed by partition members 10 upstanding from said bed plate 9 are a plurality of inclined blade magazines 11. Journaled in and between the bearing extensions 5 is a pick-up wheel or drum shaft 12, which extends adjacent to and across the lower discharge ends of said blade supply magazines.

Mounted on the shaft 12, so as to be revolved thereby, are a plurality of pick-up wheels or drums which correspond in number to the number of blade supply magazines, and which are aligned respectively with the latter. Any suitable number of such pick-up wheels or drums and corresponding blade supply magazines may be provided, but preferably there are five each thereof, as shown in Fig. 1. The shaft 12 is continuously driven so as to revolve said pick-up wheels or drums; power being transmitted thereto from a drive shaft 13. Loosely mounted on said drive shaft 13 is a gear wheel 14 which is continuously driven by a drive gear 15 from a suitable power source. Arranged between said drive shaft 13 and gear wheel 14 is a releasable clutch means 16 for clutching the latter in driving relation to the former. Said clutch means is actuated by a shift fork 17 carried by a transverse clutch control shaft 18 which is mounted in bearings 19 affixed to the machine framework. Said clutch control shaft 18 is provided with a hand lever 20 for manual operation thereof (see Fig. 2). Fixed on said drive shaft 13 is a drive sprocket 21, and fixed on said pick-up wheel or drum shaft 12 is a driven sprocket 22; power being transmitted from the one to the other by a drive chain 23.

The pick-up wheels or drums may be provided in any suitable design or shape, as e. g. in the form of a solid or spoked wheel, but so as to essentially include pneumatic blade gripping devices circumferentially spaced around its periphery for radial extension therefrom. Illustratively, as shown, each pick-up wheel or drum comprises a main body member 24 fixed on said shaft 12 so as to turn therewith. Circumferentially spaced around said main body member, for radial extension therefrom, are pneumatic blade gripping members 25, each provided at the outer extremity thereof with a soft rubber suction cup 27, and further provided with a rearwardly offset blade support or rest 28, adapted to engage and support the trailing end portion of an enveloped blade B, when the latter is operatively grasped at its leading end portion by the suction cup 27; thereby supporting the gripped blade against tilting or like displacement which, if permitted to occur, might prematurely break the suctional grip of said suction cup therefrom (see Fig. 3).

Mounted on an axial hub extension 29, with which the main body member 24 of each pick-up wheel or drum is provided, is a stationary or non-rotatable valve ring 30, the same being retained in operative relation thereto by a retainer plate 30' which is suitably fastened to the end of said hub extension 29. Formed in the inner circumferential face of said valve ring 30, contiguous to the circumferential surface of the hub extension 29 which revolves within said valve ring, is an air suction channel 31, the rearward end of which is located at a point suitably adjacent to the discharge end of a blade supply magazine, and the forward end of which is located suitably adjacent to the blade receiving and accumulating pocketed conveyer means of the machine, which will be herein subsequently described. Extending inward from the bottom of each suction cup 27, with which the pick-up wheel or drum is provided, is an air exhaust duct 32, suitably formed to extend inwardly, through the associated stem or neck 26, the member 25, and into body member 24, so as to terminate in an angular duct arm 33 through the hub extension 29 to a radial port 34 adapted to traverse and communicate with the valve ring air suction channel 31 when the pick-up wheel or drum revolves. Said valve ring 30 is provided with a radial port 35 leading outwardly therethrough from the rearward end of its air suction channel 31. Extending from the valve ring 30 and its radial port 35 is a conduit or pipe 36, which leads from a suitable air exhaust pump (not shown); said conduit or pipe also serving to hold the valve ring 30 against rotation.

Since it is usually the practice to accumulate razor blades in multiples of five for wrapping or boxing, as e. g. so that a package or box contains twenty-five, fifty, or one-hundred blades, each pick-up wheel or drum is ordinarily provided with a succession of five pneumatic blade gripping devices equally spaced around its circumferential periphery; it will be understood however that such number may be either increased or diminished, according to the multiples required for accumulating any desired ultimate number of blades per package or box.

Suitably mounted to run transversely across and adjacently beneath the series of pick-up wheels or drums is a blade collecting and assembling conveyer means. This means comprises suitably spaced supporting sprockets 37 and 38, respectively rotatably mounted on transverse shafts 39 and 40, which are suitably supported by the machine framework. Running over and between said sprockets is an endless chain 41. Affixed to said chain, at spaced intervals, corresponding to the spacing of the pick-up wheels or drums and their cooperating blade supply magazines, are blade receiving pocket forming elements 42; the pockets formed thereby being transversely open end wise. Said conveyer means is so driven as to operate with intermittent motion, whereby a period of dwell of the blade receiving pockets in alignment with and beneath the pick-up wheels or drums occurs. Such period of dwell is of duration timed to permit one revolution of the pick-up wheels or drums during the occurrence thereof, so that, as shown, five blades will be deposited by each pick-up wheel or drum during a revolution of the latter, and thus when five pick-up wheels or drums are provided, each pocket, after traversing the latter, will receive and accumulate twenty-five blades, before passing on and delivering such accumulation of blades to wrapping or boxing mechanism. Of course, it will be obvious that the timing of the pocketed conveyer may be widely varied, as may also be the number of pick-up wheels or drums, so that, in operation a greater or less total number of blades may be accumulated in each conveyer pocket. For example, the conveyer may be timed to dwell during two revolutions of the pick-up wheels or drums, so that ten blades are delivered into the receiving pockets at each pick-up wheel or drum

station, thus, when five such wheels or drums are provided, accumulating lots of fifty blades for packaging or boxing; or various other modifications of conveyer movement relative to more or less pick-up wheel or drum stations may be arranged for according to the ultimate number of blades to be accumulated per package or box.

Illustratively, as shown, the means for intermittently driving the conveyer relative to five pick-up wheels or drums, so as to accumulate twenty-five blades per package or box, comprises a ratchet-wheel **43** to which the driver sprocket wheel **38** is affixed. Pivotally mounted on said shaft **40** is a rocker member, upon the upper arm **44** of which is pivotally attached a spring pressed pawl **45** operative to actuate said ratchet-wheel **43** and attached driver sprocket wheel **38**. Fixed on the shaft **39**, which is suitably geared to and driven by the drive shaft **13**, is a cam **46** for actuating a pivoted oscillator lever **47**, the free end of which is connected to the lower arm **48** of said rocker arm by a link **49**. Said oscillator lever **47** is provided with an anti-friction roller **50** adapted to en engaged by the periphery of said cam **46**, and a suitably anchored pull-spring **51** is connected to said oscillator lever **47** to hold the same and its roller **50** in operative relation to said cam. The shaft **13** and the cam **46** is driven in synchronism with the pick-up wheel or drum shaft **12**, so that the same makes one revolution to each revolution of the latter. It will thus be obvious that the rocker-arm **44—48** will be oscillated once during a given period in each revolution of the pick-up wheels or drums, so as to advance the pocketed conveyer one step for each said revolution of the pick-up wheels or drums.

The blade magazines **11** incline downwardly so that their discharge ends terminate adjacent to the pick-up wheels or drums. The blades B are stacked in the magazines so as to rest endwise upon the floors thereof, thus forming a stack or column of blades B in each magazine, which, by its own weight, will gravitate downwardly toward the magazine discharge mouth. Provided in association with the discharge mouth of each magazine is a blade stack lift means operative to lift the stack or column of blades in each magazine as a pneumatic gripping device of an associated pick-up wheel or drum approaches the magazine mouth so as to pass beneath and in opposition to the lowermost blade ready to grip and withdraw the same. Said lift means for each magazine comprises a lift lever **52** adapted to be swung inwardly toward the opposed blade stack or column, so as to engage and lift the latter, whereby to push its lower end out of the path of movement of and so as to provide clearance for an approaching pneumatic gripping device to pass beneath and into operative alignment with said blade stack or column. Said lift levers **52** are affixed on an actuating rock-shaft **53**, which extends transversely of and below the magazine structure adjacent to the magazine discharge mouths; said rock-shaft being journaled in and between bearing brackets **54** dependent from the bed plate **9** of said magazine structure. The means for producing properly timed operative movements of said lift levers **52** comprises an actuating lever member **55** having an angularly projecting chamfered nosing **56** adjacent to its free end. Fixed on said pick-up wheel or drum shaft **12**, so as to turn therewith, is a five point cam **57**, the points of which engage and actuate the lever member **55** and lift levers **52** as each pneumatic gripping device of each pick-up wheel or drum approaches and aligns with the discharge mouth of a magazine **11** (see Fig. 5).

Provided in connection with each magazine, above but adjacent to the discharge mouth thereof, is means for segregating a minor quantity of the blades B, forming the stack or column in each magazine, from the main mass of said stack or column thereof, whereby the weight of said main mass is removed from said minor quantity, so that withdrawal of the lowermost blade by a pneumatic gripping device of a pick-up wheel or drum may be easily effected, unimpeded by frictional resistance which would otherwise be engendered if the weight of the whole column or stack of blades were permitted to bear upon said lowermost blade. The means for this purpose comprises a pair of rock-shafts disposed to extend transversely of the magazines above and below the same, viz. an upper rock-shaft **58** and a lower rockshaft **59**; the former being suitably journaled in and between bearing brackets **60** upstanding from the magazine structure, and the latter being journaled in and between the bearing brackets **54** dependent from the bed plate **9** of the magazine structure. Affixed respectively to the respective rock-shafts **58** and **59**, to be operated thereby for service relative to the magazines **11**, are opposed upper and lower segregating lift dogs **61** and **62** of suitable shape and structure. Extending across the upper sides of the magazine mouths is a bridging check plate **63**, the same being so located and arranged as to abut the ends of all but the lowermost blade in the minor group thereof formed in each magazine, thereby leaving the lowermost blade free to be slid off and away from said minor group, but holding all the rest against accompanying movement. Said check-plate **63** is suitably cut away to permit operative projection therethrough of the upper segregating lift dogs **61** for movement into and out of the magazines; and, in like manner, the bed plate **9** of the magazine structure is also cut away to permit operative projection therethrough of the lower segregating lift dogs **62** for movement into and out of the magazines.

To cause simultaneous and cooperative in and out movements of the segregating lift dogs **61** and **62** when the same are actuated, said rock-shafts **58** and **59** are respectively provided with lever arms **64** interconnected by a coupling link **65** in such manner, that rotary movement of rock-shaft **58**, in direction to swing its lift dogs **61** into the magazines to operatively engage and lift the major portion of the blade stacks or columns at the upper sides thereof, will be simultaneously transmitted to rock-shaft **59** to cause rotary movement thereof in direction operative to likewise swing its lift dogs **62** into the magazines so as to engage and lift said major portion of the blade stacks or columns at the lower sides thereof. The means for producing suitably timed oscillation of the rock-shafts **58—59** and their lift dogs **61—62** comprises a cam **66**, which is fixed on the pick-up wheel or drum shaft **12** so as to turn therewith. Pivotally mounted on a bearing support **67**, which is affixed to the magazine structure, is a rocker lever, the lower arm **68** of which is provided with an anti-friction roller **69** engageable by said cam **66**. The upper arm **70** of said rocker lever engages the roller stud **71** of a crank-arm **72** which is affixed to the upper rock-shaft **58**. Suitably anchored pull-spring means **73** is connected with the lever arm **64** of said upper rock-

shaft 58, whereby the described actuating mechanism is biased to cause the rocker lever roller 69 to follow the cam 66.

In order to positively assure removal of the pick-up wheel or drum transferred blades from the pneumatic gripping means of the latter for deposit in an aligned receiving pocket of the accumulating conveyer, means is provided intermediate the pick-up wheels or drums and said conveyer for stripping the blades from the former and guiding them into the pockets of the latter. This means, in an illustrative form thereof as shown, comprises an upstanding back plate 74 which is disposed adjacent to the inner side of the upper operative course of the pocketed conveyer. Connected with said back plate to incline upwardly and forwardly therefrom are stripper members 75 to which are secured lateral guide plates 76 adapted to be perpendicularly disposed in the planes of the magazine partition members 10 and said conveyer pocket forming element 42, so as to extend above the latter. Said stripper members and back plate are suitably supported in their associated relation by brackets 77 which are affixed to the machine framework. Said stripper members 75 are spaced apart so as to straddle the path of revolution of the pneumatic blade gripping devices of the pick-up wheels or drums, thereby forming sets of spaced opposed stripper lips 78, which overhang the conveyer blade receiving pockets when the latter dwell in aligned relation to said pick-up wheels or drums. As a blade B, supported by a suction cup 27 of a pick-up wheel or drum, is carried beneath and so that oppositely projecting lateral marginal portions thereof are engaged by a set of opposed stripper lips 78, when the suction of the cup 27 is broken, the thus engaged blade will be stripped from the latter. The blade being thus positively separated from the suction cup, said blade will thereupon drop by gravity into the awaiting receiving pocket; being guided during such gravitational movement by the lateral guide plates 76 and the back plate 74.

Cooperative with the operative course of said pocketed conveyer is means for causing the blades, successively deposited in the receiving pockets thereof, to be symmetrically registered one with and upon another, whereby to assure formation of an even, symmetrical pile thereof ready for packaging or boxing. The means serving such purpose, in an illustrative form thereof as shown, comprises an oscillatable blade registering plate 79 disposed adjacent to the outer side of the operative course of the pocketed conveyer, in opposition to blade receiving pockets dwelling at any given time in aligned relation to the pick-up wheels or drums. Said blade registering plate 79 is affixed to a rock-shaft 80 which is journaled in and between bearing members 81 mounted on the machine framework. The means for rocking said rock-shaft 80 so as to impart oscillatory motion to said blade registering plate 79 comprises a crank-arm 82 affixed to an end of said rock-shaft 80. Supported in bearings 81 and 83, which are mounted on the machine framework, is an oscillator shaft 84. Affixed to an end of said oscillator shaft 84 is a slotted actuator arm 85 adapted to engage and actuate said crank-arm 82, and affixed to the opposite end of said oscillator shaft 84 is a driver arm 86 upon which is mounted an anti-friction roller 87. A rotatable oscillator cam 88, the shaft 89 of which is journaled in a supporting bearing 90 mounted on the machine framework, is continuously rotated by suitable transmission means, such as chain and sprocket means 91, from the drive shaft 13, or any other convenient continuously running shaft possessed by the machine. Said oscillator cam is provided in its periphery with a successtion of vibrator cam points 92, terminating in a drop cam section 93. An anchored pull spring 94 is connected with the slotted actuator arm 85, whereby the described oscillator mechanism is biased to cause its driver arm 86 and roller 87 to follow the oscillator cam 88.

In the operation of the mechanism, as thus far described, the magazines 11 having been supplied with stacks of blades B, power is transmitted to the shaft 12, whereby to cause the pick-up wheels or drums to revolve in clockwise direction. As the pick-up wheels or drums turn, the pneumatic blade gripping members 25 thereof are successively passed across the discharge end of the magazines, so as to pick-up and withdraw blades therefrom, and then transfer the latter to the awaiting receiving pockets of the accumulating conveyer, into which the blades drop when released and stripped from said pneumatic blade gripping members.

At a convenient moment in the circuit of the revolving pick-up wheels or drums, at a time while the magazine blade stacks are supported by the in-swung blade stack lift levers 52, the segregating lift dogs 61—62 are momentarily swung out of the magazines 11 to release the blade stack as a whole for downward feeding movement (see Fig. 5), and then swung into the magazines again so as to engage, lift and support the major portion of each blade stack, but so as to leave a minor portion of at least five blades, and preferably a few more than five, segregated at the discharge mouth of each magazine (see Fig. 3). Such operation of the segregating lift dogs 61—62 is caused and timed by the cam 66, as the roller 69 of the rocker lever 68—70 rides into and out of the peripheral drop section with which this cam is provided, thus oscillating said rocker lever and in turn the crank-arm 72 by which the interlinked rock-shafts 58 and 59 are rocked to produce the described in and out movements of said segregating lift dogs 61—62. In this manner, the weight of the major portions of the blade stacks is removed from the segregated minor portions of the blades for the purposes and advantages already above set forth. Each time the lift dogs 61—62 are thus actuated, blades are fed down to the minor quantity thereof so as to replace those withdrawn by the pick-up wheels or drums, and consequently the minor quantities of blades are replenished at a given period during each complete revolution of said pick-up wheels or drums.

Prior to the approach of each pneumatic blade gripper member 25 of each pick-up wheel or drum to the discharge end of the magazine served by the latter, the lift levers 52 are in-swung to lift the minor quantities of blades B above and clear of the path of movement of the suction cup 27 of such approaching blade gripper member, whereby said suction cup 27 may unimpededly move beneath and into blade gripping position. This is accomplished by the operation of the five point cam 57, the points of which correspond to the number of pneumatic blade gripper members 25 with which each pick-up wheel or drum is provided. Since the cam 57 is fixed on the shaft 12 so as to be rotated thereby, its rotation is synchronized with the revolution of the pick-up wheels or drums, and so that the points thereof

operate the lift lever actuating means each time a blade gripper member and its suction cup **27** approaches and registers in operative alignment with the discharge end of a blade magazine **11**. As a cam point engages the nosing **56** of the actuating lever **55**, the latter is up-swung, thereby rocking the lift lever rock shaft **53** in direction to swing up the lift levers **52** to blade lifting position (see Fig. 5), and so that the approaching suction cup **27** may pass beneath the up-lifted blades to a desired position for engagement with the lowermost blade. By the time the suction cup **27** reaches such blade engaging position, the cam point passes off of the nosing **56** of the actuating lever **55**, so that the latter swings down again, thereby rocking the rock-shaft **53** in the opposite direction, and permitting consequent out-swinging movement of the lift-levers **52**. The out-swinging movement of said lift levers **52** lowers the minor quantity of blades in the magazines so that the lowermost thereof is engaged with the operative face of the aligned blade gripping suction cup **27** (see Fig. 3).

As a given blade gripping member approaches the discharge end of a magazine **11**, the port **34** of its air exhaust or suction ducts **32—33** moves into communication with the suction channel **31** of a cooperating valve ring **30**, so that the air evacuating effect of an air exhaust pump, operative through a connected exhaust pipe **36**, is produced at the suction cup **27** of said blade gripping member. Consequently, when the lowermost blade at the magazine discharge end which is opposed to said suction cup, is moved into engagement with the latter by out-swinging of the corresponding lift lever means **52**, said lowermost blade is firmly gripped and attached to the blade gripping means by the applied suction effect. The position of such suction cup engagement of the blade is applied to the leading end portion of the latter, as related to the movement of the pick-up wheel or drum, and consequently, when the blade is gripped, its trailing end portion will be engaged and supported by the blade rest **28** of the blade gripping means, against undesired tilting or other displacing movement.

The blade being thus gripped by the blade gripping means, the onward rotary movement of the pick-up wheel or drum, will slide out the engaged blade from the minor quantity of blades in the served magazine, so as to carry the same forward toward the pocketed conveyer means into a pocket of which it is to be deposited. The blade check plate **63**, which is cooperative with the blade magazines, holds back all blades of the minor quantities thereof, except the pick-up wheel or drum gripped blade; the lip of said check plate **63** being so positioned as to give clearance to said gripped blade for outward passage from the magazine.

The suction effect for gripping a blade, thus withdrawn from a magazine, is maintained until the blade gripping member, by which a blade is carried, approaches the blade collecting and accumulating conveyer. As the gripped blade is carried beneath the stripper lips **78** of the blade stripping means, the port **34** of the air exhaust or suction ducts **32—33** will pass the far end of the valve ring suction duct **31**, so as to interrupt communication therewith, and thus terminate the blade gripping effect of the suction cup **27** served by said ducts **32—33**. As a consequence of this the blade will be released, and as the blade gripping member moves on, the stripper lips **78** will effectively assure separation of the blade from the gripping member, and thereupon its guided gravitation to and deposit within an awaiting pocket of the collecting and accumulating conveyer (see Fig. 3).

While blades are thus being deposited in the pockets of the collecting and accumulating conveyer, the rotation of the oscillator cam **88** causes its vibrator points **92** to traverse the roller **87** of the driver arm **86**, whereby to oscillate the oscillator shaft **84**, and through the lever **85** and crank arm **82**, in turn oscillate the rock-shaft **80** of the blade registering plate **79**. As a consequence of this said blade registering plate **79** is given a vibratory in and out movement relative to the outer ends of the blade receiving pockets of the collecting and accumulating conveyer, whereby the blades deposited within the latter are agitated sufficiently to substantially assure symmetrical superposition of one upon another within said pockets. Upon completion of each revolution of the oscillator cam **88**, its drop section **93** permits a maximum movement of the driver arm **86**, whereby the said interconnected blade registering plate actuating means is given a maximum movement which swings the blade registering plate **79** inward to a perpendicular position, prior to an advance movement of the conveyer, so as to move all blades, deposited in the pockets thereof, into symmetrical superposed alignment, whereby as the desired number of accumulated blades is completed, ready to be passed on to packaging or boxing means, the same will be related in an evenly piled symmetrical stack ready for the packaging or boxing operation.

As gripped blades are carried away from the magazines by the pick-up wheels or drums, the same are caused to move beneath detector means, which functions to ascertaain that each gripping device has properly engaged and therefore carries a blade for deposit in the collecting and accumulating conveyer, and which, in event any gripping device has failed to withdraw a blade, or has by chance picked up an empty blade envelope or one containing a broken blade, further functions to bring into operation means for immediately stopping the machine, so that an attendant may apply a proper blade, and thus avoid miscount or diminution of the required number of blades per package or box desired to be accumulated.

The detector means and mechanism controlled thereby for the purposes stated comprises a rock-shaft **95** which is journaled in and between the bearing brackets **54** so as to extend transversely of the magazines, below but adjacent to the discharge ends thereof. Affixed to said rock-shaft **95**, to depend therefrom, are carrier arms **96**, to the free end portions of which is affixed to a presser bar **97**, which is thus disposed in parallel offset relation of said rock-shaft. Loosely pivoted on said rock-shaft **95**, to freely turn or swing thereon, are a series of detector arms **98** capable of movement toward and from the orbit of movement through which gripped blades are carried by the revolving pick-up wheels or drums; there being one such detector arm for each pick-up wheel or drum. Each detector arm **98** is provided with a tail piece **99**, oppositely projecting from its pivoted end. Said tail pieces **99** extend under the presser bar **97** subject to engagement thereby. Anchored pull springs **100** are connected with each tail piece **99**, to both urge said tail pieces into engagement with the presser bar **97** as well as to swing down the detector arms **98** to operative positions when released from the

restraint of said presser bar. The presser bar 97 normally holds the detector arms 98 up-swung to out-of-service position (see Fig. 3), but is moved to release said detector arms for service each time a blade gripping means of the pick-up wheels or drums move into opposed relation to the operative ends of said detector arms. The means for timing and actuating such movements of the presser bars 97 comprises a detector release cam 101, the shaft 102 of which is journaled in a bearing 103 carried on an extension 5 of a bracket member 4. Said cam 101 is provided with a peripheral drop section 104. Said cam 101 engages a roller 105 of an operator lever 106 which is affixed to and extends from the rock-shaft 95; said lever 106 being biased by a pull-spring 107 to cause the same and its roller to follow the cam. Said cam 101 is driven at a five to one ratio from the pick-up wheel or drum shaft 12, by means of a driver gear 108 which is affixed to the latter and which meshes with and drives a driven gear 109 which is affixed to the cam shaft 102.

The means for stopping the machine which is subject to actuation by any detector arm 98, under circumstances later to be described, comprises a clutch release lever 110, which is affixed to and extends from the clutch control shaft 18 to a point behind one of the bracket members 4. Affixed to said bracket member 4 is a guide block 111, through the guideway opening 112 of which extends a vertically reciprocable trip bar 113. This trip bar is pivotally suspended from the rearward arm 114 of a pivoted rocking bar 115, the opposite or forward arm 116 of which is provided with a roller stud 117, adapted to be engaged by a clutch release cam 118 which is fixed on the pick-up wheel or drum shaft 12 so as to turn therewith. The peripheral shape of said cam provides cam points 119 corresponding in number to the number of blade gripping members with which the pick-up wheels or drums are provided. Said rocking bar is biased by a pull spring 120 to cause the same and its roller stud 117 to follow the cam 118. Said trip bar 113 is provided with a suitably located trip nosing 121, adapted, when the trip bar is out-swung, to engage and throw down the clutch release lever 110, and thus turn the clutch release shaft 18 in direction to swing the shift fork 17 to clutch releasing position. Normally said trip-bar 113 is reciprocated in a path inward of said clutch release lever 110 (as indicated in Fig. 3), and consequently its trip nosing 121 will by-pass the latter without disturbing it. When said trip-bar 113 is out tilted from true perpendicular, however, its trip nosing 121, on descent, will encounter the clutch release lever 110, and will down-swing the latter to clutch releasing position, (as indicated in Fig. 7). The means for out tilting the trip bar 113 is adapted to be actuated by any detector arm 98, and comprises a rock-shaft 122 which is journaled in and between the bearing brackets 54 so as to lie parallel to but downwardly and outwardly offset from the rock-shaft 95 on which the detector arms 98 are pivoted. Affixed to said rock-shaft 122 are upwardly projecting carrier arms 123, to the free ends of which is affixed a thrust bar 124, which extends transversely above the tail pieces 99 of the detector arms 98. Said thrust bar 124 is provided with an adjustable abutment screw 125 for opposition to the tail piece of each said detector arm. Affixed to said rock-shaft 122 is a push-piece 126, the free end of which is opposed to the inner side of the trip bar 113.

Each detector arm 98 is provided at its free end with an angularly disposed terminal portion 127, preferably provided with downwardly directed, spaced feeler fingers 128.

In the operation of the detector means, as blade gripping members of the pick-up wheels or drums engage and withdraw blades B from the magazines, and advance the same toward the collecting and accumulating conveyer, by the time the carried blades are opposed to the free ends of the detector arms 98, the drop section 104 of the release cam 101 traverses the roller 105 of operator lever 106, whereby the latter swings to rotate the rock-shaft 95 and presser bar 97 clockwise and away from the tail-pieces 99 of the detector arms 98. The detector arms 98 are thereby released subject to the pull of their springs 100, and consequently said detector arms are down-swung toward the pick-up wheel or drum carried blades B (see Fig. 6). If a proper enveloped blade is present, the feeler fingers 128 will engage the same, and descent of the detector arm will be arrested whereby before movement of the latter can be transmitted to the thrust bar 124 of the machine clutch release mechanism, and consequently operation of the machine will not be arrested. Thereafter, before the detector arm engaging blades are carried away from said detector arms by onward movement of the pick-up wheels or drums, the drop section 104 of the release cam 101 passes the operator lever roller 105, so that the operator lever is again swung up to carry the presser bar 97 into engagement with the detector arm tail pieces, thus swinging up the detector arms 98 to normal out-of-service positions, ready for repetition of the above described operations on the approach of succeeding blades carried by the pick-up wheels or drums.

If, when the detector arms 98 are released for service in the manner above set forth, in the event a blade gripping member of any of the pick-up wheels or drums had failed to pick up and carry a blade thereto, or should a broken blade be presented, or an empty blade envelope presented, no resistance would be offered to full down swinging movement of the opposed detector arm 98, and consequently the amplitude of movement of the latter would be sufficient to carry its tail piece 99 into lifting engagement with the thrust bar 124. The uplifting movement thus imparted to the thrust bar 124 would be then transmitted through the arms 123 to the rock-shaft 122, so that the latter would be turned counterclockwise, and function to swing forward the push-piece 126, so as to swing outward the reciprocating trip bar 113, whereby its nosing 121 would be aligned in opposition to the clutch release lever 110. As a high point 119 of the clutch release cam 118 thereafter rocked the rocking bar 115 to swing down its rearward arm 114, the latter would thrust down the trip bar 113 so as to engage the nosing 121 with the clutch release lever 110 with down-swinging effect thereupon. Such operation of the clutch release lever operates to rotate the clutch control shaft 18 so as to swing the shift fork 17 to release clutch 16, and thus immediately stop the machine. The machine being thus automatically stopped, an attendant can supply the missing or replace the defective blade, whereupon the machine is again started by throwing in the clutch 16 by means of the hand lever 20.

From the above description and the drawing disclosures, it will be apparent that this invention

provides an automatic blade collecting and accumulating mechanism of comparatively simple and compact construction, and yet one capable of rapid operation, while none-the-less safeguarded against blade miscounts or delivery of defective blades.

It will be understood that various changes may be made in the disclosed constructions, and many apparently widely different embodiments of this invention could be made without departing from the scope thereof as defined by the following claims. It is therefore intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In a machine of the kind described, a revolved pick-up wheel having blade gripping means spaced around the periphery thereof, a fixed blade supply stack magazine inclining downwardly toward said pick-up wheel with its discharge end aligned substantially in the path of movement of said blade gripping means, upper and lower lift dogs movable into and out of said magazine, and means to produce timed actuation of said lift dogs, whereby inward movement of said lift dogs operates to lift and support a major portion of the blade supply stack and separate the same from a lower free minor portion thereof located at the discharge end of the magazine, while outward movement of said lift dogs operates to release said major portion so as to effect replenishment of the minor portion after the latter has been diminished by the blade withdrawing action of said pick-up wheel.

2. In a machine of the kind described, a revolved pick-up wheel having blade gripping means spaced around the periphery thereof, a fixed blade supply stack magazine inclining downwardly toward said pick-up wheel with its discharge end aligned substantially in the path of movement of said blade gripping means, blade segregating means movable into and out of said magazine, and means to produce timed actuation of said blade segregating means, whereby to divide the blade stack into an independently supported upper major portion and a lower free minor portion located at the discharge end of the magazine, and at intervals to release the major portion so as to effect replenishment of the minor portion after the latter has been diminished by the blade withdrawing action of said pick-up wheel, means for temporarily lifting said minor portion out of the path of each blade gripping means as the latter moves into alignment with the former and thereafter lowering said minor portion to engage its lowermost blade with the aligned blade gripping means, and means to produce timed actuation of said last mentioned lifting means.

3. In a machine of the kind described, a driven shaft, a series of pick-up wheels mounted on said shaft so as to be revolved thereby, each having suction-type blade gripping means spaced around the peripheries thereof, blade supply stack magazines inclining downwardly toward said pick-up wheels with their discharge ends aligned substantially in the path of movement of the blade gripping means of the latter, upper and lower lift dogs cooperative with each magazine, cam means on said driven shaft and motion transmission means operated thereby to produce timed actuation of said lift dogs, whereby to move said lift dogs into said magazines so as to lift major portions of the blade supply stacks to segregate therefrom minor portions of the latter located at the discharge ends of said magazines and at intervals to move said lift dogs out of said magazines to release said major stack portions so as to effect replenishment of said minor stack portions after the latter have been diminished by the blade withdrawing action of said pick-up wheels.

4. In a machine of the kind described, a driven shaft, a series of pick-up wheels monuted on said shaft so as to be revolved thereby, each having suction-type gripping means spaced around the peripheries thereof, blade supply stack magazines inclining downwardly toward said pick-up wheels with their discharge ends aligned substantially in the path of movement of the blade gripping means of the latter, upper and lower lift dogs cooperative with each magazine, cam means on said driven shaft and motion transmitting means operated thereby to produce timed actuation of said lift dogs, whereby to move said lift dogs into said magazines so as to lift major portions of the blade supply stacks to segregate therefrom minor portions of the latter located at the discharge ends of said magazines and at intervals to move said lift dogs out of said magazines to release said major stack portions so as to effect replenishment of said minor stack portions after the latter have been diminished by the blade withdrawing action of said pick-up wheels, oscillatable means for lifting said minor stack portions to provide clearance for the passage thereunder of each blade gripping means of corresponding pick-up wheels into blade receiving position and thereafter lowering said minor stack portions to engage lowermost blades thereof with aligned blade gripping means, and a second cam means on said shaft and motion transmission means operated thereby to produce timed actuation of said last mentioned lifting means.

5. In a machine of the kind described, a driven shaft, a series of pick-up wheels mounted on said shaft so as to be revolved thereby, each having suction-type blade gripping means spaced around the peripheries thereof, blade supply stack magazines inclining downwardly toward said pick-up wheels with their discharge ends aligned substantially in the path of movement of the blade gripping means of the latter, upper and lower lift dogs cooperative with each magazine, cam means on said driven shaft and motion transmission means operated thereby to produce timed actuation of said lift dogs, whereby to move said lift dogs into said magazines so as to lift major portions of the blade supply stacks to segregate therefrom minor portions of the latter located at the discharge ends of said magazines and at intervals to move said lift dogs out of said magazines to release said major stack portions so as to effect replenishment of said minor stack portions after the latter have been diminished by the blade withdrawing action of said pick-up wheels, oscillatable means for lifting said minor stack portions to provide clearance for the passage thereunder of each blade gripping means of corresponding pick-up wheels into blade receiving position and thereafter lowering said minor stack portions to engage lowermost blades thereof with aligned blade gripping means, a second cam means on said shaft and motion transmission means operated thereby to produce timed actuation of said last mentioned lifting means, an intermittently actuated blade collecting and assembling conveyer having pockets to successively receive blades from each pick-up wheel whereby

to assemble in said pocket blade groups of predetermined number, and stationary blade stripping and guiding means disposed intermediate said pick-up wheels and said conveyer along the inner side of the latter for cooperation with pockets thereof positioned to receive blades, said stripping and guiding means being adapted to strip released blades from the blade gripping means of said pick-up wheels and guide the same for gravitation into said conveyer pockets.

6. A machine of the kind described as defined by claim 5, including an oscillatory blade registering plate disposed along the outer side of the conveyer to engage blades deposited in pockets thereof, and a driven oscillator cam and motion transmission means actuated thereby adapted to vibrate said registering plate against deposited blades, whereby to settle and position the same within said pockets in symmetrically superposed mutually registered relation.

7. A machine of the kind described as defined by claim 5, including a pivoted oscillatory blade registering plate disposed along the outer side of the conveyer to engage blades deposited in pockets thereof, a driven oscillator cam and motion transmission means operated thereby adapted to actuate said registering plate, said oscillator cam having a succession of cam points operative to transmit vibratory motion of limited amplitude to said registering plate whereby to engage and settle deposited blades in flat-lying positions within said conveyer pockets, and said oscillator cam being further provided with a drop section operative to produce maximum inward movement of said registering plate against deposited blades, so as to position the latter within said pockets in symmetrically superposed mutually registered relation.

8. In a machine of the kind described having a series of revolved blade pick-up wheels and cooperating magazines to supply blades thereto, an intermittently actuated blade collecting and assembling conveyer having pockets to successively receive blades from each pick-up wheel whereby to assemble in said pockets blade groups of predetermined number, a pivoted oscillatory blade registering plate disposed along the outer side of the conveyer to engage blades deposited in pockets thereof, a driven oscillator cam and motion transmission means operated thereby to actuate said registering plate, said oscillator cam having a succession of cam points operative to transmit vibratory motion of limited amplitude to said registering plate whereby to engage and settle deposited blades in flat-lying positions within said conveyer pockets, and said oscillator cam being further provided with a drop section operative to produce maximum inward movement of said registering plate against deposited blades, so as to position the latter within said pockets in symmetrically superposed mutually registered relation.

9. A machine of the kind described as defined by claim 5, wherein each pick-up wheel comprises a body structure having a hub, blade gripping suction cups circumferentially spaced around said body structure, a non-rotatable valve ring mounted on said hub, said valve ring having an air suction channel suitably extending through a portion of its internal circumference and contiguous to said hub, means to connect said suction channel in communication with air exhaust means, and said body structure and its hub having air exhaust ducts extending therethrough from the interior of each suction cup and terminating in ports opening outwardly from said hub, said ports being adapted to move into and out of communication with said air suction channel of said valve ring, whereby blade gripping suction effect of said suction cups is initiated as the latter approach a blade supply magazine and released as they approach the blade receiving conveyer.

10. In a machine of the kind described, a driven shaft, a blade pick-up wheel mounted on said shaft so as to be revolved thereby, a magazine cooperative with said pick-up wheel to supply blades thereto, a pocketed blade collecting conveyer to which blades are delivered by said pick-up wheel, said pick-up wheel comprising a body structure having a hub, blade gripping suction cups circumferentially spaced around said body structure, a non-rotatable valve ring mounted on said hub, said valve ring having an air suction channel suitably extending through a portion of its internal circumference and contiguous to said hub, means to connect said suction channel in communication with air exhaust means, and said body structure and its hub having air exhaust ducts extending therethrough from the interior of each suction cup and terminating in ports opening outwardly from said hub, said ports being adapted to move into and out of communication with said air suction channel of said valve ring, whereby blade gripping suction effect of said suction cups is initiated as the latter approach the blade supply magazine and released as they approach the blade receiving conveyer.

11. A machine of the kind described as defined by claim 10, wherein said pick-up wheel body structure is provided with blade rest means spaced behind each suction cup to cooperate therewith in supporting a blade gripped thereby against displacement therefrom.

12. A machine of the kind described as defined by claim 5, including clutch controlled power transmission means for driving said pick-up wheel shaft, a clutch release means, a reciprocated trip means, a trip actuator cam on said pick-up wheel shaft and motion transmission means operated thereby for producing timed reciprocation of said trip means, a series of pivoted spring actuated detector devices to respectively cooperate with the respective pick-up wheels, means for holding said detector devices raised to out-of-service positions, means for retracting said holding means including a driven actuating and timing cam, whereby to release said detector devices for operation each time pick-up wheel blade gripping means advance beyond the magazines to positions opposed to said detector devices, and means adapted to be actuated by unresisted movement of any detector device for moving said reciprocated trip means into operative relation to said clutch release means.

13. In a machine of the kind described, a driven shaft, blade pick-up wheels mounted on said shaft so as to be revolved thereby, blade gripping means spaced around the peripheries of said pick-up wheels, magazines cooperative with said pick-up wheels to supply blades thereto, a pocketed blade collecting conveyer to which blades are delivered by said pick-up wheels, clutch controlled power transmission means for driving said pick-up wheel shaft, clutch release means, a series of movable detector devices to respectively cooperate with the respective pick-up wheels, means for holding said detector devices in out-of-service positions, means for releasing said detector devices for service each time pick-up wheel blade gripping means advances beyond the magazines

to positions opposed to said detector devices, and means adapted to be actuated by unresisted movement of any detector device for operating said clutch release means.

14. In a machine of the kind described, a driven shaft, blade pick-up wheels mounted on said shaft so as to be revolved thereby, blade gripping means spaced around the peripheries of said pick-up wheels, magazines cooperative with said pick-up wheels to supply blades thereto, a pocketed blade collecting conveyer to which blades are delivered by said pick-up wheels, clutch controlled power transmission means for driving said pick-up wheel shaft, clutch release means, a reciprocated trip means, a trip actuator cam on said pick-up wheel shaft and motion transmission operated thereby for producing timed reciprocation of said trip means, a series of movable detector devices to respectively cooperate with the respective pick-up wheels, means for holding said detector devices in out-of-service positions, means for releasing said detector devices for service each time a pick-up wheel blade gripping means advances beyond the magazines to positions opposed to said detector devices, and means adapted to be actuated by unresisted movement of any detector device for moving said reciprocated trip means into operative relation to said clutch means.

15. In a machine of the kind described, a driven shaft, blade pick-up wheels mounted on said shaft so as to be revolved thereby, blade gripping means spaced around the peripheries of said pick-up wheels, magazines cooperative with said pick-up wheels to supply blades thereto, a pocketed blade collecting conveyer to which blades are delivered by said pick-up wheels, clutch controlled power transmission means for driving said pick-up wheel shaft, clutch release means, a reciprocated trip means, a trip actuator cam on said pick-up wheel shaft and motion transmission means operated thereby for producing timed reciprocation of said trip means, a series of pivoted spring actuated detector devices to respectively cooperate with the respective pick-up wheels, means for holding said detector devices raised to out-of-service positions, means for retracting said housing means including a timing cam driven from and in timed relation to said pick-up wheel shaft, whereby to release said detector devices for operation each time pick-up wheel blade gripping means advance beyond the magazines to positions opposed to said detector devices, and means adapted to be actuated by unresisted movement of any detector device for moving said reciprocated trip means into operative relation to said clutch release means.

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