

June 22, 1965

A. SCHMERMUND

3,190,478

FEEDING DEVICE

Filed May 1, 1962

7 Sheets-Sheet 1

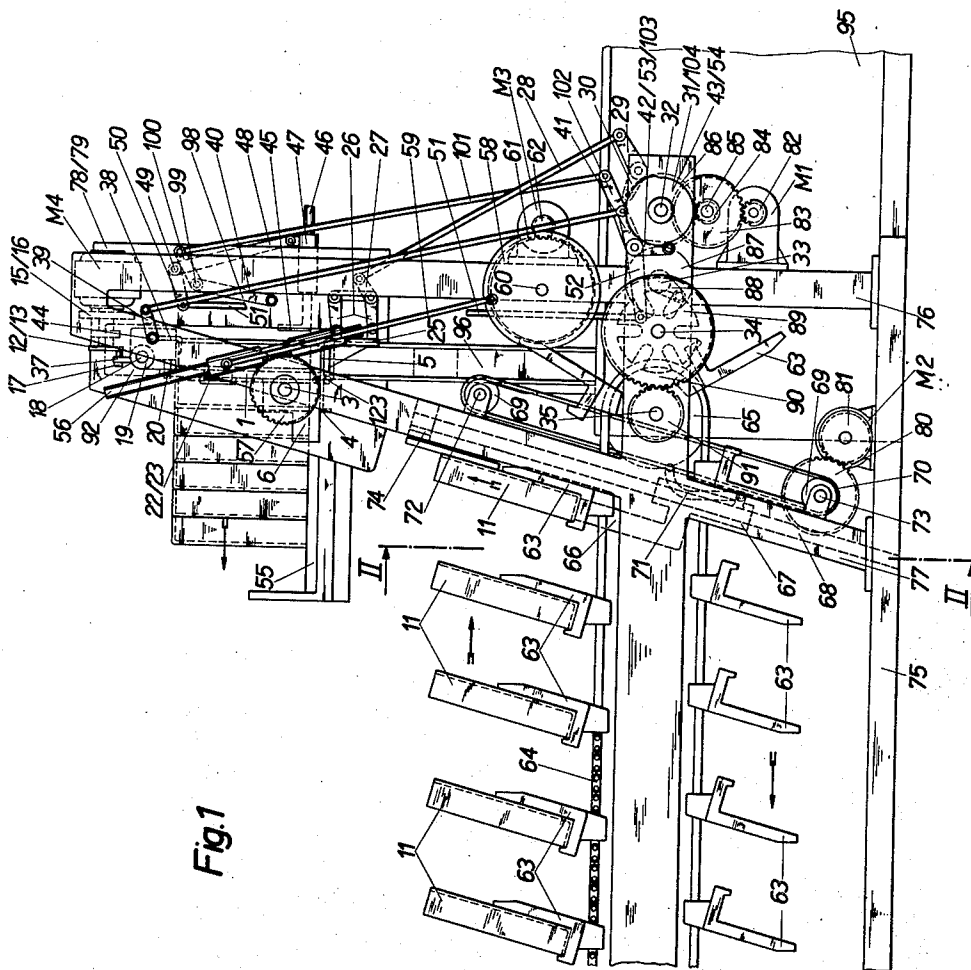


Fig. 1

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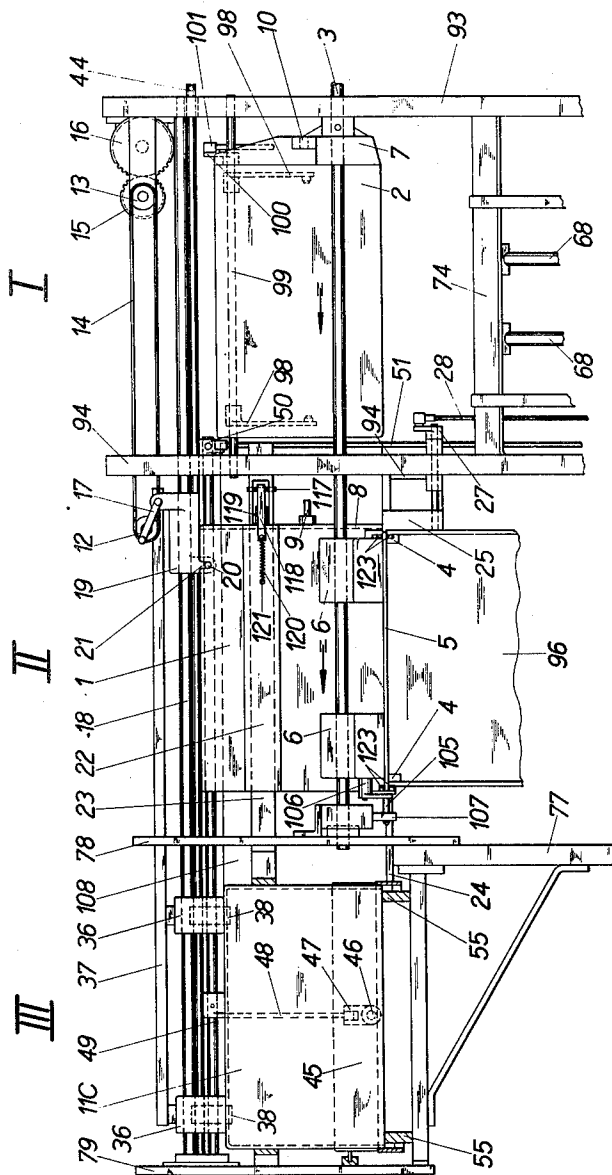


Fig. 4

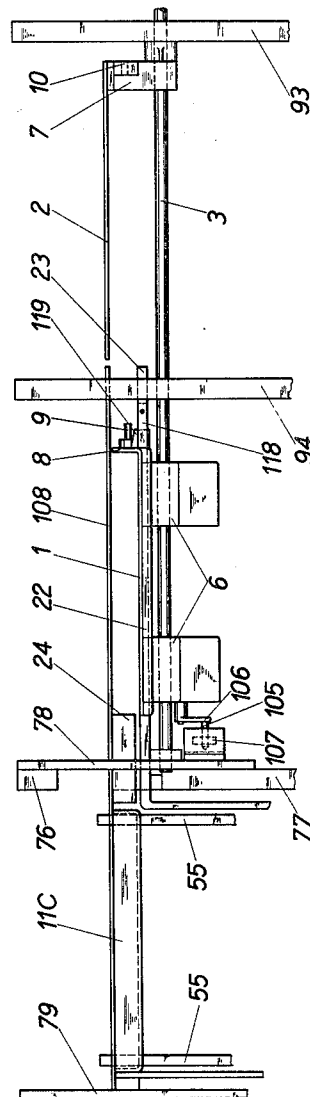


Fig. 5

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Fig. 6

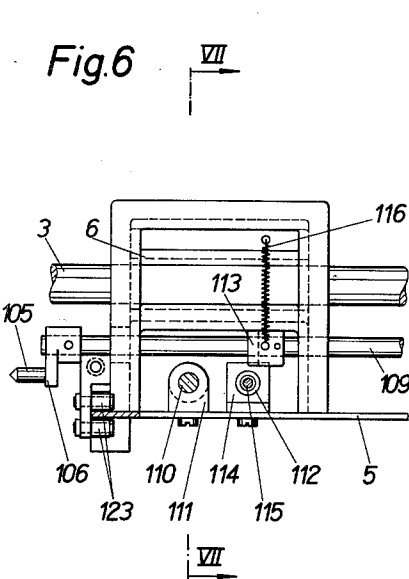


Fig. 7

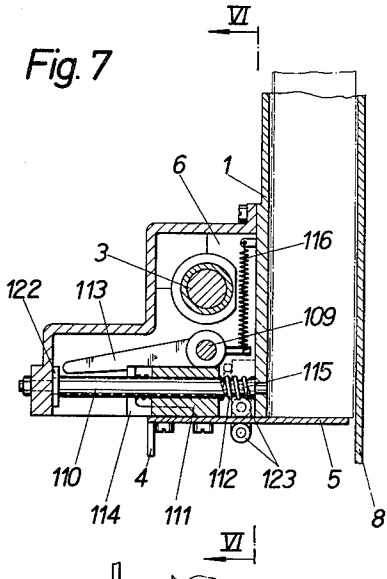
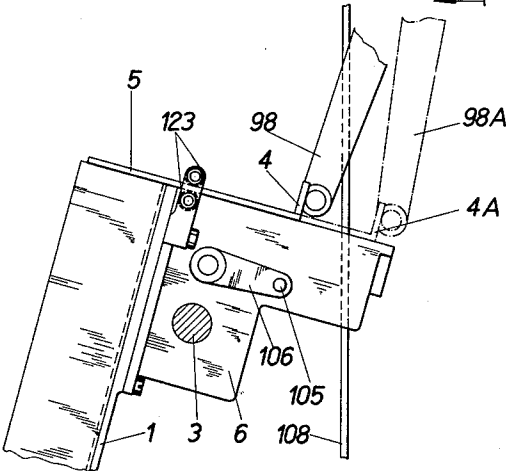


Fig. 8



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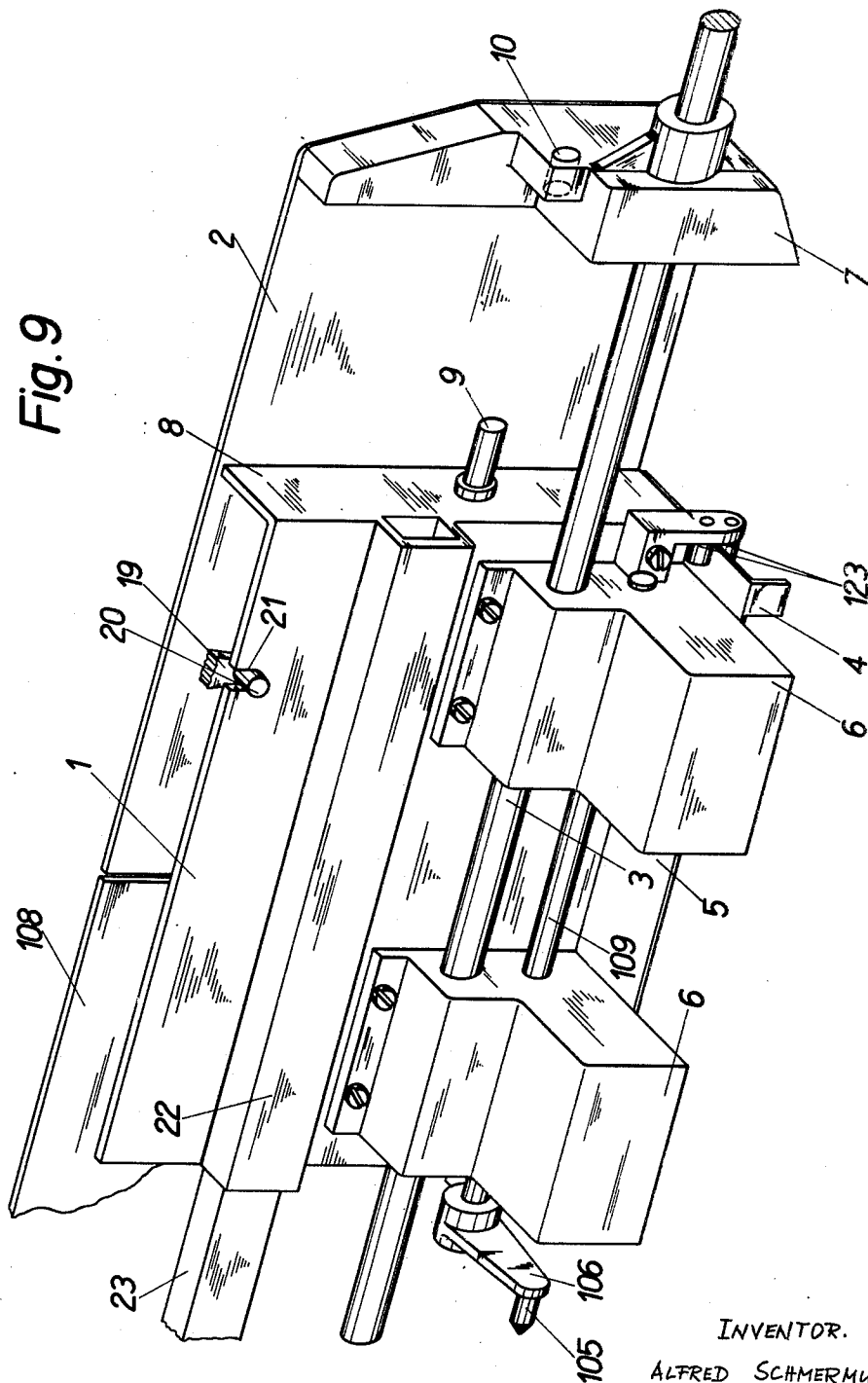
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7 Sheets-Sheet 5



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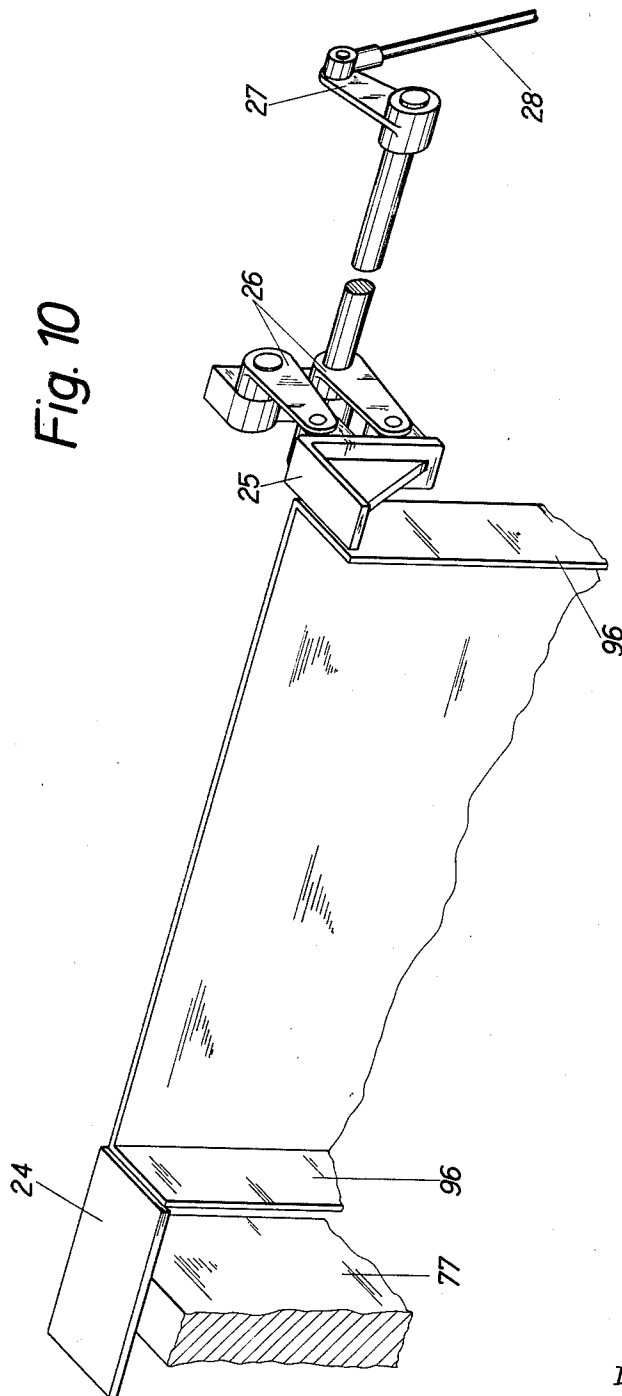
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Fig. 11

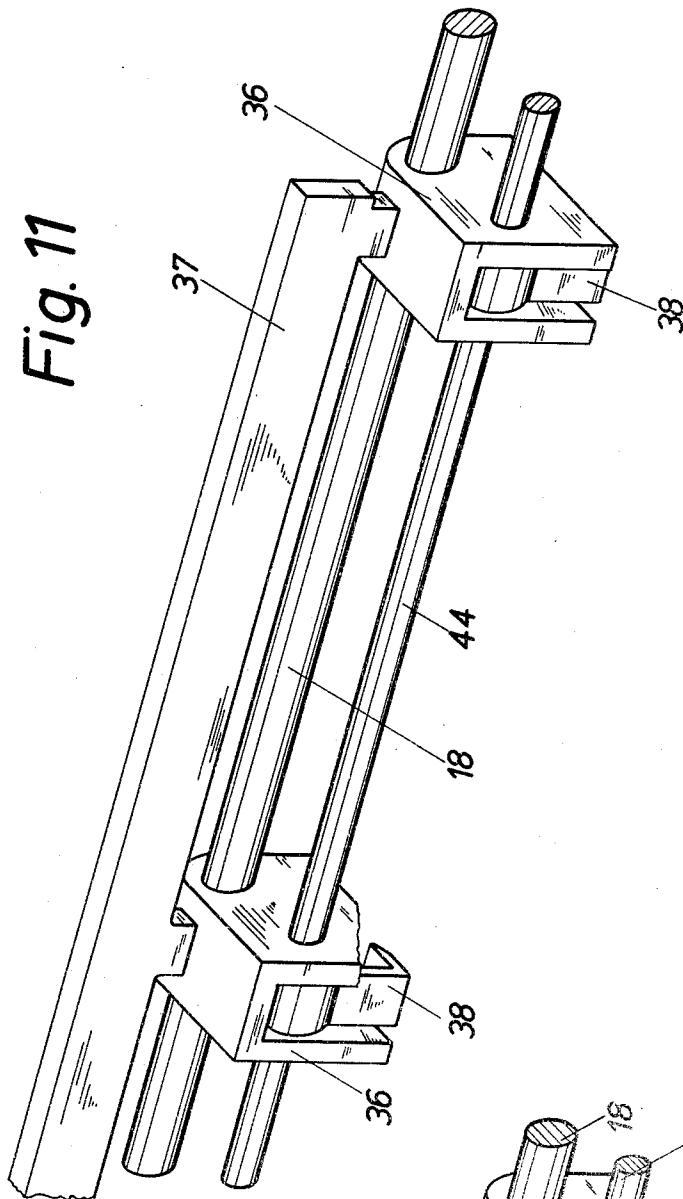
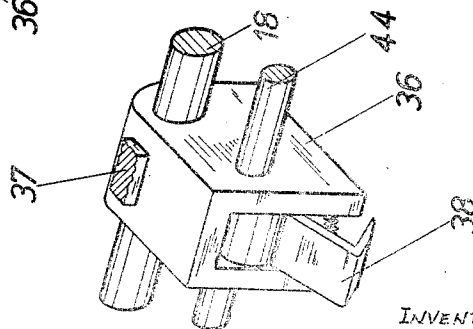


Fig. 12



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3,190,478

FEEDING DEVICE

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Sch 29,645

10 Claims. (Cl. 214—307)

The invention relates to feeding devices for elongated articles, such as cigarette feeding devices for cigarette packing machines.

An automatic cigarette feeding device has been proposed in which magazines of metal, wood, plastic material or the like, and filled with cigarettes, are successively fed into a frame arrangement serving for tipping the magazines, into a position above a supply hopper of the packing machine, the frame arrangement having a bar-like blocking member displaceable transversely to and fro which can occupy two positions. A spring loaded striking arrangement is provided for striking the blocking member and driving it into one of its two positions, the blocking member, when in its other position, serving for preventing cigarettes from falling from a magazine when being moved by the frame arrangement from an oblique position into a substantially vertical, tipping position. The striking arrangement is operated when the magazine is in the substantially vertical position whereby to free the cigarettes in the magazine and allow them to fall therefrom in a mass into the supply hopper of the packing machine.

The previously proposed device has the disadvantage that access to the supply hopper of the packing machine is rendered difficult. This makes operation of the machine troublesome since, in general, the machine must be stopped when disturbances occur in the supply hopper, as otherwise the tipping movement of the frame arrangement would prevent correction of the disturbance.

It is an object of the invention to provide an automatic feeding device in which the above mentioned disadvantage is avoided or, at least, mitigated.

A frame arrangement having a tipping action is desirable, in view of its simplicity and in view of the reduced possibility of the articles in the magazine being damaged. Accordingly it is another object of the invention to provide a feeding device having a frame arrangement operating with a tipping action, but in which the supply hopper of a packing machine is not substantially obstructed by the frame arrangement.

It is a further object of the invention to provide a cigarette feeding device which is suitable for cooperation with a cigarette packing machine.

These and other objects and advantages will become apparent to those skilled in the art from the following description of a cigarette feeding machine, when read with reference to the appended drawings, which are given by way of example and in which:

FIG. 1 is a side view of a cigarette feeding device, partly broken away;

FIG. 2 is a sectional view of the device, along the line II—II of FIG. 1;

FIG. 3 is a schematic view illustrating the passage of a magazine through the device;

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FIG. 4 is an elevational view corresponding to FIG. 2, showing a frame arrangement of the device in a different position to that shown in FIG. 2;

FIG. 5 is a plan view corresponding to FIG. 4;

FIG. 6 is a sectional view of a detail of the device, to a larger scale than FIG. 1, along the line VI—VI of FIG. 7;

FIG. 7 is a sectional view along the line VII—VII of FIG. 6;

FIG. 8 is a side view of a detail of the frame arrangement of the device;

FIG. 9 perspective illustrates a portion of the device;

FIG. 10 perspective illustrates a parallelogram mechanism and some additional parts of the device; and

FIG. 11 and 12 perspective illustrate further details of the device, FIGS. 9 to 12 being on a larger scale than the preceding figures.

The device comprises a horizontal conveyor arranged at convenient table-height alongside the packing machine. The horizontal conveyor is provided with equi-spaced carriers 63 for carrying obliquely positioned magazines 11 of cigarettes, the full magazines 11 being successively conveyed to an obliquely operating lifting device 66 (FIG. 1) which successively lifts the magazines 11 from the carriers 63 and introduces them from below into a holder or frame arrangement having a front part 1, a rear part 2 and a member 5 (see also FIG. 2). The holder or frame arrangement 1, 2 is rotatable by a shaft 3 from an oblique, inverted, position shown in dash-dotted lines in FIG. 1 in which the member 5 lies at the top, into a vertical, non-inverted, position shown in full lines in FIG. 1, in which the member 5 lies at the bottom, the side opposite the member 5 being open so that a magazine 11 when in the oblique position can be introduced into the frame arrangement through its open side by the lifting device 66. The magazine 11 when in the oblique position is indicated by reference numeral 11' and when rotated with the frame arrangement into the said vertical position is indicated by reference numeral 11''.

The front part 1 (as viewed in FIGS. 2 and 9) and the rear part 2 are provided on the shaft 3. Part 2 is keyed to the shaft 3 and rotatable thereby. Part 1 is fixed to slide guides 6 which are displaceably mounted on the shaft 3, the part 1 being thus longitudinally displaceable to and fro on the shaft 3 together with the slide guides 6 (see FIGS. 2 and 4). The part 1 has a side wall 8 (see FIG. 4) and carries the bottom member 5, which is transversely displaceable and which normally blocks cigarettes in a magazine carried by the frame arrangement from falling therefrom (see also FIG. 9). The components 1, 5, 6 and 8 are slidably mounted as a unit on the shaft 3 by means of the slide guides 6 and are movable on the shaft 3 to and fro between position I and position II (FIGS. 2 and 4). When in position I, the part 1 is coupled to the part 2 by engagement of a pin 9 carried by the part 1 in an eye 10 carried on the part 2, so that on rotating or tipping movement of the frame arrangement 1, 2 when the shaft 3 is turned after a magazine has been introduced into the frame arrangement, both parts 1 and 2 move jointly with the magazine between them.

On transverse movement of part 1 from position I to position II, part 2 and a clamping portion 7 thereof

(see also FIG. 5) remain in position I, whereas components 1, 5, 6 and 8 carry the full magazine 11 from its vertical position 11" to a displaced position 11'" above a supply hopper 96, 97 of the packing machine 95 (see FIG. 2).

During the tipping of the magazine 11 into the vertical position 11" from the position 11' the cigarettes in the magazine 11 are closed in at all sides, so the tipping action can be fast, without danger of the cigarettes being damaged or jammed between the magazine and the rear wall of the frame arrangement.

Transport of the frame arrangement part 1 from the position I to the position II is effected by a conveyor chain 14 which is entrained over chain wheels 12 and 13, wheel 13 being fixed to a toothed wheel 15 meshing with a toothed wheel 16 arranged for being driven by a drive motor M4. A coupling rod 17 is provided which links the chain 14 to a slide 19 provided on a guide rod 18, the coupling rod 17 being so arranged that in one or the other endmost position of the to and fro movement of the slide 19, pivot points of the coupling rod 17 lie in line with the centre of rotation of the chain wheel 12 or 13 respectively, causing the slide 19 to remain stationary, although the respective chain wheel is rotating, prior to a reversal of the movement of the slide 19, these endmost positions being called dead points in the movement of the slide 19. Thus small inaccuracies in the switching of the motor M4 are rendered ineffective on the precise movement of the chain 14, since small angular rotations of the chain wheels 12 and 13 at the said dead points have no effect on the longitudinal movement of the slide 19, so that the end positions of the part 1 on to and fro movement between position I and position II are reached with sufficient accuracy. Coupling of the part 1 to the slide 19 is effected at the end of the tipping movement, when a stud 20 of the slide 19 engages in a recess 21 of the part 1.

The frame arrangement part 1 has a U-shaped channel 22 which, on movement from position I to position II moves over a fixed supporting member 23, the supporting member 23 serving to support a magazine 11 in the position 11'" above the supply hopper, on return movement of the part 1 from the position II to the position I. As will be seen from FIGS. 4 and 5, the supporting member 23 has a recess at its front side through which a locking member 119 extends for holding the magazine (when in position 11'" in the general position II against a wall 108 (FIGS. 5 and 7) on return movement of the part 1 to position I. The locking member 119 is secured to an operating bar 118 pivoted at 117 and acted upon by a spring 120 extending between the operating bar 118 and a stud 121.

Before the return of the part 1 of the frame arrangement from the position II to the position I, the bottom member 5 is struck from its blocking position in a manner to be later described allowing cigarettes in the magazine 11'" to fall into the supply hopper. When the part 1 of the frame arrangement is in position II and a magazine therein is in position 11'", the part 1 and magazine rest at opposite edges on a platform 24 and a support 25 (see FIG. 2). After the return of the part 1, the magazine 11'" remains supported with one of its edges on the platform 24 and its opposite edge on the support 25. The support 25 is movable up and down for vibrating the magazine and thereby facilitating emptying the same by a parallelogram mechanism (see also FIG. 10) acted on by a lever 27 which is connected to a push rod 28 engaging a lever 29, 30 which is controlled by a cam 31 provided on a shaft 32. A rod (not shown) extending parallel to the supporting member 23 prevents an undesired backward tipping of the frame arrangement part 1 during its to and fro movement between position II and position I when the stud 9 is not engaged in the eye 10.

A further transporting arrangement is coupled to the

slide 19 by means of a connecting rod 37, the further transporting arrangement travelling from position II to position III and back (FIGS. 2 and 4) when the slide 19 travels from position I to position II and back. The further transporting arrangement (see also FIGS. 11 and 12) comprises gripper slides 36 having jaw members 38, the gripper slides 36 being slidably guided on the shaft 18 and the jaw members 38 being slidably guided on a shaft 44. The shaft 44 serves as an operating shaft for opening the jaw members 38 when the shaft 44 is rotated, the shaft 44 being rotatable by means of a lever 39, a pull rod 40, and a lever 41, 42 by a cam 43 provided on the shaft 32. The gripper slides 36, in cooperation with the jaw members 38, grip magazines 11'" in the position II and when the magazines 11'" are empty move them successively to position III while a next magazine is moved into position II. An indication that a magazine 11'" in position II is empty is given by a photo-electric cell arrangement (not shown) known per se. At an appropriate signal from an amplifier of the photo-electric cell arrangement, the motor M4 is switched on and the feed of a fresh full magazine and removal of an emptied magazine commences. At position III the empty magazines are set down, since the jaw members 38 open, and an onward feed member 45 having an operating rod 46 mounted in a member 47 pushes the empty magazines onto a fixed platform 55 where a number of magazines can collect in readiness for removal. The member 47, in which the operating rod 46 of the onward feed member 45 is mounted, is connected to a lever arm 48 fixed on a shaft 49. A further lever arm 50 is fixed on the shaft 49 and is acted on by a pull rod 51 connected to lever arm 52. The lever arm 52 forms part of a lever having a further arm 53 which engages an actuating cam 54 provided on the shaft 32. The collected empty magazines may be lowered to a convenient level from the platform 55 by known means (not shown). The path of the magazines 11 from the carriers 63 to positions I, II, III and onto the platform 55 is indicated diagrammatically in plan view in FIG. 3. The frame arrangement 1, 2 which is provided on the shaft 3 is moved from the oblique position to the vertical position by action of a rack 56 meshing with a toothed wheel 57 secured to the shaft 3, the rack 56 being movable in its longitudinal direction by a push rod 59 operable by a crank plate 58. The crank plate 58 is provided on a shaft 60 on which a toothed wheel 61 is also provided. By means of the toothed wheel 61 the crank plate 58 is driven from a pinion 62 of a motor M3, in such a manner that the end positions of the movement of the frame arrangement 1, 2 correspond to dead centre positions of the crank plate 58 i.e. to positions in which the push rod 59 is aligned with the axis of rotation of the shaft 60. The motor M3 runs periodically but always in the same direction.

The lifting device 66 comprises two slides 67 arranged for sliding on guide rods 68 provided on a lower part 75 of a frame of the device and on a traverse member 74 of the frame of the device. The slides 67 are connected by means of a coupling rod 71 to chains 70 which are entrained around chain wheels 69. The upper chain wheels 69 are mounted on a shaft 72 provided in fixed frame members 77.

The lower chain wheels 69 are mounted on a shaft 73 also provided in the fixed frame members 77. On the shaft 73 a toothed wheel 80 is provided which is driven from a toothed wheel 81 provided on the shaft of a drive motor M2. The coupling rod 71 is so pivoted and arranged that its two pivot points form a line with the centre of rotation of the shaft 72 so that the uppermost position of the slides 67 is at the same time the upper dead centre of the lifting device drive system. Since the lowermost position of the slides 67 does not need to be accurate, the formation of a dead center point for the lower position of the slides is dispensed with.

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The motor M1 by means of a pinion 82 and intermediate toothed wheels 83 and 84 provided on a shaft 85, drives a toothed wheel 86 provided on the shaft 32, the toothed wheel 86 simultaneously driving a toothed wheel 87 provided on a shaft 33. On the shaft 33 a crank 88 of a Maltese cross 89 is provided, the Maltese cross 89 being arranged for periodically driving the shaft 34. By means of toothed wheels 90 and 91, the shaft 34 periodically drives the shaft 35 and therewith chain wheels 69 for a chain 64 of the horizontal conveyor.

The frame of the device comprises three struts 76, 77 which are secured to the lower part of base frame 75 and which are united at their upper parts by lateral walls 78, 79 and 93. The centre strut 77 extends only to below the level of the bottom member 5 of the magazine frame arrangement 1, 2, whereby the part 1 of the arrangement 1, 2 can pass over the same. The centre strut 76 extends right through to its upper part 94. Both centre struts 76, 77 are held together by a link 94. The lateral wall 78 has an interruption 92 through which empty magazines 11''' can pass.

A mechanism for displacing the bottom member 5 of the frame arrangement is built into the slides 6. Since the magazine 11 in position II is laterally supported on the platform 24 and the support 25, it is not possible to allow the bottom member 5 to extend laterally (i.e. in a direction parallel to the plane of FIG. 2) beyond the ends of the magazine. The bottom member 5 is therefore extended in its transverse direction (i.e. in a direction parallel to the plane of FIG. 1) towards the part 1 of the frame arrangement and guided on two guide rods 110, one for each slide 6 (see FIGS. 6 and 7) by means of ball guides 111. Additionally the bottom member is supported above and below by rollers 97. Furthermore it is provided with abutment lugs (see also FIG. 9). Two compression springs 112, one for each slide 6 act to urge the bottom member 5 into its ineffective position. By means of its abutment lugs 4, the bottom member 5 is set into its blocking position, the abutment lugs 4 being acted on by two roller levers 98 which are mounted on a shaft 99 (FIG. 1) and are operated by a lever 100 acted on by a push rod 101 which engages a lever 102, 103 acted on by a control cam 104 provided on the shaft 32. The bottom member 5 is latched in its blocking position by a latching lever 113 mounted on a shaft 109 and arranged for engaging a latch yoke 114 secured to the bottom member 5.

The shaft 109 carries a lever 106 having a stud 105 arranged for being engaged by an armature 107 (FIGS. 4 and 9) of an electromagnet M for causing release of the latching lever 113 from the latch yoke 114 so that the bottom member 5 is quickly moved into its non-blocking position when the frame arrangement part 1 is in position II. A buffer 122 provided on a stud 115 which carries the spring 112, is provided for damping the impact of the latch yoke 114. Resetting of the latching lever 113 is effected in position I (FIGS. 2 and 4) when the frame arrangement 1, 2 is in the oblique position (see FIGS. 1 and 8), by means of the lever 98. A tension spring 116 is provided for urging the latching lever 113 into its latching position.

It should be clearly understood that the detailed description given hereinbefore is merely given by way of example and that many modifications, omissions and additions are possible without departing from the scope and spirit of my invention.

I claim:

1. A device for feeding elongated articles contained in a plurality of magazines, comprising a front part, a rear part, a bottom member, means for releasably connecting said front part to said rear part, means for releasably connecting said bottom member to said front part, said front part, said rear part and said bottom member being shaped and arranged to constitute, when connected, a

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holder for a magazine, means at a first working place for turning said holder into an oblique, inverted position with said bottom member uppermost of said holder and for turning said holder back into an upright, vertical position with said bottom member lowermost of said holder, said rear part being fixed to said turning means, means for introducing said magazine into said holder when at said first working place and in its oblique position, means for jointly displacing said front part and said bottom member to a second working place while said rear part is released from said front part and remains at said first working place, an abutment for carrying the introduced magazine together with said front part and said bottom member to said second working place, means for separating said bottom member from said front part when at said second working place to allow emptying said magazine, means for returning said front part and said bottom member to said first working place, and means for re-connecting said front part to said rear part and said bottom member.

2. A device as defined in claim 1, wherein said turning means comprises a rotatable shaft to which said rear part is fixed, and means for rotating said shaft.

3. A device as defined in claim 1, and further comprising means for gripping said magazine when at said second working place, and means for displacing said gripping means and thereby said magazine from said second working place to a third working place.

4. A device as defined in claim 3, and further comprising timing means for correlating movement of said front part from said first working place to said second working place with movement of said magazine from said second working place to said third working place.

5. A device as defined in claim 4, wherein said gripping means comprise jaw members, a displaceable shaft for displacing said jaw members, a turnable shaft for operating said jaw members, means for displacing said displaceable shaft, and means for turning said turnable shaft.

6. A device as defined in claim 1, wherein said means for separating said bottom member from said front part comprise spring means for urging said bottom member into its separated position, a lever for latching said bottom member in its initial position against the action of said spring means, and electric means for releasing said latching lever to separate said bottom member under the action of said spring means.

7. A device as defined in claim 1, and further comprising a fixed member for supporting said magazine during movement of said front part and said bottom member from said first working place to said second working place.

8. A device as defined as claim 7, wherein said front part has a channel accommodating said supporting member.

9. A device as defined in claim 7, and further comprising a wall, and locking member extending through a recess of said supporting member, said locking member being constructed and arranged for holding said magazine at said second working place against said wall when said front part returns to said first working place.

10. The combination of a horizontal conveyor for magazines containing cigarettes, means for moving said magazines in an inclined position from said horizontal conveyor upwards, a front part, rear part, a bottom member, said front part being connectable to said rear part and to said bottom member to form a holder for a magazine, a rotatable shaft, said rear part being fixed on said rotatable shaft at a first working place, means for rotating said shaft, said moving means being arranged for successively introducing said magazines into said holder when rotated by said shaft into an inclined, inverted, position with said bottom member uppermost of said holder, means for separating said front part and said bottom member from said rear part when in a vertical position with said bottom member lowermost of said

holder and one of said magazines positioned on said bottom member, means for displacing said front part and said bottom member with said one magazine from said first working place to a second working place, means for steadying said one magazine while being displaced from said first working place to said second working place, means for displacing said bottom member relative to said front part to open and empty said one magazine, means for returning said front part and said bottom member to said first working place, means for gripping said one magazine when at said second working place, means for displacing said gripping means and therewith said one magazine from said second working place to a

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third working place, and means for operating said gripping means.

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