Jan. 24, 1939. O. E. HAGEN 2,145,048

MACHINE FOR MAKING SANITARY NAPKINS

Filed Sept. 10, 1936 4 Sheets-Sheet 1

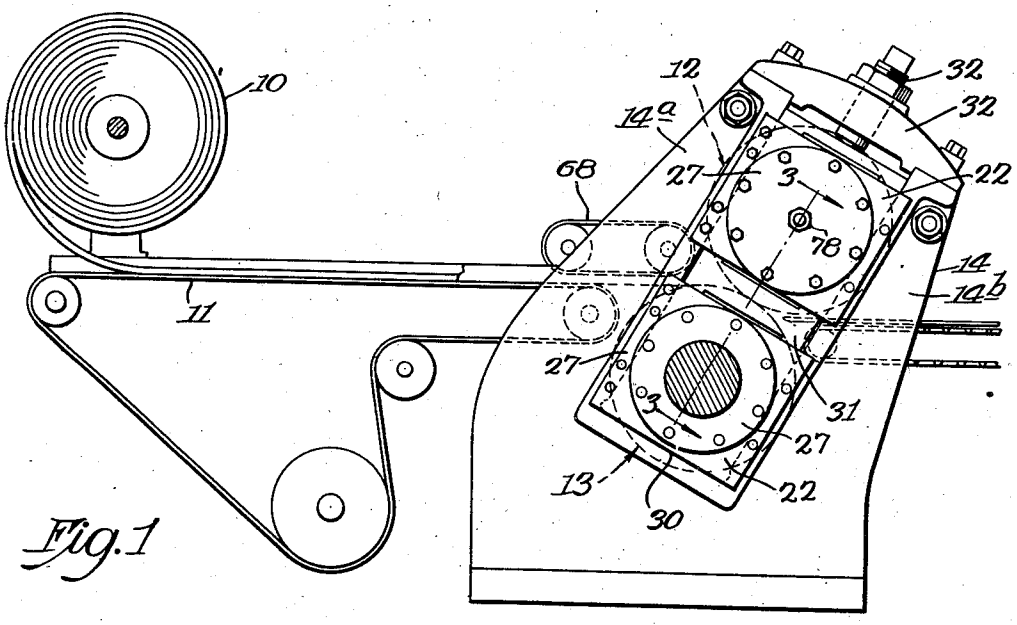


Fig. 1

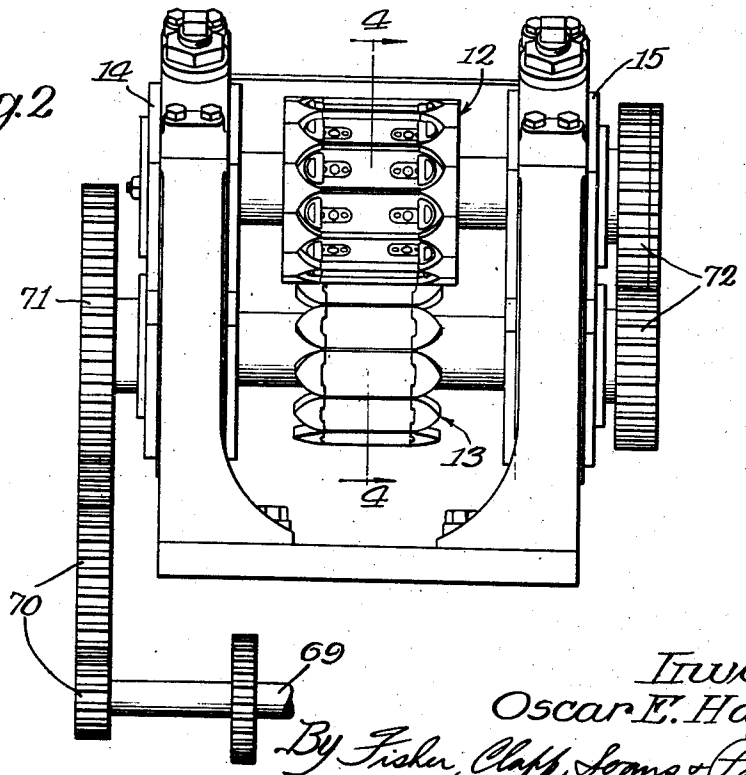


Fig. 2

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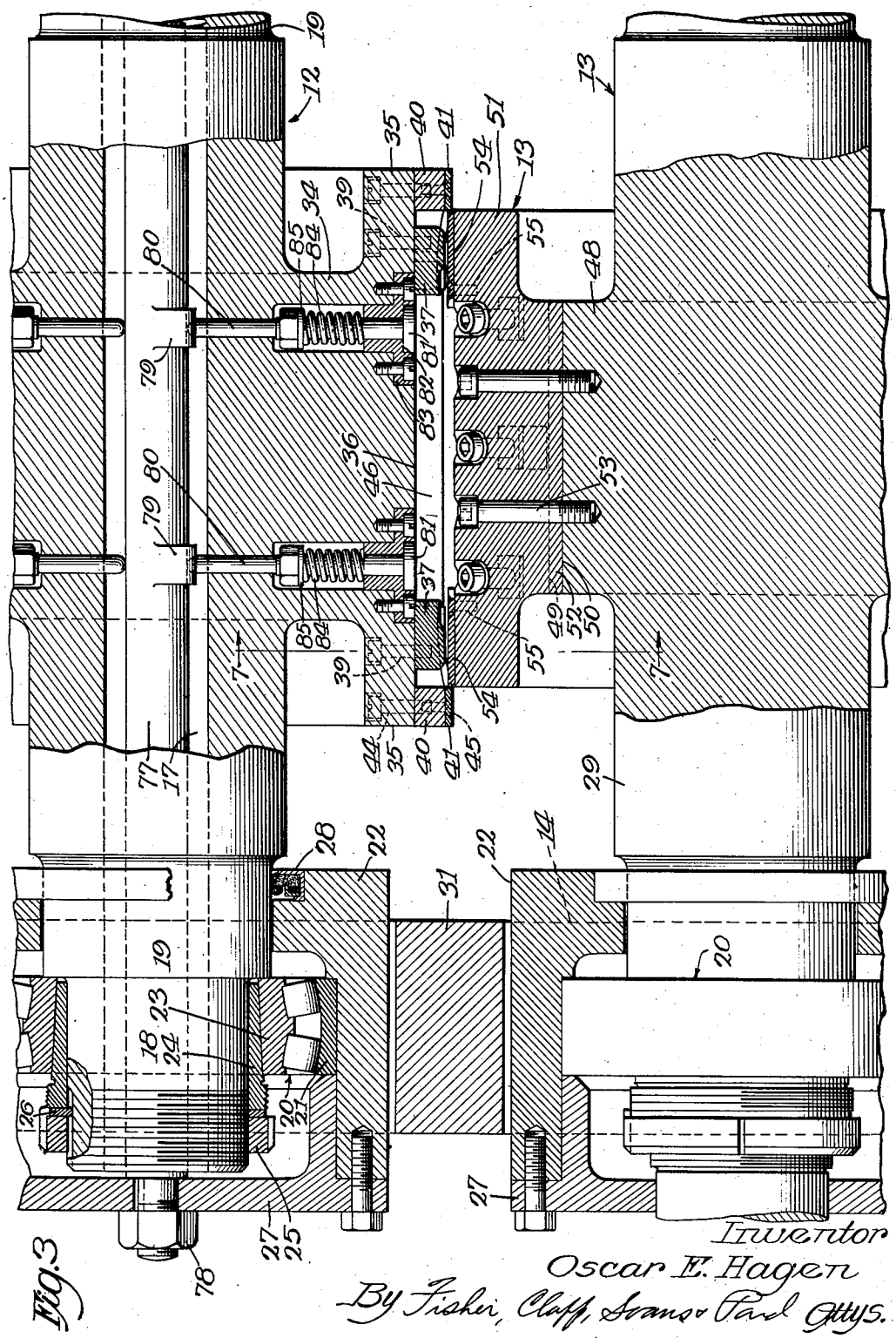


Fig. 3

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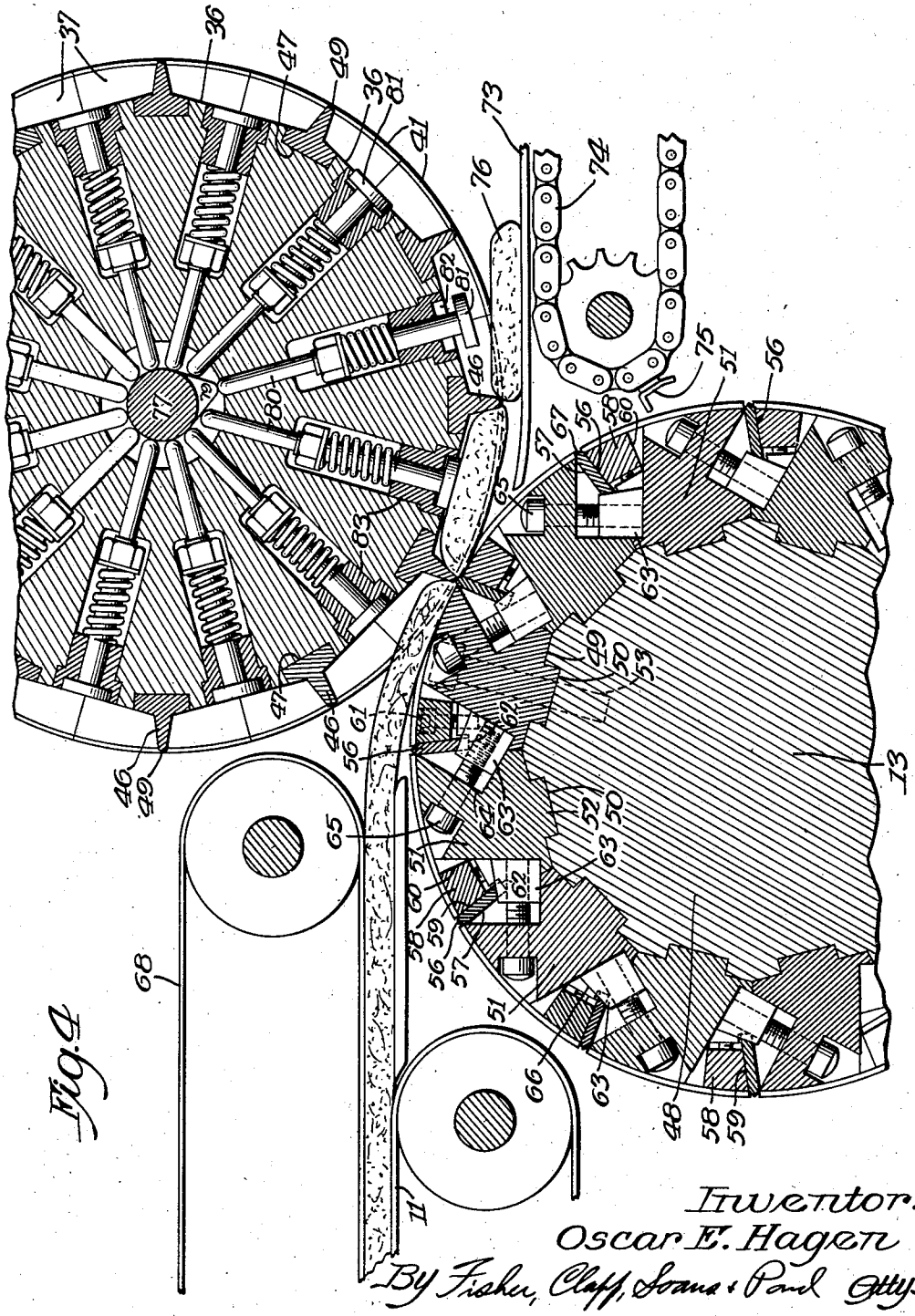


Fig. 4

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Fig. 5

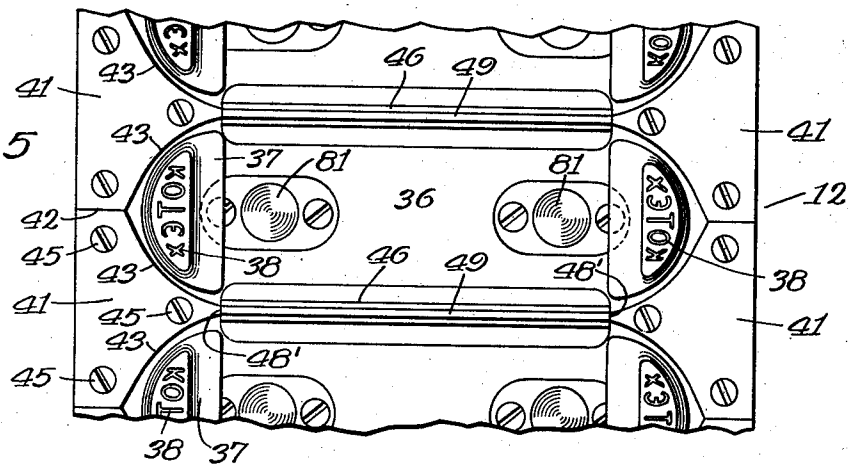


Fig. 6

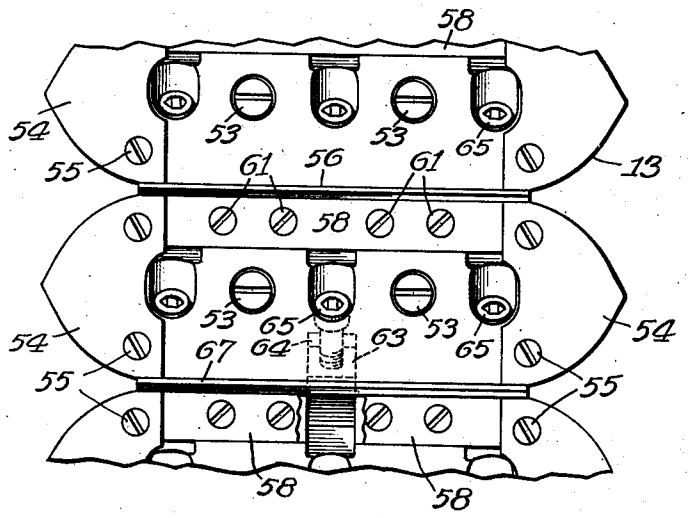
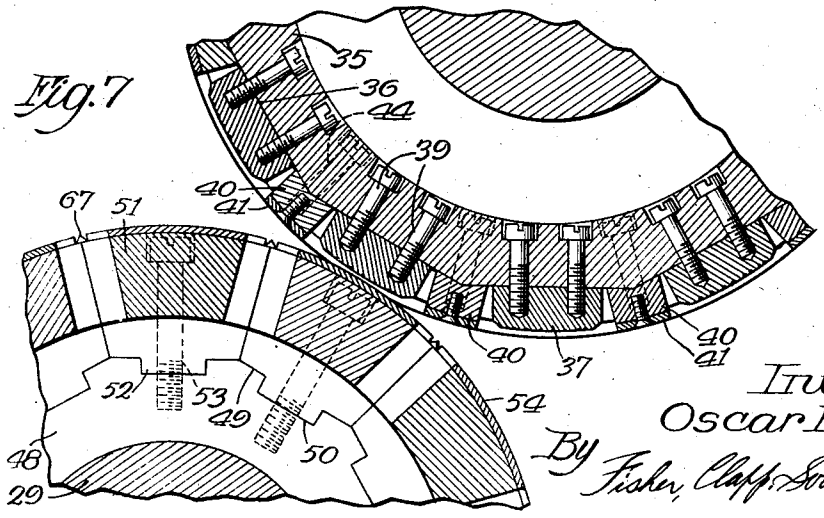


Fig. 7



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UNITED STATES PATENT OFFICE

2,145,048

MACHINE FOR MAKING SANITARY NAPKINS

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Application September 10, 1936, Serial No. 100,132

14 Claims. (Cl. 154—29)

This invention relates to improvements in machines for making sanitary napkins and it has particular reference to improved mechanism for forming absorbent pad bodies which form the bulk of the napkins.

The main object of the invention is to provide mechanism which will be operative to produce the pad bodies swiftly and quietly with a minimum of attention from an operator or attendant.

Sanitary napkin machinery of the general type here involved is disclosed in the patents to Bauer No. 1,794,358 and Thompson No. 1,869,177. The said patents disclose various forms of pad forming mechanism embodying reciprocating apparatus for cutting pads from a strip of wadding. The pads so cut are then fed to mechanism for enfolding the pads in a gauze wrapper. From such wrapping mechanism the pads may be fed to mechanism for folding end extensions or tabs of the gauze wrapper over the body of the wrapped pad and then to mechanism for inserting the pads into boxes containing any predetermined number of pads. Folding mechanism such as referred to is disclosed in the pending application of Oscar T. Thompson, Serial No. 148,322, and packaging machinery is disclosed in the patent to Thompson No. 1,708,686.

In pad making machinery embodying reciprocating mechanisms such as shown in the aforesaid Bauer and Thompson patents, the speed of operation of the mechanism is, in view of practical requirements, limited. According to the present invention, rotary pad cutting mechanism is provided which may be operated considerably faster than reciprocating mechanism of the type heretofore used.

Other objects and advantages of the invention will be understood by reference to the following specification and accompanying drawings (four sheets) wherein there is illustrated a rotary pad forming mechanism embodying a selected form of the invention.

In the drawings:

Fig. 1 is a side elevation.

Fig. 2 is an end elevation of the right hand end of Fig. 1.

Fig. 3 is a section on the line 3—3 of Fig. 1.

Fig. 4 is a section on the line 4—4 of Fig. 2.

Figs. 5 and 6 are enlarged elevations respectively of portions of the mechanism shown on a smaller scale in Fig. 2; and

Fig. 7 is a section on the line 7—7 of Fig. 3.

Referring now to the drawings, there is shown in Fig. 1 a supply roll 10 of absorbent wadding material which is fed forwardly continuously by means of a suitably propelled conveyor 11. The illustration of the supply roll supporting means and conveyor supporting means is more or less schematic and needs no further illustration since such elements are well known to those skilled in the art and illustrated in one or more of the patents above referred to. Also, the conveying means 11 is here shown as being typical of various means which may be used for feeding the supply strip of absorbent wadding.

The absorbent wadding strip is fed between a pair of cooperating rolls designated 12 and 13 which are provided with cooperating cutting devices for cutting the absorbent wadding strip into separate absorbent pads of suitable shape and dimensions.

As indicated in Figs. 2 and 3, the upper and lower rolls 12 and 13 respectively are journaled in side frames designated 14 and 15. Suitable bearings and connections are provided for insuring free but synchronized rotation of the rolls and adjusting means is also provided for maintaining the rolls in proper cooperative relationship.

As best shown in Fig. 3, the upper roll 12 comprises a main body 16 having an axial bore 17 extending therethrough. At its ends the main body 16 of the roll is provided with reduced diameter portions indicated at 18 and 19. The reduced diameter portion 18 is provided for receiving a ball or roller bearing structure 20, the outer race 21 of which is seated in a housing 22 which is mounted in the frame 14 between the legs 14a and 14b thereof for sliding adjustment. The inner race 23 of the anti-friction bearing structure 20 is seated on the reduced portion 18 of the shaft through the agency of a collar 24 having a conical outer surface which fits a corresponding inner surface of the race 23. A nut 25 threadingly engaging the shaft portion 18 is provided for forcing the conical collar or sleeve 24 inwardly for the purpose of expanding the bearing race 23 to take up any possible looseness in the bearing. A locking washer 26 is provided for locking the nut 25 in set position to prevent accidental loosening of the nut. A cap 27 is secured over the outer end of the housing 22 to close that end of the bearing against dirt and dust and to retain lubricant within the housing. A seal of any conventional construction, such as indicated at 28, is provided around the shaft portion 19 for preventing the escape of lubricant and the entrance of dirt and dust at that end.

The lower roll 13 comprises a main shaft structure 29 which is journaled through the agency of

a bearing structure 20 similar to that above described within a housing structure 22. The housing 22 of the lower roll is also slidably mounted in the frame 14 between its arms, but is normally positioned against a bottom stop 30 provided near the bottom ends of the arms 14a and 14b, as indicated in Fig. 1.

Inasmuch as it is desirable to accurately maintain a predetermined relation between the upper and lower rolls, the spacing thereof is maintained by a shim or spacer member 31 positioned between the housings 22 of the respective rolls. The shim 31 may be locked against sidewise displacement in any conventional manner, or it may be held in place solely as an incident to the pressure thereon between the upper and lower bearing housing, the upper housing being pressed downwardly by means of a set screw 32 which is carried by a cross member 33 which is rigidly secured to the upper ends of the frame arms 14a and 14b (see Fig. 1).

It will of course be understood that both ends of the respective rolls 12 and 13 are similarly journaled in the side frames 14 and 15 respectively.

The upper roll is equipped with a series of female die units which, when assembled, provide in the arrangement shown, a series of twelve female dies respectively adapted to cooperate with corresponding male die members carried by the lower roll.

The female die structure of the upper roll is best shown in Figs. 3, 4, 5 and 7. Referring particularly to the said figures, it will be observed that the main body 16 of the upper roll is provided with a circumferential enlargement 34 which at its outer end is provided with oppositely directed flanges 35, 35. The outer surface of the flanges 35, 35 and the intermediate portion of the enlargement 34 are machined to provide a series of twelve substantially flat faces designated 36. On the end portions of each of the flat faces 36 there are mounted presser blocks designated 37, which may be provided with raised or embossed letters such as indicated at 38, for impressing a trade-mark or the like on the pads produced by the mechanism. The presser blocks 37, 37 may be secured in any conventional manner, for example, by means of screws indicated at 39, which extend outwardly through the flanges 35 and threadedly engage suitably tapped openings provided in the presser blocks. Female die members disposed outwardly of the presser blocks 37 embody foundation members 40 and cutting plate elements 41. It is preferable to form the said female die parts in such a manner that each unit embodies a die portion for one-half of one of the flat surfaces of the roll body and a die portion of one-half of the adjacent flat surface. As clearly shown in Fig. 7, the member 40 straddles the ridge between adjacent flat surfaces and extends halfway over the width of the respectively adjacent surfaces. By inspection of Fig. 5, it will be seen that adjacent die members 41, 41 come together as indicated at 42 substantially centrally of a flat face 36. The inside edges 43 of the cutting members 41 are so shaped that the adjacent edges 43 of adjacent die members cooperate to form a slightly pointed but generally semi-circular shape. As also shown in Fig. 7, the members 40 may conveniently be secured in place by such means as screws 44 which extend outwardly through the flanges 35 and engage suitably tapped openings provided in the members 40. The cutting plate elements 41 may conveniently be secured in place by such means as screws 45 extending inwardly through the plate elements and threadedly engaging suitably tapped openings provided in the foundation blocks 40.

Intermediate the end die members there are provided anvil bars designated 46, such bars being of suitably hardened metal and being recessed as indicated at 47 into the body of the roll. It will be apparent by inspection of Fig. 4 that the anvil bars 46 are aligned with the ridges intermediate the respective flat surfaces 36, 36. Also, as indicated in Fig. 5, the anvil bars 46 terminate with their ends abutting end portions 48' of the female die elements 41. As shown in Fig. 4, the anvil surfaces 49 of the bars 46 are positioned slightly below or inwardly of the surfaces of the die members 41.

The lower roll 13 has a central annular enlargement 48 which has its periphery machined to provide 12 flat faces 49 respectively provided with a centrally disposed recessed seat 50. Said recessed seat 50 extends longitudinally of the roll as best indicated in Figs. 3, 4 and 7.

Foundation blocks such as indicated at 51 are mounted on each of the flat faces 49, each of the blocks being provided with a tongue 52 on its bottom adapted to fit in the recessed seat 50 of the roll. The foundation blocks 51 may be securely locked in operative position by means such as screws 53, which extend through suitable holes in the blocks and threadedly engage properly tapped openings in the portion 48 of the roll. Each end of each foundation block 51 is provided with a cutting plate member 54, the outer ends of said plates being shaped to correspond with the shape of the pointed, substantially semi-circular female die formation above explained. The die plates 54 may be fastened in place by any conventional means such as screws 55, as indicated.

For cooperating with the anvil bars 46 of the female die roll, the male die roll is provided with cutter bars designated 56, said cutter bars being adjustably supported and locked in place by means of wedge blocks As best shown in Fig. 4, the cutting bars 56 are positioned against one side face 57 of a groove which extends longitudinally of the roll. The groove is of course formed between adjacent faces of adjacent foundation blocks 51, being mainly formed in the side of one of the blocks. A wedge block or strip 58 is positioned between the face 59 of the cutting bar and the other face 60 of the groove referred to. Screws such as indicated at 61 are provided for forcing the wedge strips downwardly into the groove which, as indicated, is tapered in cross section to a reduced width adjacent its bottom. Hence, when the wedge strip is forced downwardly, the cutting bar or knife 56 is securely clamped against the face 57 formed on the adjacent foundation block 51. In the bottom of the groove formed in each foundation block there is an auxiliary narrow groove 62 which is designed to receive the lower marginal portion of the cutting bar below the normal bottom of the main groove.

For adjustably supporting the knives, there is provided a plurality, in this instance three, members 63 which are slidable transversely of the knife in recesses or pockets 64 formed in adjacent portions of adjacent foundation blocks, part of such pocket being formed in each block. Adjusting screws 65 which extend through suitable openings in the foundation bar or block 51 and threadedly engage properly tapped openings

in the members 63 are operative to effect forward or outwardly directed movement of the members 62. The upper surfaces 66 of the members 63 are angularly disposed with respect to the lower surfaces thereof so that when the members 63 move outwardly or forwardly, the knives 56 are correspondingly wedged or cammed outwardly. By this arrangement the extent to which the cutting edges of the knives project from the roll may be very accurately adjusted and securely maintained. As shown in Fig. 6, the knives extend from end to end and terminate in such relation that their end edges will cooperate with the narrow flat ends 48 of the female die members for cutting purposes, as will presently appear. Also, it will of course be understood, especially by an inspection of Fig. 4, that the sharpened edges designated 67 abut the anvil bar surfaces 49 for cutting purposes. As indicated, the cutting edges 67 of the knives are formed by surfaces disposed at a substantial angle to each other so that the cutting edge is adequately backed by the metal of the knife, whereby sharpness may easily be maintained for considerable periods of time during which the mechanism is employed.

By reference to Fig. 1, it will be seen that a supply strip of wadding from the roll 10 is fed forwardly continuously by the conveyor 11. An auxiliary feed belt 68, suitably driven at the same surface speed as the conveyor 11, may be provided for more effectively delivering the web of wadding into the bite of the cooperating rolls. The cooperating rolls 12 and 13 may conveniently be driven from any suitable source of power by means of gear connections such as indicated in Fig. 2, where the shaft indicated at 69 may be assumed to be any driven shaft from which power may conveniently be taken off for the drive of the cooperating cutter rolls. Gearing indicated at 70 may connect the source of power 69 with a gear 71 carried by the shaft of the lower roll 13. Gearing designated 72 may be provided on the ends of the shafts of the rolls 12 and 13 on the other side of the machine for effecting simultaneous synchronized rotation of the upper and lower rolls. One of the gears 72 is preferably formed of two sections so that one section may be "fanned" relative to the other to take up any slack which may otherwise exist in the meshing of the teeth of the gears. By this means accuracy in the synchronization of the two rollers is readily obtained.

It will be apparent that when the wadding strip 10 is fed between the driven male and female die rolls 12 and 13 the wadding strip will be severed or divided into relatively independent pad bodies corresponding in shape to the outline formed by opposed male die ends and connecting knives 56, 56.

A receiving support designated 73 is provided for receiving the pads thus formed, such table being preferably in the form of a plurality of relatively spaced flat bars. For propelling the pads delivered to the supporting table 73 away from the area in which they are deposited, a conveyor such as indicated at 74 may be provided, such conveyor being equipped with pushers 75 designed to extend upwardly between adjacent bars forming the table 73 to engage the rearmost edges of the pad bodies.

From an inspection of Fig. 4 it will be evident that the pad body designated 76, which is illustrated in the position of having just been deposited on the support 73, will be advanced a slight distance forwardly by continued engagement of the front face of the anvil bar 46 and then by the pusher 75. The conveyor 74 is driven at such a speed that it will advance the deposited pad body 76 with sufficient rapidity to clear the receiving area of the support 73 in time to receive the next formed pad body. Also, the speed of the conveyor 74 is preferably such that the pad bodies will be separated a distance which will deliver them in properly spaced relation to means for depositing them on a moving gauze strip in properly spaced relation. Such depositing means is disclosed in the Bauer and Thompson patents above mentioned.

For insuring deposition of the pad bodies on the receiving table 73, and for insuring their disengagement from the recess of the female die roll, plunger mechanism such as best shown in Figs. 3, 4 and 5 is provided.

A stationary cam shaft 77 extends through the bore 17 of the upper roll 12. Said stationary cam shaft is anchored in fixed position by means of lock nuts such as indicated at 78, which clamp the ends of the rod in the cap members 27 of the bearing housings. The cam shaft 77 is provided with cams designated 79 which are adapted to engage the inner ends of plungers such as 80 which are mounted for radial movement in the upper roll member. Each plunger 80 is provided with a head 81 which is normally received within a recess 82 provided in a fitting 83 which is recessed into the roll and secured therein by screws clearly shown in Fig. 3. The plunger 80 is slidably supported in said fitting 83 and in suitable bores provided in the roll and a coil spring 84 disposed between the inner end of the fitting 83 and a collar or the like 85 provided on the plunger normally urges the plunger to its inwardly disposed position with its head 81 disposed substantially flush with the bottom surface 36 of the female die structure. As each female die portion reaches the position in which the pad body should be discharged, the plunger is forced outwardly by the cam element 79 (see Fig. 4) with the result that the plunger 81 forces out the pad body if it has not already begun to fall out.

To secure accurately mating male and female die members, it is preferable that the upper die plates be formed of hardened steel while the lower die plates are somewhat softer. The rolls may be rotated when properly assembled to produce the cutting edges, the hardened upper die members being operative to shear through any excess metal on the softer die plates. When the cutting edges become dulled, the edges of the softer die plates may be brought out by peening and the cutting edge regained by again shearing the softer plate with the harder plate as explained.

It will be observed that in the cutting operation there is no point where the inter-fitting male and female die parts are disposed parallel with the axes of the rolls. Hence, the cutting action of the dies will be a desirable shearing action.

As indicated best in Fig. 7, the compressive action of the presser blocks 37 will be exerted against the surfaces of the male die plates 54. A substantial pressure is exerted, the pressure being sufficient to produce compressed ends on the pad bodies substantially as explained in the patent to Glomstead No. 1,857,854, May 10, 1932.

The waste material resulting from the rounded end formations may be removed from the machine by suitably positioning vacuum conveyors

or suction tubes adjacent the ends of the receiving area of the support 73.

The described construction provides a fast and quiet operating pad forming mechanism. Changes in its construction may be made without departing from the spirit of the invention, the scope of which should be determined by reference to the following claims, which should be construed as broadly as possible consistent with the state of the art.

I claim—

1. In a machine of the character described, a pair of continuously rotating rolls, the circumference of one of said rolls having a plurality of parallel flat faces extending lengthwise thereof and anvil bars between adjacent faces, and the other roll having on its circumference knives cooperating with said bars to sever a wadding strip passing between said rolls into napkin units.

2. In a machine of the character described, a pair of continuously rotating rolls, the circumference of one of said rolls having a plurality of parallel flat faces extending lengthwise thereof and anvil bars between adjacent faces, and the other roll having on its circumference knives cooperating with said bars to sever a wadding strip passing between said rolls into napkin units; said rolls also having cooperating male and female die means for cutting the ends of said units to a predetermined shape.

3. In a machine of the character described, a pair of oppositely rotating rolls, the circumference of one of said rolls having a plurality of flat faces extending lengthwise thereof, anvil bars between adjacent faces, and cutting plates opposite the ends of said bars, and the other roll having on its circumference knives cooperating with said bars to sever a wadding strip passing between said rolls into napkin units and cutting plates cooperating with said first-named cutting plates to trim the ends of said units to a predetermined shape.

4. In a machine of the character described, a pair of oppositely rotating rolls, the circumference of one of said rolls having a plurality of flat faces extending lengthwise thereof, anvil bars between adjacent faces, and cutting plates opposite the ends of said bars, and the other roll having on its circumference knives cooperating with said bars to sever a wadding strip passing between said rolls into napkin units and cutting plates cooperating with said first-named cutting plates to trim the ends of said units to a predetermined shape; the cutting edges of said plates conforming to the curvature of the circumferences of their respective rolls, whereby they have a shearing action on the ends of said units.

5. In a machine of the character described, a pair of oppositely rotating rolls, the circumference of one of said rolls having a plurality of flat faces extending lengthwise thereof, cooperating cuting elements on said rolls for severing a wadding strip passing between them into napkin units, female cutter dies on the ends of said faces, and male cutter dies on the other roll cooperating with said female dies to trim the ends of said units to a predetermined shape.

6. In a machine of the character described, a pair of oppositely rotating rolls, the circumference of one of said rolls having a plurality of flat faces extending lengthwise thereof, anvil bars between and projecting radially beyond said faces, said faces and bars forming recesses to receive the pads cut from a strip of absorbent wadding passing between said rolls, the other roll having knives cooperating with said anvil bars to sever said strip into said pads and presser blocks in the recesses formed by said faces and bars and located on the end portions of said faces for cooperating with complementary portions of the other roll to compact the end portions of said pads.

7. In a machine of the character described, oppositely rotating male and female rolls for cutting and shaping napkin units from a strip of absorbent wadding passing between them, the circumference of the female roll having a plurality of flat faces extending lengthwise thereof, anvil bars between and projecting radially beyond said faces, said faces and bars forming recesses to seat pads cut from said strip of wadding, and the male roll having on its circumference knives cooperating with said anvil bars to sever said strip into pads; and automatic means for ejecting said pads from said recesses as they pass beyond the nip of said rolls.

8. In a machine of the character described, oppositely rotating male and female rolls for cutting and shaping napkin units from a strip of absorbent wadding passing between them, the circumference of the female roll having a plurality of flat faces extending lengthwise thereof, anvil bars between and projecting radially beyond said faces, said faces and bars forming recesses to seat pads cut from said strip of wadding, and the male roll having on its circumference knives cooperating with said anvil bars to sever said strip into pads; and automatic means for ejecting said pads from said recesses as they pass beyond the nip of said rolls; said automatic pad ejecting means comprising a stationary shaft coaxial with said female roll, a cam on said shaft, and spring-retracted radial plungers in said female roll adapted to be forced outwardly by said cam.

9. In a machine of the character described, a pair of oppositely rotating rolls for cutting a strip of absorbent wadding passing between them into sanitary napkin pads, the circumference of one of said rolls having spaced anvil bars extending parallel with its axis, and the circumference of the other roll having correspondingly spaced grooves, cutter blades seated in said grooves, wedge blocks and adjusting screws for clamping said blades securely in said grooves, and wedge blocks and adjusting screws for adjusting said blades outwardly.

10. In a machine for making sanitary napkin pads from a continuous strip of absorbent wadding, a pair of cooperating rotary rolls between which said strip is fed, said rolls being axially parallel to each other but being offset horizontally and having cooperating means for cutting said strip into individual napkin units, means for guiding said wadding strip to the uppermost surface portion of the lower roll, said means being disposed at an obtuse angle to an upper-roll-radial line directed toward the center of the lower roll, thereby to facilitate entrance of the wadding strip between said rolls, and pad-receiving means juxtaposed with the lower surface of the upper roll and at a lower elevation than said wadding guiding means.

11. In a machine of the character described, a pair of continuously rotating rolls, the circumference of one of said rolls having a plurality of parallel flat faces extending lengthwise thereof, said rolls having cooperating anvil bars and knives disposed intermediate adjacent sides of said flat faces, said anvil bars and knives serving to sever a wadding strip passing between said rolls into sanitary napkin pad units.

12. In a machine for making sanitary napkins from a continuous strip of absorbent wadding, a pair of cooperating rotary rolls between which said strip is fed, said rolls being axially parallel to each other but being offset transversely horizontally relative to each other and having cooperating means for cutting said strip into individual napkin units, one of said rolls having recessed areas for receiving the thickness of said wadding as an incident to the cutting operation, said offset arrangement serving to facilitate entrance of the wadding between said rolls and to permit substantially simultaneous engagement of the top and bottom surfaces of the wadding by the cooperating cutting means.

13. In a machine for making sanitary napkins from a continuous strip of absorbent wadding, a pair of cooperating rotary rolls between which said strip is fed, said rolls each having a plurality of peripherally spaced cutting devices, and said rolls being adapted to cooperate to cut said strip into individual napkin units, the cutting device of one of said rolls having a substantial radial depth so as to form napkin unit receiving recesses intermediate adjacent cutting devices, and said roll being provided with means located in said recesses for cooperating with complementary portions of the other roll to compact portions of said napkin units positioned in said recesses.

14. In a machine for making sanitary napkins from a continuous strip of absorbent wadding, the combination with means for continuously feeding said strip, of a pair of cooperating rolls between which said strip is fed, said rolls having cooperating pressure cutting means for slitting said strip at intervals corresponding to the width of the individual napkin units to be formed, and cooperating punch and die means for cutting the strip so as to substantially connect the ends of adjacent slits to complete the separation of the respective napkin unit widths from said strip and incidentally to cut the unit ends to a predetermined shape.

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