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[72] Inventors **Friedrich Kratzert**
Schlossberg via Rosenheim;
Hermann Rocker, Hulben via Urach, both of Germany

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[73] Assignee **Windmoller & Holscher**
Lengerich of Westphalia, Germany
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[33] **Germany**
[31] **P 19 16 130.9**

[54] **MACHINE FOR MAKING BAGS OF PAPER OR PLASTICS FILM AND WHICH IS EQUIPPED WITH A ROTARY DELIVERY CYLINDER**
21 Claims, 5 Drawing Figs.

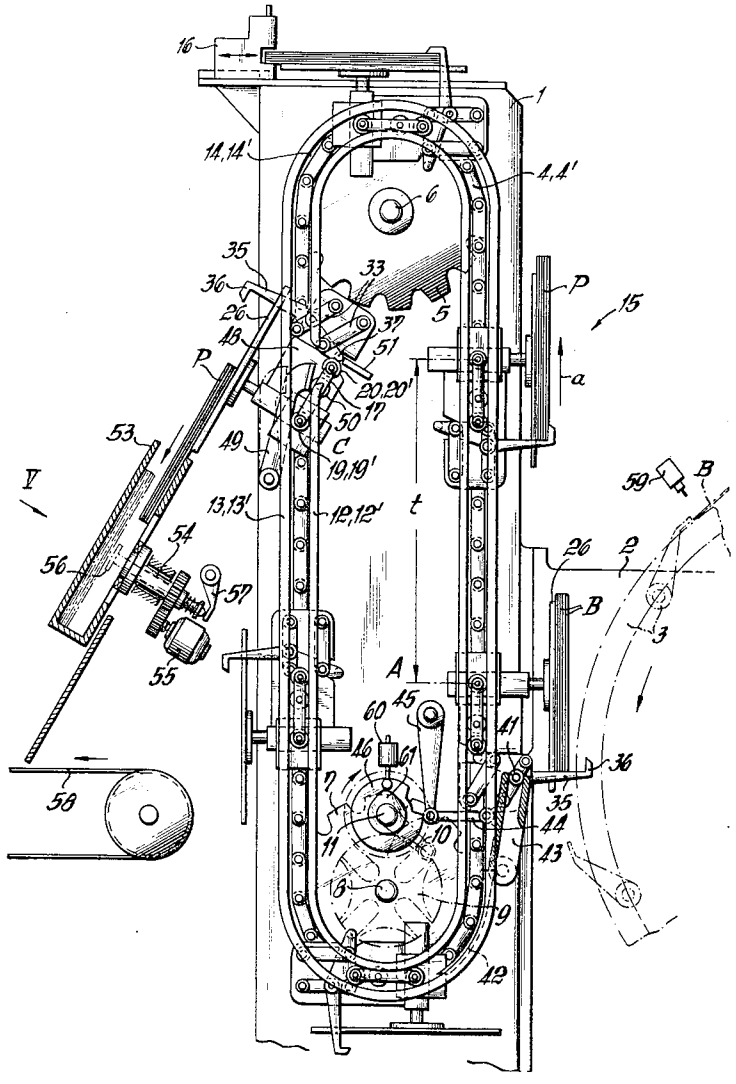
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[51] **Int. Cl.** **B65h 33/00**
[50] **Field of Search** ..... 93/93 R, 93 M, 93 DP; 198/134, 156, 157, 179, 35; 271/79

[56] **References Cited**
UNITED STATES PATENTS

2,729,151	1/1956	Evers	93/93
3,019,886	2/1962	Winkler et al.	198/13 Y
3,404,609	10/1968	Hartbauer et al.	93/93 M

Primary Examiner—Bernard Stickney
Attorney—Fleit, Gipple and Jacobson

ABSTRACT: An apparatus adapted to receive a predetermined number of bags from a bagmaking machine equipped with a rotary delivery cylinder and to form a bag packet therefrom, the apparatus comprising a plurality of gripping means located on an endless conveyor, said gripping means movable from a first position adjacent said rotary delivery cylinder where a predetermined number of bags is gripped to a second position remote from the delivery cylinder where the gripping means together with the bags are transported to stapling and discharge stations by the intermittent movement of the conveyor.

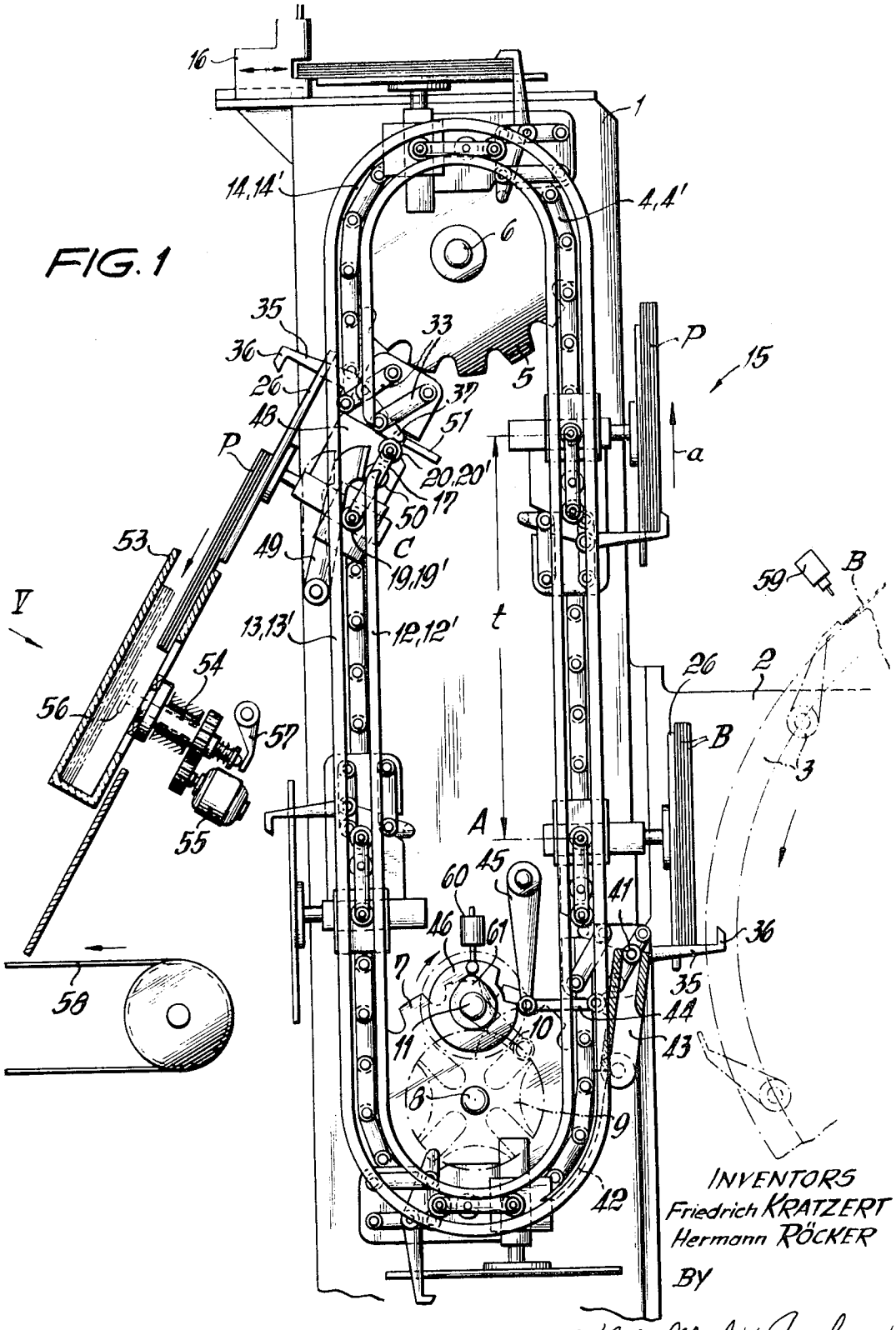


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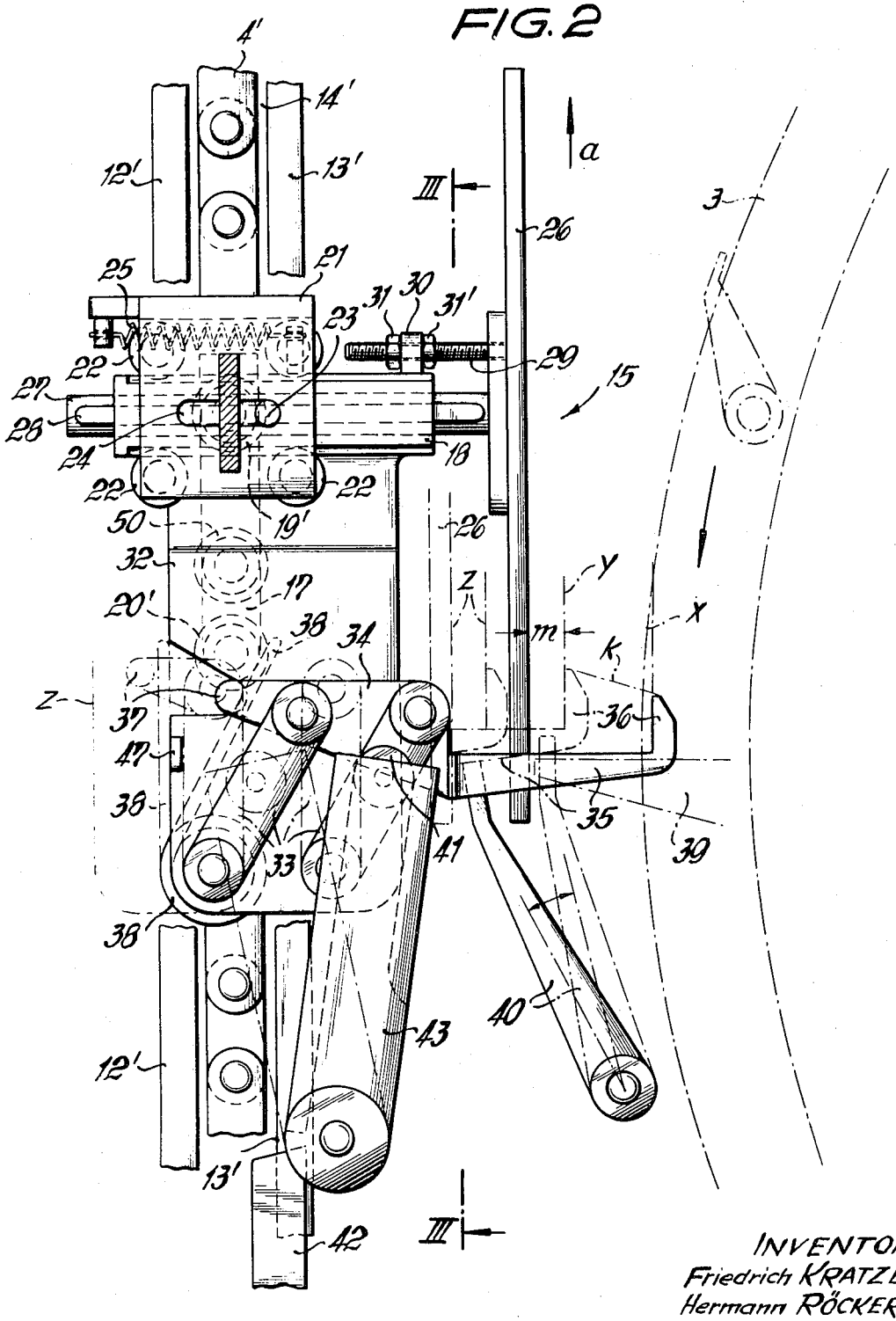
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FIG. 1



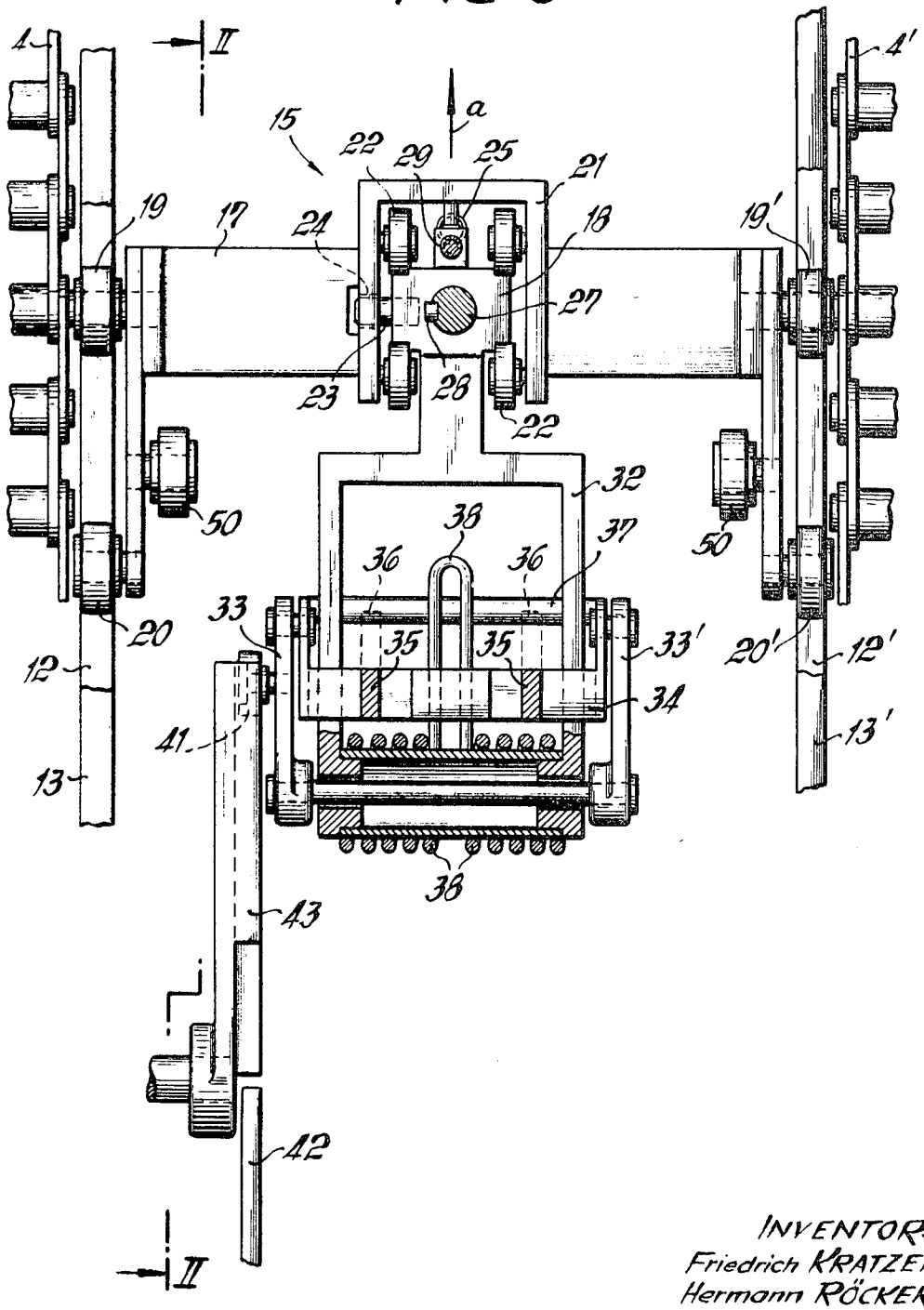
INVENTORS
Friedrich KRATZERT
Hermann RÖCKER
BY
Fleit, Gipple & Jacobson
their ATTORNEYS

FIG. 2



INVENTORS
Friedrich KRATZERT
Hermann RÖCKER
BY
Fleit, Gipple & Jacobson
their ATTORNEYS

FIG. 3



INVENTORS
Friedrich KRATZERT
Hermann RÖCKER
BY

Fleit, Gipple & Jacobson
their ATTORNEYS

FIG. 4

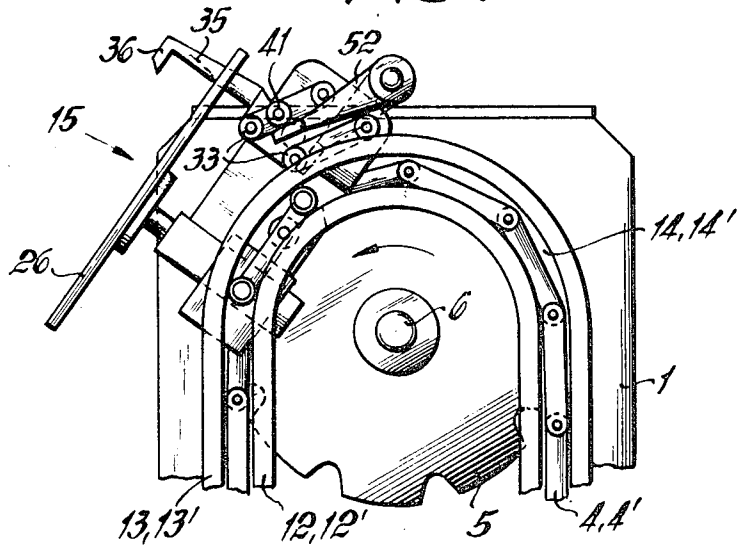
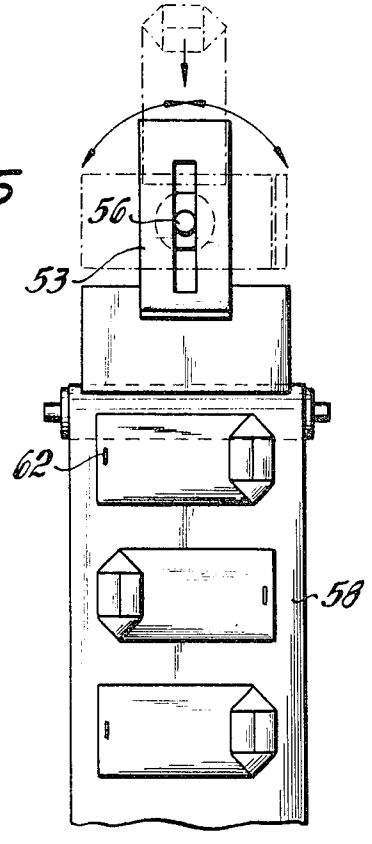


FIG. 5



INVENTORS
Friedrich KRATZERT
Hermann RÖCKER
BY
Fleit, Gipple & Jacobson
their ATTORNEYS

MACHINE FOR MAKING BAGS OF PAPER OR PLASTICS FILM AND WHICH IS EQUIPPED WITH A ROTARY DELIVERY CYLINDER

The invention relates to a machine for making bags of paper or plastics film which is equipped with a rotary delivery cylinder for discharging the finished bags and an apparatus for catching and collecting predetermined numbers of such bags arriving from the delivery cylinder to form packets of bags which are then transported away from the machine.

In a known bagmaking machine, the bags are delivered in an upright position and a catching apparatus gathers the bags into packets containing predetermined numbers of bags, the packets being intermittently conveyed in a radial direction away from the delivery cylinder. The packets form a straight row with their faces in an upright condition and parallel to one another. In this formation the individual packets are not, however, readily accessible to stapling or banding or tying equipment with the aid of which the individual bags in each packet are to be secured against relative displacement.

It is an object of the invention to provide an uncomplicated apparatus to be associated with the delivery cylinder of a bagmaking machine which can gather and hold predetermined numbers of the bags to form packets thereby avoiding displacement of the individual bags.

It is a further object of this invention to provide an apparatus capable of forming packets of bags, whose size can be readily varied.

It is a still further object of this invention to provide an apparatus adapted to transfer the packets directly to stapling or banding equipment without the need for interposing a separate conveyor so that the packets can be discharged in a compact secure form after they leave the stapling or banding equipment.

According to the invention, there is provided a bagmaking machine having a delivery cylinder for individual bags made thereby and apparatus for catching and holding a predetermined number of said bags and conveying same as a packet to a stapling or banding station and/or to a discharge station, said apparatus comprising a plurality of gripping units carried at equal spacings along an intermittently movable conveyor having one run juxtaposed to said delivery cylinder, each gripping unit comprising gripping members which are movable transversely to said one conveyor run from an extended first position, at which they are adjacent said cylinder and adapted to gather said individual bags and form said packet while said conveyor is at a standstill, to a retracted second position, at which they are clear of said cylinder in readiness for conveying the formed packet upon subsequent intermittent movement of said conveyor. The said one conveyor run preferably extends vertically and preferably also moves upwardly against the direction of rotation of the delivery cylinder.

The present invention will be more fully understood by reference to the following drawings:

FIG. 1 is a part-sectional side elevation of a catching and holding apparatus for bags coming from the delivery cylinder of a bagmaking machine;

FIG. 2 is an enlarged part-sectional side elevation on the line II—II in FIG. 3 of one of the FIG. 1 gripping units when located in its catching and gripping position;

FIG. 3 is a part-sectional front elevation of the gripping unit taken on the line III—III in FIG. 2;

FIG. 4 is a fragmentary side elevation of the FIG. 1 apparatus showing a modified arrangement of the discharge station for the packets of bags, and

FIG. 5 is a part-sectional reduced plan view taken in the direction of the arrow V in FIG. 1.

Referring to FIG. 1, a bar-catching and-holding apparatus having a frame 1 is secured to the delivery end of a bagmaking machine 2 adjacent a delivery cylinder 3 of the machine. The frame 1 accommodates a vertically conveying conveyor comprising two parallel endless chains 4, 4'. The chains pass over a double sprocket 5 seated on a shaft 6 and under a double sprocket 7 on a shaft 8. The shaft 8 is intermittently driven by a Maltese cross 9 by a crank arm 10 which is rotated by a drive

shaft 11. The direction of rotation of the Maltese cross 9 is such that the run of the conveyor nearest the delivery cylinder 3 intermittently moves upwardly in steps *t* which are equal to the spacing between adjacent gripping units 15 carried by the chains. The direction of movement of the conveyor is indicated by the arrow *a* and this direction is opposite to the direction of rotation of the delivery cylinder 3. To both sides of each of the conveyor chains 4, 4' there are stationary pairs of inner guide rails 12, 12' and outer guide rails 13, 13' which define endless guide channels 14, 14' that follow the course of the chains. The gripping units 15 are guided in these channels 14, 14'. The overall arrangement of the apparatus relatively to the delivery cylinder 3 is such that the run of the conveyor nearest the delivery cylinder moves vertically upwards substantially tangentially to the cylinder 3 and so that during each standstill period of the conveyor chains one of the gripping units 15 will be located in the upwardly moving run at a position A opposite the cylinder 3 ready for catching and gripping flattened bags B arriving on the delivery cylinder 3 while another of the gripping units will be located in the downwardly moving run at a discharge station C at which packets P of the gathered bags are released. At one or more further stations at which each gripping unit will be at a standstill between the positions A and C, there may be provided a stapling or banding apparatus 16 of any desired construction for stapling or tying the packets that are still held by the gripping units.

As more clearly shown in FIGS. 2 and 3, each gripping unit 15 comprises a carriage 17 and a slide 18 which is displaceable in the carriage transversely to the conveying direction *a* and which carries catching and gripping members for forming a packet of bags. The carriage runs on two pairs of wheels 19, 19', 20, 20', along the two endless guide channels 14, 14' formed between the pairs of guide rails. The axle of the leading pair of wheels 19, 19' is pivoted to the two chains 4, 4'. The carriage 17 has a U-shaped central portion 21 in which the slide 18 is displaceable between rollers 22. Movement of the slide relatively to the carriage is limited by an abutment pin 23 on the slide engaging in a slot 24 in the U-shaped central portion 21. A spring 25 holds the slide in a position at which it is withdrawn from the delivery cylinder 3. The slide 18 carries a supporting plate 26 extending parallel to the conveying direction *a*. This plate is fixed to a guide rod 27 which is displaceable within the slide and which is secured against rotation by a key 28. An adjusting spindle 29 on the supporting plate 26 passed through a hole in an extension 30 of the slide and two nuts 31, 31' permit the position of the supporting plate 26 to be changed relatively to the slide.

Mounted on an extension 32 of the slide 18 that is parallel to the supporting plate 26 there are two pairs of cranks 33, 33' of which the free ends are pivoted to a common coupling member 34. Fixed to the coupling member there is a row of hook members comprising arms 35 which extend through recesses in the trailing end of the supporting plate 26 to form supports for catching the individual bags from the delivery cylinder and hook portions 36 constituting jaws for cooperating with the supporting plate to grip the bags. The catching and gripping members of each gripping unit are therefore the supporting plate 26 and the arms 35 and hook portions 36 of the hook members. The jaw opening *m* is adaptable to the thickness of the packets P and thus to the number of bags B in each packet by means of the aforementioned adjustability of the supporting plate 26.

A crossmember 37 of the coupling member 34 is engaged by a spring 38 for returning the hook members 35, 36 from a catching position *x* shown in full lines in FIG. 2 to a gripping position *y* shown in chain-dotted lines. The gripping movement of the hook members effected by means of the spring 38 is limited by a stop 47 in the path of the pair of cranks 33. The arrangement of the cranks 33, 33' on the extension 32 is such that the hook members 35, 36 leave their catching position *x* adjacent the cylinder 3 along an upwardly directed arcuate path *k*. The delivery cylinder 3 is associated with a depositing table 39 which is defined by a grating comprising a plurality of

spaced rods between which the gripping members 35, 36 can pass to reach their catching position *x* and to engage in peripheral recesses in the delivery cylinder. At the end remote from the delivery cylinder, the depositing table 39 is associated with pivoted holding fingers 40 which are swung to and fro by any suitable means (not shown), for example by a thrust cam on the drive shaft 11 of FIG. 1. The holding fingers 40 are operated so that during movement of the gripping unit 15 by means of the conveyor chains the fingers assume an upper end position which is shown in chain-dotted lines in FIG. 2 and in which they project beyond the surface of the depositing table but during standstill periods of the conveyor chains and units 15 the fingers are in a lower end position below the table surface as shown in full lines.

Under the influence of the springs 25 and 38, the gripping members 26, 35, 36 assume their retracted or conveying position *z* shown in chain-dotted lines in FIG. 2. In this retracted position of the gripping members, the slide 18 as well as the cranks 33, 33' are in a left-hand end position as viewed in FIG. 2, this end position being defined by the stops 23, 24 and 47. The same withdrawn position of the gripping members also obtains, for example, for the gripping units 15 located immediately in front of and immediately behind the unit that is shown at A in FIG. 1. The gripping unit which is momentarily located on the sprocket 7 in FIG. 1 is the one that will be brought up to in front of the delivery cylinder 3 when the conveyor is moved on the next occasion. To extend the gripping members 26, 35, 36 to the catching position *x* shown in full lines in FIG. 2, at least one of the pairs of cranks 33, 33' carries a control roller 41 which, as the gripping unit approaches the delivery roller, runs onto a guide rail comprising a fixed part 42 and a pivoted part 43. The guide rail is designed so that, while the conveyor is moving a gripping unit to the position A in FIG. 1, the gripping members 26, 35, 36 are forced by the roller 41 to extend gradually against the action of the springs 25, 38. For the purpose of rapid return movement of the gripping members to the conveying or withdrawn position *z*, the pivoted end piece 43 of the guide rail is swung under the action of links 44, 45 operated by a thrust cam 46 on the drive shaft 11 of the intermittent driving means, 9, 10. The thrust cam 46 is so shaped and arranged that the gripping members start to return to the withdrawn position *z* upon commencement of each intermittent movement of the driving means 9, 10, the tension springs 25, 38 acting through the roller 41 and the pivoted guide rail portion 43 to ensure that the cam follower is kept in contact with the cam 46. To ensure that the gripping members will first assume the gripping position *y* and only thereafter the fully withdrawn or conveying position *z*, the force of the spring 38 is larger than that of the spring 25. The slide 18 and supporting plate 26 fixed thereto will, under the influence of the weaker spring 25 acting thereon, therefore remain in their full line positions of FIG. 2 until the hook members 35, 36 have reached the gripping position *y*. Only then will all the gripping members return to the withdrawn position *z* in unison.

It has already been mentioned that during each standstill period of the conveyor chains 4, 4' one of the gripping units 15 will be located at a discharge station C in the downwardly moving run of the conveyor. As shown in FIG. 1, the gripping unit is here in an inclined position so that the packet P of bags released thereby can slide under gravity down a ramp formed by the inclined supporting plate 26. The inclination of the gripping unit is brought about by swinging the carriage 17 about the axle which carries the wheels 19, 19' and which is pivoted to the conveyor chains 4, 4' as previously described in relation to FIG. 3. To enable the wheels 20, 20' to leave their respective guide channels 14, 14' defined between the guide rails, the inner guide rails 12, 12' are interrupted by a gap 48 at the position assumed by the wheels 20, 20' when the gripping unit is at the discharge station C. To swing the carriage 17, the discharge station is provided with a pressure member 49 which oscillates to and fro in synchronism with the cycle of the apparatus. The pressure member 49 is associated with two pressure rolls 50 on the carriage. Swinging movement of the carriage is limited by a fixed abutment 51 which is located in the swinging path of the carriage so that it is struck by the crossmember 37 that interconnects the cranks 33, 33'. Thus, the stop 51 is effective to swing the cranks 33, 33' and therefore to move the hook members 35, 36 away from the supporting plate 26 to release the package P.

In a modification, the discharge station may be located on a leading segment of the sprocket 5 in the manner illustrated in FIG. 4. When the conveyor chain is stationary, the supporting plate 26 will therefore already be inclined to serve as a ramp for the packet of bags that is to be discharged and that is in this case released by the gripping members under the action of a pivoted control lever 52 which acts on the control roller 41 of the cranks 33 and causes hook members 35, 36 to be opened.

Referring to FIGS. 1 and 5, the discharge station C is followed by a magazine 53 which has the same inclination as the supporting plate 26 at the discharge station and which can be pivoted by an electric motor 55 about a shaft 54 either 90° to the left or 90° to the right. The magazine is of U-section and is open at the top and the sides. With the aid of a suitable motor switch (not shown), the magazine is rotated in alternately opposite directions in synchronism with the cycle of the apparatus. The magazine is also provided with a displaceable pressure member 56 which is coaxial with the pivotal shaft 54 and which is controlled by a log 57 so that, just before the magazine is to be turned, the pressure member is projected to the position shown in dotted lines in FIG. 1 so as to clamp the packet of bags to a wall of the magazine and thus prevent displacement of the packet until after rotation has been completed, whereupon the pressure member is withdrawn again. The position of the magazine on the shaft 54 is displaceable in a lengthwise direction of the magazine so that the pivotal axis of the latter can always be arranged to coincide with the center of the packet, no matter how long the bags in the packet may be. This will ensure that, after rotation through 90° successive packets deposited by the magazine onto a discharge conveyor 58 thereunder will be arranged in a substantially straight row as shown in FIG. 5.

The entire apparatus is controlled by a counter 59 which counts the bags B delivered to the apparatus by the delivery cylinder 3 of the bagmaking machine and can be preset to the desired number of bags to be contained in each packet. The counter is effective to switch on the drive motor of the apparatus as soon as the preset number of bags has been reached. The drive motor is switched off again by a terminating switch 60 actuated by a cam 61 on the drive shaft 11. The angular position of the cam 61 on the shaft 11 is such that it causes the drive motor to be switched off only shortly in front of commencement of the next intermittent driving movement so that when the next starting impulse is received from the counter 59 there will be no delay in the intermittent movement of the chain conveyor.

While a packet P is being formed, each gripping unit assumes the FIG. 2 position where the gripping members 26, 35, 36 are held in their catching or extended position *x* adjacent the delivery cylinder 3 by means of the pivoted end portion 43 of the guide rail acting on the roller 41. The successive bags delivered by the bagmaking machine on the cylinder 3 are caught by the arms 35 of the hook members, which arms engage the bases of the bags, and are kept in an upright position by the supporting plate 26. When the preset number of bags has been counted by the counter 59, i.e. when a predetermined number of bags has been collected by the hook members, the drive motor of the intermittent driving means 9, 10 is started. The thrust cam 46 will immediately initiate swinging of the guide rail portion 43 whereby the hook members 35, 36 are rapidly returned to the gripping position *y* under the influence of the spring 38. This causes the hooks 36 to press the bags against the plate 26 and thereby hold the packet of bags. The spring 25 will now also become effective to move the slide 18 and retract the gripping members 26, 35, 36 and the packet gripped thereby out of the immediate vicinity of the cylinder 3

and depositing table **39** to assume the position *z* at which the moving parts are clear of the stationary parts so that the gripping unit can be moved upwardly through a distance *t* by the conveyor chains.

At the same time as the hook members **35**, **36** start their withdrawal movement, the holding fingers **40** are moved to their upper projecting position shown in chain-dotted lines in FIG. **2**. The holding fingers prevent bags that continue to arrive on the continuously moving cylinder **3** from dropping off the depositing table **39**.

During the intermittent passage of each gripping unit **15** towards the discharge station C, the end of the packet P formed by the mouth portions of the bags will arrive at the position of a stapler **16** which can be reciprocated in the direction of the arrows indicated in FIG. **1** and force a staple **62** (FIG. **5**) through the packet during one of the standstill periods of the conveyor.

The next feeding step will bring the gripping unit and stapled packet to the discharge station C where the thrust member **49** will swing the gripping unit to the inclined condition shown in FIG. **1** and the gripping members **26**, **35**, **36** are opened by the fixed abutment **51**. The released packet will slide, stapled end foremost, down the inclined supporting plate **26** into the magazine **53**, whereafter the lug **57** will advance the pressure member **56** to clamp the stack in the magazine. The magazine is now turned through 90° and will release the packet of bags to slide onto the discharge conveyor **58** as soon as the pressure member **56** has been withdrawn. The next packet of bags to reach the magazine **53** will be turned through 90° in the opposite direction so as to assume a position that is turned through 180° relatively to the preceding bag. In this way the mouths of the bags in successive packets on the conveyor **58** will face in alternate directions in the manner shown in FIG. **5** and they will be aligned to form a row if the center of the bags received in the magazine coincides with the axis of rotation of the machine by appropriately arranging the magazine on the shaft **54**. The packets on the conveyor **58** can be conveniently stacked on one another because the natural differences in thickness between the two ends of each packet caused by the base folds of each bag will be balanced out.

We claim:

1. A bagmaking machine having a delivery cylinder for individual bags made thereby and apparatus for catching and holding a predetermined number of said bags and conveying same as a packet to a stapling or banding station and/or to a discharge station, said apparatus comprising a plurality of gripping units carried at equal spacings along an intermittently movable conveyor having one run juxtaposed to said delivery cylinder, each gripping unit comprising gripping members which are movable transversely to said one conveyor run from an extended first position, at which they are adjacent said cylinder and adapted to gather said individual bags and form said packet while said conveyor is at a standstill, to a retracted second position, at which they are clear of said cylinder in readiness for conveying the formed packet upon subsequent intermittent movement of said conveyor.

2. A machine according to claim **1**, wherein said one conveyor run extends vertically and is adapted to move upwardly against the direction of rotation of said cylinder.

3. A machine according to claim **1**, wherein said conveyor comprises an endless chain driven by intermittent driving means having an adjustable standstill period.

4. A machine according to claim **3** including a counter for counting the bags and actuating said intermittent driving means upon reaching said predetermined number of bags, and a terminating switch on said driving means for stopping same.

5. A machine according to claim **4**, wherein each said gripping unit comprises a carriage which is hinged to said conveyor and guided between guide rails, and a slide displaceably mounted in said carriage, said gripping members being carried by said slide.

6. A machine according to claim **5**, wherein the gripping members of each gripping unit comprise a supporting plate fixed to said slide and extending parallel to said one conveyor run and a row of spring influenced hook members displaceably mounted on said slide for movement transversely to said one conveyor run in a direction towards said delivery cylinder against the spring influence, the hook members comprising arms which extend through recesses in the said supporting plate and form supports for catching the individual bags from the delivery cylinder and hook portions constituting jaws for cooperating with the supporting plate to grip the bags so caught.

7. A machine according to claim **6**, wherein the position of the supporting plate on the slide is adjustable in the same direction as the slide is displaceable in the carriage.

8. A machine according to claim **6**, wherein the hook members are hinged to said slide by a linkage comprising pairs of parallel crank arms.

9. A machine according to claim **8**, wherein the linkage is such that, when the hook members are moved away from said delivery cylinder, they follow an upwardly directed arcuate path.

10. A machine according to claim **8**, wherein the linkage is common to the hook members and carries a control roller engageable in a guide rail for moving the gripping members to said extended first position.

11. A machine according to claim **10**, wherein the guide rail comprises an end portion which is mounted for movement transversely to said one conveyor run.

12. A machine according to claim **11**, including means for operating said end portion so that in one terminal position of the end portion it is effective to move the gripping members to said extended first position and, by rapid return movement to a second terminal position, it is effective to move the gripping members to said retracted second position.

13. A machine according to claim **12**, wherein said counter is effective to actuate said operating means for displacing the end portion from said one to said second terminal position.

14. A machine according to claim **12**, wherein said operating means comprise a thrust cam on a drive shaft of said intermittent driving means, and rods between the thrust cam and said end portion.

15. A machine according to claim **6** including a depositing table at the delivery cylinder, said table being defined by a grating of spaced bars between which the hook members can pass to extend into peripheral recesses in the delivery cylinder, and pivotable bag-holding fingers cooperating with end of the table remote from the cylinder.

16. A machine according to claim **3**, wherein the catching and holding apparatus is arranged in relation to the delivery cylinder so that, when the conveyor is at a standstill, one gripping unit will be located at a discharge station for each packet at a leading sector of a sprocket for the chain.

17. A machine according to claim **5**, wherein the catching and holding apparatus is arranged in relation to the delivery cylinder so that, when the conveyor is at a standstill, one gripping unit will be located in another run of the conveyor and wherein the carriage is laterally pivotable.

18. A machine according to claim **8**, wherein the conveyor comprises two parallel endless chains each extending alongside a pair of inner and outer guide rails for said carriage, the carriage comprises two pairs of wheels, a shaft for one of said pairs of wheels is pivoted to the chains, the inner guide rail of each said pair of guide rails is interrupted at the location of the other pair of wheels when the gripping unit is disposed at said discharge station thereby to permit the carriage to be pivoted, a thrust member is provided at the discharge station for so pivoting the carriage, and a fixed stop is provided against which the linkage of said hook members abuts to limit the pivotal movement of the carriage and to cause the gripping members to open and release a packet of bags held thereby.

19. A machine according to claim **1**, wherein the discharge station is succeeded by an open-sided and open-topped

magazine of U-section which is pivotable through 90° in alternate directions from a packet receiving position and which is inclined at the same angle as the inclination assumed by the supporting plate at the discharge station when releasing a packet.

20. A machine according to claim **19** including a pressure member which is coaxial with the pivotal axis of the magazine and which is displaceable to clamp a packet received by the magazine while the latter is being pivoted.

21. A machine according to claim **19**, wherein the position of the magazine is adjustable on its pivotal axis in a direction lengthwise of the limbs of the U.

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