Aug. 8, 1961 P. G. KLAR 2,994,996

FLAT-BAG PACKAGING MACHINE

Filed Aug. 28, 1957 5 Sheets-Sheet 1

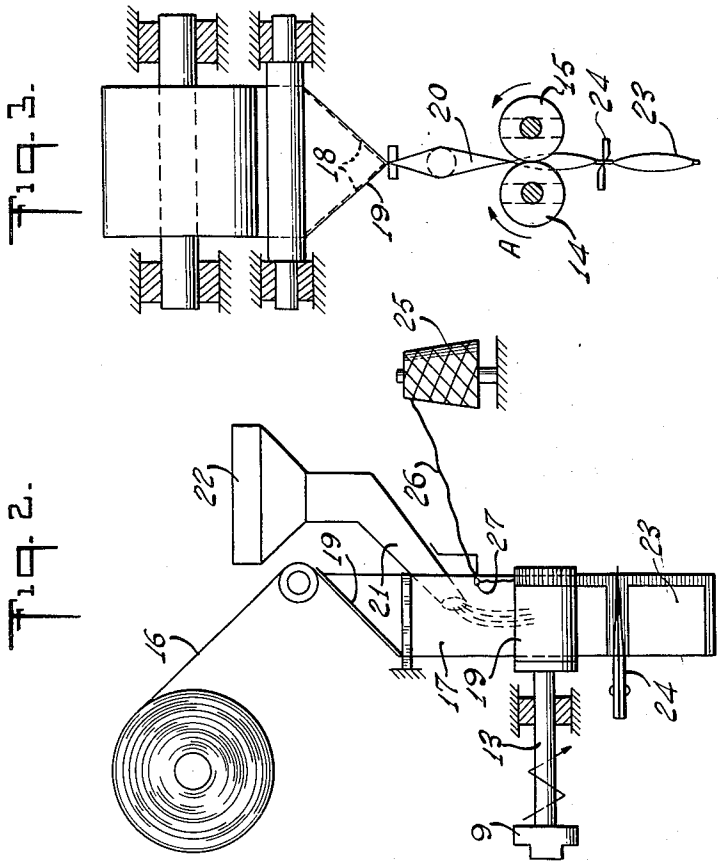

Fig. 3.

Fig. 2.

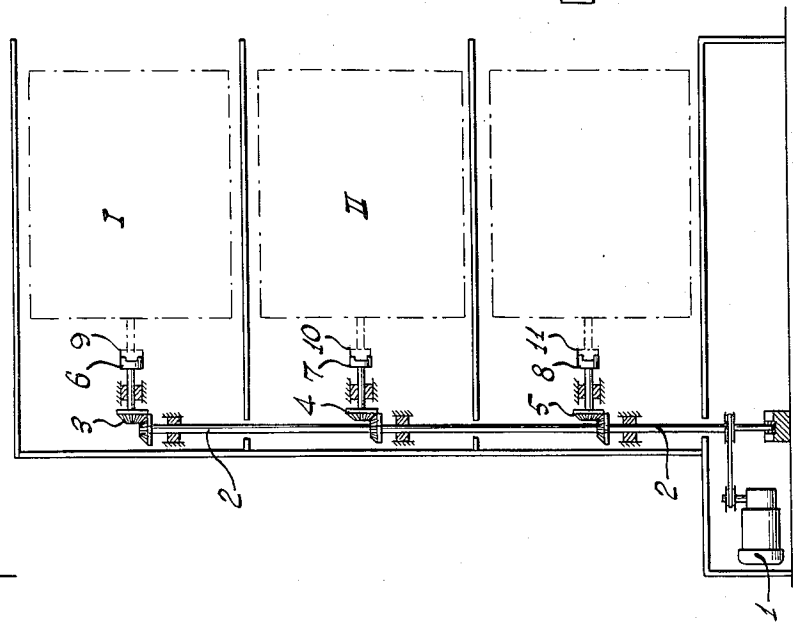

Fig. 1.

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FLAT-BAG PACKAGING MACHINE

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Fig. 8.

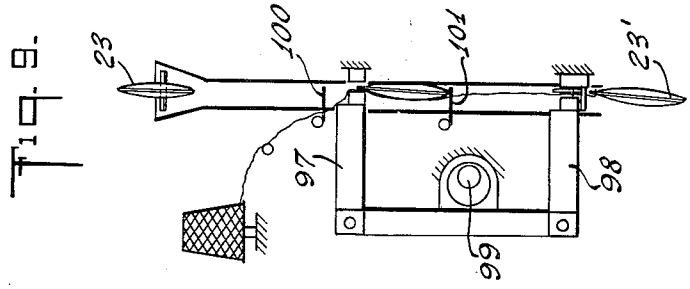


Fig. 8.

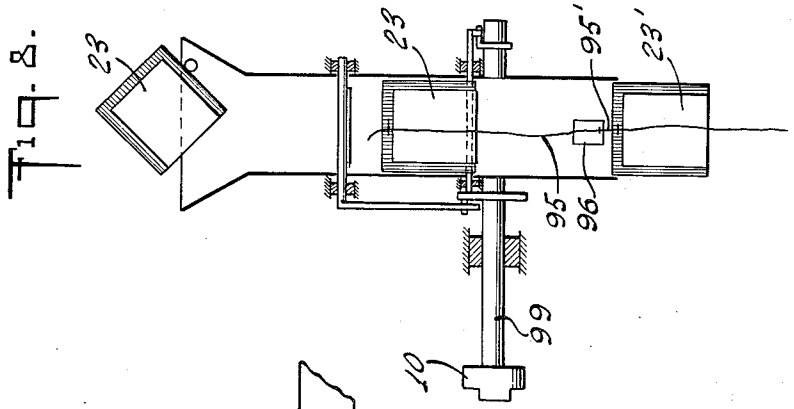
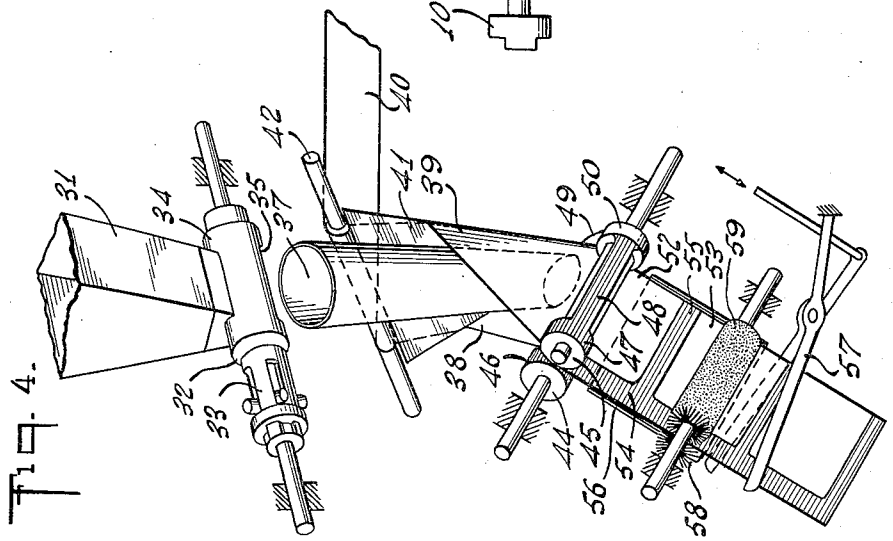


Fig. 4.



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FLAT-BAG PACKAGING MACHINE

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Fig. 5.

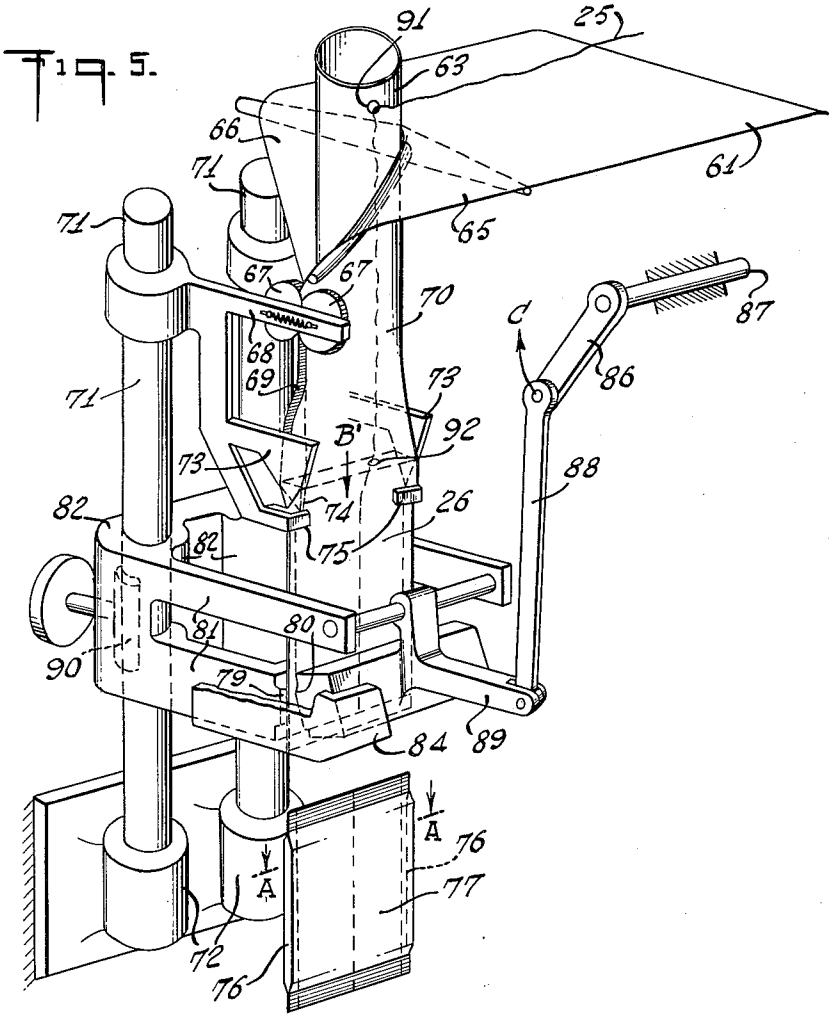


Fig. 6.

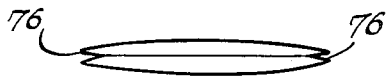
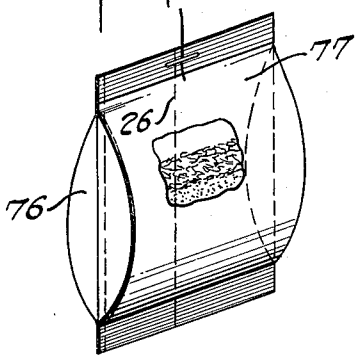


Fig. 7.



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FLAT-BAG PACKAGING MACHINE

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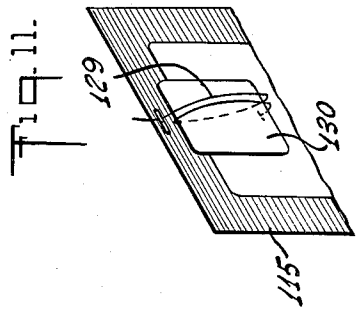

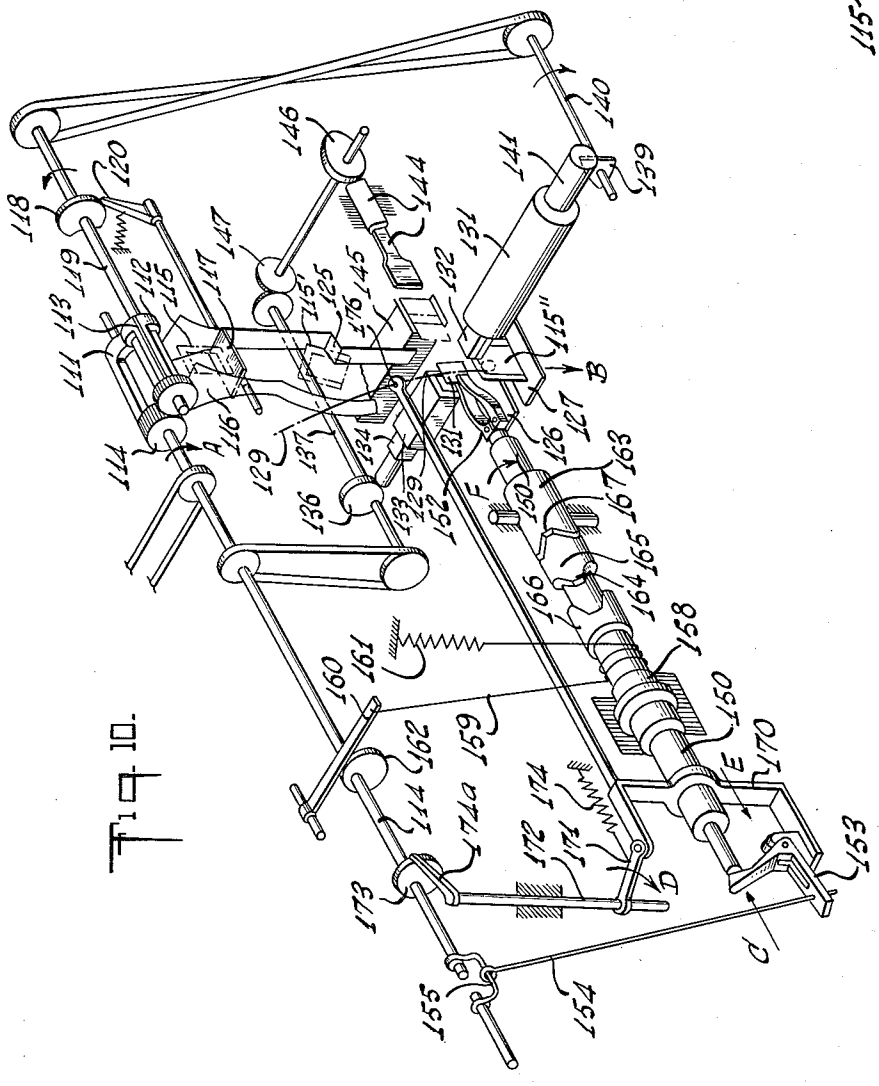

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Fig. 12.

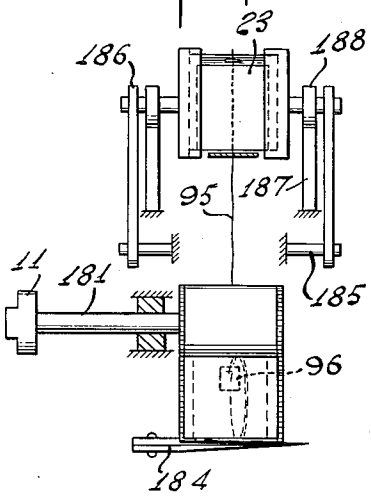


Fig. 13.

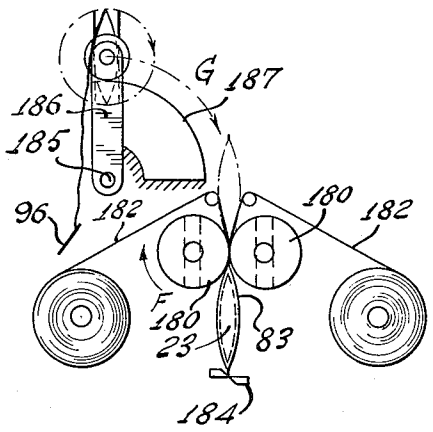


Fig. 14.

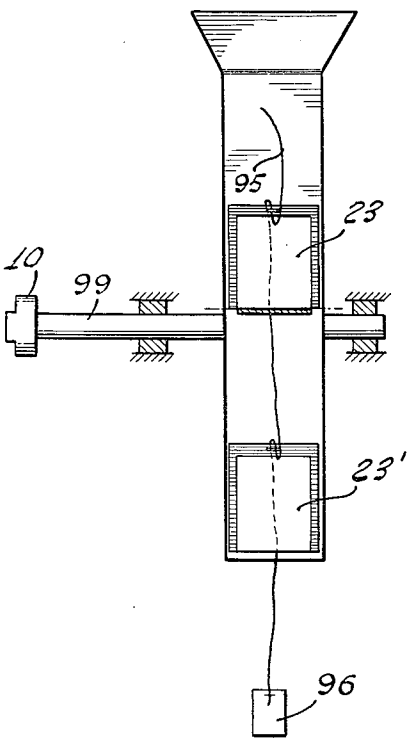
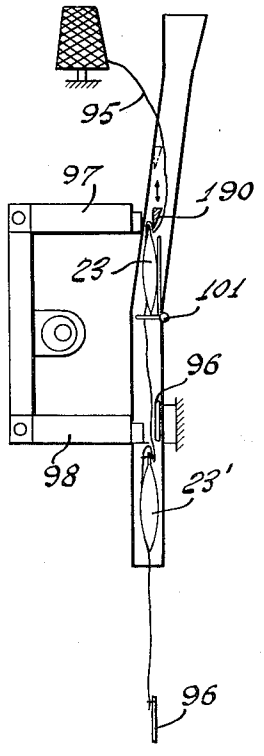


Fig. 15.



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Patented Aug. 8, 1961

2,994,996

FLAT-BAG PACKAGING MACHINE

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Munich 21, Germany

Filed Aug. 28, 1957, Ser. No. 680,712
Claims priority, application Germany Aug. 29, 1956
10 Claims. (Cl. 53—134)

My invention relates to machines for packaging tea, coffee or other material into bags of the kind having a tag attached by a string.

In the known machines of this type, a flaccid bag material, such as water-permeable paper, is supplied in form of one or several strips and is shaped into a continuous, longitudinally sealed hose which is supplied with the filler material, for instance tea or coffee. The desired individual bags are obtained by partitioning and transversely sealing the hose and then severing the partitioned portions. The filling of the bags takes place while the strip of bag material is being folded to a hose, and is usually effected by means of a nozzle pipe. The longitudinal seal along the hose and the transversal partitioning seals are produced by hot-welding rollers, gluing devices and similar means.

The filled and sealed bags are then subjected to further processing, such as attaching a string to the bag, attaching a tag to the string, and placing the bag into packaging material or into a container. For conveying the filled and sealed bags to the localities of such further processing, the known machines are equipped with longitudinally and transversely operating conveying devices whose functioning is controlled in dependence upon the performance of the various processing steps. Such machinery requires a large amount of space mainly because of the necessity for driven and controlled conveying devices operating in different directions, and leaves much to be desired because of its relatively low efficiency, its high cost, and its complexity and susceptibility to trouble. In most cases, such machines form part of a larger entity which also comprises a drive and auxiliary equipment, so that, if packages of different type or make-up are to be produced, a different complete machine must be provided.

It is an object of my invention to satisfy the increasing demands for flat-bag shaped packages of different design and make-up to a greater extent than can be met by machines of the known type. More particularly, it is an object of my invention to provide machines for the above-mentioned purpose that eliminate the described disadvantages and shortcomings, and also afford various structural and operational improvements in such machines.

In accordance with a feature of my invention, the entire machinery for producing and fabricating bag-shaped packages of material is subdivided into individually operable subassemblies in accordance with the various functions to be performed. Thus, I provide the machine with an individually operable and complete bagging assembly for producing, filling and sealing the bags; and with a separately operable tagging assembly for attaching the string to the bag and to the tag. I further provide, as a separate entity, a packaging assembly for wrapping or otherwise packaging the completed bags with their tags. These individual and mutually independent subassemblies or units, including the respective control means for these units, are connected with a common main drive by readily disconnectible coupling means so that the individual assemblies can be conveniently and rapidly exchanged for spare assemblies or for assemblies of different design and performance.

According to another feature of my invention, the above-mentioned individual subassemblies are mounted

vertically one above the other, and the flat bags to be produced and processed are supplied from one to the next assembly by gravity feed, that is simply by dropping the bags rather than by means of driven conveying devices.

This machine design makes it possible, simply by exchanging an individual subassembly, to adapt or modify the performance of the entire machine in accordance with any desired design or make-up of the bags to be produced and packaged. The vertical stacking of the individual assemblies according to the invention contributes toward this advantage insofar as it permits the use of a single main drive shaft that passes vertically along the assemblies and drives the individual assemblies simultaneously in the proper time relation to one another. As a result, the machine also simplifies the requirements as regards the transmitting means that distribute the driving power to the various assemblies. The gravity feed of the bags from one operating stage to the other also contributes to greatly simplifying the entire machinery because the various operating stages are connected with each other by the shortest distance possible, and any particular drives and control devices for conveying the bags from one to the other stage are eliminated.

According to another feature of the invention, an additional control of the machine performance is obtained by placing stopping devices, such as retaining flaps, into the travel path of the bags ahead or behind one or several of the above-mentioned individual assemblies, and by controlling the operation of each stopping device or flap from the drive shaft of the appertaining assembly.

The foregoing and more specific objects, advantages and features of the invention will be apparent from, and will be mentioned in, the following description of the embodiments illustrated by way of example on the accompanying drawings, in which—

FIG. 1 shows schematically the layout and main drive for a packaging machine according to the invention, comprising three subassemblies, namely a top assembly I for producing and filling bags of tea or the like material, a next lower assembly II for attaching a string and a tag to the individual bags coming from assembly I, and a bottom assembly III for packaging the bags.

FIG. 2 shows diagrammatically and partly in section a front view, and FIG. 3 a side view of a bagging assembly corresponding to the one denoted by I in FIG. 1; and

FIG. 4 is a schematic and perspective view showing more realistically the design of a similar bagging assembly embodying the principles of FIGS. 2 and 3.

FIG. 5 is a schematic and perspective view of a further embodiment of a bagging assembly corresponding to the one denoted by I in FIG. 1;

FIG. 6 shows a cross section through one of the flat bags formed in the assembly according to FIG. 5, the cross section being taken along the line denoted by A—A in FIG. 5; and FIG. 7 is a perspective view of the same bag.

FIG. 8 is a schematic and sectional front view and FIG. 9 a schematic side view of an embodiment of a tagging assembly for attaching a string and a tag to the bag coming from assembly I, the assembly of FIGS. 8 and 9 corresponding to the one denoted in FIG. 1 by II.

FIG. 10 is a more realistic and perspective view of a somewhat modified embodiment of a tagging assembly II; and

FIG. 11 shows one of the flat bags provided with a string in the assembly according to FIG. 10.

FIGS. 12 and 13 show respectively a schematic front view and a schematic side view of an embodiment of a packaging assembly corresponding to the one denoted by III in FIG. 1; and

FIGS. 14 and 15 show respectively a schematic front view and a schematic side view of still another embodiment of a tagging assembly II.

The machine illustrated in FIG. 1 comprises, within its housing and supporting structure, three vertically stacked compartments for accommodating respective individually operable assemblies or units schematically shown at I, II and III. Driving power is imparted to the three assemblies from an electric motor **1** through a vertical main drive shaft **2** which extends from the machine base upwardly through the compartments. The individual assemblies are driven from main shaft **2** through branch-off transmissions **3**, **4** and **5** respectively. To readily permit exchanging each individual assembly for a spare assembly or for an assembly of different design or performance, each of the branch-off transmissions is provided with the driving portion **6**, **7** or **8** of a disengageable claw-type clutch whose driven portions are indicated in FIG. 1 at **9**, **10** and **11** respectively and are also shown in various other illustrations relating to individual assemblies.

The top assembly I, for instance, may consist of a device for producing, filling and sealing flat bags for tea, coffee and other materials, as illustrated in FIGS. 2, 3 and described presently.

The bagging assembly according to FIGS. 2 and 3 comprises a power-input drive shaft **13** with the above-mentioned driven clutch portion **9** with the aid of which the assembly, when mounted and in operative condition, is connected with the driving clutch portion **6** to be driven from the main drive shaft **2** of the machine (FIG. 1). The drive shaft **13** of the bagging assembly drives a sealing roller **14** in the direction of the arrow B. Roller **14** is geared to another sealing roller **15** so as to rotate it in the direction of the arrow C. The rollers **14** and **15** operate as pinch rollers to advance a tape **16** of bag material, such as paper, which comes from a supply reel **16***a* on a reel shaft **16***b* and passes over a guide roller **16***c* and thence over the edges **18** of a folder structure **19** consisting essentially of a fixed sheet or plate of triangular shape. During feeding operation, the rollers **14** and **15** are also effective to longitudinally and transversely seal the folded and hose-shaped portion **17** of the bag material. The hose **17** is formed by the operation of the folder **19** which causes the advancing tape **16** to become folded to one half of its original width so as to form an open pocket at **20**. A filling pipe **21** enters into the pocket **20** to supply it with tea or other material from a hopper **22**. As soon as the hose portion **17** is transversely sealed by the action of rollers **14** and **15**, a quantity of material is supplied into the pocket **20** through pipe **21**. After the flat bag **23** thus formed and filled is completely sealed, it is cut off by means of a cutter **24**.

The bagging assembly shown in FIG. 4 incorporates the essential features and performs the essential operations described above with reference to FIGS. 2 and 3.

According to FIG. 4, a hopper **31**, containing the material to be packaged, is located above a dosage-dispensing device **32** which comprises a substantially horizontal cylinder **33** provided with one or several longitudinal grooves and rotating within a sleeve **34** which has a top opening communicating with hopper **31** and a bottom opening **35** from which the discharged dose of material drains into a funnel-shaped filler pipe **37**. During rotation of the grooved cylinder **33**, the dosage grooves receive a measured quantity of material from hopper **31**, and this quantity drains from each filled groove into the filler pipe **37** when that particular groove reaches the lowermost position where it registers with the bottom opening **35** of sleeve **34**.

The dosage can be adjusted or varied by changing the volume of the grooves in cylinder **33**. This is done by axially displacing respective slidable inserts **36**.

The vertical filler pipe **37** extends downwardly into a pocket space formed between the two portions **38** and **39** of the bag material which is supplied as a single, unfolded tape **40** and passes through a folding device consisting essentially of a triangular folder sheet **41** and a guide roller **42**.

The folded bag material passes between two sealing rollers **44** and **45**. The rollers have respective shoulder portions **46** and **47** which pinch the longitudinal edges of the tape portions **38** and **39** and thus form a longitudinal seal which converts the bag material into a hose. The rollers **44** and **45** are further provided with respective axial portions **48** which cooperate with each other to form transverse seals, thus partitioning the hose into a series of individual flat bags. The pinch rollers are geared to each other, for example and as shown, by means of respective spur gears **49** and **50** meshing with each other, so that the two rollers rotate in mutually opposite directions and in constrained relation to each other. The sealing of the bags can be effected by applying an adhesive or by hot welding. In the latter case, the pinch rollers are kept heated to the proper temperature.

The axes of respective rollers **49** and **50** are inclined a certain angle relative to the horizontal. The inclination depends upon the angle of inclination of the plane defined by folder sheet **41** relative to the horizontal. When using a triangular folder sheet as in the illustrated embodiment, the folder angle directly determines the position of the pinch rollers.

The bag strip **52** formed of a series of interconnected bags **53** and the strip seals **54**, **55** leaves the pinch rollers **49**, **50** in a direction perpendicular to their axes and passes through a guide **56** whose longitudinal edges are bent toward the observer to form a U-shape, thus preventing undesired lateral displacements of the traveling material. The material then passes by a cutting device **57** which severs the bag strip along the middle of the seals **55** so that the individual bags can drop into the next lower assembly II more fully described in a later place.

The bagging assembly according to FIG. 4 is particularly simple and efficient because the filling material, such as tea or coffee, can freely drop into the pre-folded hose without entering at this location between the sealed edges of the bag being formed.

The embodiment of assembly II illustrated in FIG. 5 has the advantage of producing a bag differing from the conventional flat bags particularly by having a bellows-type fold along the longitudinal bag sides. To produce such an expansible bag, the strip of bag material **61** passes over a guide rod **62** toward and around the filler pipe **63** while being pulled downward in the direction indicated by an arrow B'. The edges **65**, **66** of strip **61** pass between sealing rollers **67** which are urged against each other on their holder **68** by means of a spring, and which operate to longitudinally seal the sheet **61** so as to form a hose **70** around the lower end of the filler pipe. The holder **68** is fastened to one of two parallel supporting rods **71** stationarily mounted on a holder **72**.

The filler pipe **63** has circular or elliptic cross section in its top portion. This cross section merges downwardly and gradually into an elongated rectangular cross section at the outlet opening of pipe **63**, the rectangular outlet cross section being indicated by a broken line. Consequently, the bag material being pulled downwardly over the filler pipe **63** also forms a rectangular hose where it passes beyond the filler pipe. Mounted on each of the two vertical supporting rods **71** is a folder device **73**. The triangular folder tips of the two devices **73** protrude into the narrow lateral sides of the hose **70** at a height immediately below the bottom opening of the filler pipe **63**, the respective points of the folder tips being located opposite each other at the same height in the longitudinal center plane of the hose **70**.

Located directly beneath the two folder devices **73** are respective guide brackets **75** on both sides of the hose.

Each bracket 75 straddles the hose, so that the hose must pass through narrow gaps formed by the respective guide brackets.

The dimensions and geometry of the folder devices 73, relative to the guides 75 and the dimensions of the cross section at the opening of filler tube 63, are such as to form permanent W-shaped folds 76 at both longitudinal sides of the hose, one of these folds including the longitudinal seal 69 (FIG. 6).

Downward feed movement can be imparted to the hose, and the partitioning of the hose by transverse sealing and severing can be effected, in various ways, for example, as described in conjunction with the preceding embodiments. However, in the assembly shown in FIG. 5, a hose-feeding and partitioning device is used that comprises two sealing cheeks or pinch bars 79, 80 which periodically travel upwardly and downwardly along the supporting rods 71. The pinch bars are mounted on a supporting structure 81. Bar 79 is rigidly joined with supporting structure 81, whereas pinch bar 80 is rotatably joined with supporting structure 81 by a pivot shaft 83. The pivotal movement of pinch bar 80 is limited by means of a stop 84 fastened to the supporting structure 81. The supporting structure 81 has respective sleeve-shaped portions 82 displaceably seated on the two supporting rods 71.

A crank 86 on a shaft 87 is continuously driven from the clutch portion (9 in FIG. 1) of the machine main drive so as to rotate in the direction of the arrow C'. Crank 86 is linked by a connecting rod 88 to an arm 89 attached to pinch bar 80. During rotation of crank 86, the pinch bar 80 is periodically operated and the supporting structure 81 is periodically reciprocated vertically along the supporting rods 71.

The above-described assembly is shown at a moment when crank 86 has just passed through its lower dead-center position and has turned the pinch bar 80 through parts 88, 89 outwardly about the pivot shaft 83 up to the stop 84. During further rotation of crank 86, the structure 81 and the components mounted thereon are shifted upwardly along rods 71 until crank 86 reaches upper dead-center position. During the following movement of pinch bar 80 about pivot shaft 83, smaller inertia and reduced friction are encountered as compared with the preceding vertical movement of the structure 81 along rods 71. Consequently, as soon as the crank 86 passes beyond the upper dead-center position, there occurs at first a pivoting movement of pinch bar 80 inwardly until it abuts against the hose of bag material and forces it against the fixed pinch bar 79. The continuing motion of crank 86 then causes the supporting structure 81 and the hose of bag material to be shifted downwardly. At the same time, the pinch bars 79 and 80 operate as a sealing device and partition the hose of bag material transversely by hot welding. Preferably, the pinch bars are provided with a cutter blade extending transversely of the hose, so that the strip seal, during compression of the pinch bars, is severed in its middle and only the upper portion of the strip-shaped transverse seal is used for pulling the hose downwardly.

After the crank 86 has reached the lower dead-center position, the pinch bar 80 is again removed from bar 79, whereafter the completed package, for instance a bag of tea or other infusion material, will drop out of the assembly into the range of the next lower assembly II, as will be further described in a later place.

As mentioned, the pivotal movement of pinch bar 80 takes place each time ahead of the vertical displacing motion of supporting structure 81 along rods 71. For reliably securing this desired sequence of motion, an adjustable braking device 90 may be provided in the guide-sleeve portion 82 of the supporting structure.

When a bag made in the above-described manner is being used, the filler material, for instance tea, will swell when immersed in water and will then cause the bag to expand to the shape exemplified in FIG. 7. Consequently, the material in the bag becomes exposed to the liquid on a very large surface, thus promoting the desired diffusion and preventing the bag from bursting.

Aside from the special design of the bag just described, other expedients may be applied during production of the bag, for securing additional advantages relating to the use of the bag. For example, it may be desirable to improve the bag so as to prevent inadvertent tearing of the sealed edges, particularly if the tag string is fastened to a sealed edge as is the case with most of the bags of this type. In order to distribute the pulling force of the tag string over the entire edge or over several edges of the bag, the sealing edges can be reenforced by means of an auxiliary string or thread directly or indirectly connected with the tag string. An additional device serving this purpose is schematically represented in FIG. 2 by way of example. The additional device comprises a spool of thread 25 from which the auxiliary thread 26 passes through a stationary eye 27 between the folded bag material 17 where it is glued or sealed into the sealing edge. The auxiliary thread can also be sewed or glued into the edge portion of the bag.

According to a modification of such a reenforcing device, the auxiliary thread is passed through the interior of the bag. A device suitable for this purpose is shown in FIG. 5. The auxiliary thread 26 passes through an opening 91 into the filler pipe 63 and thence through a guiding eye 92, mounted at the bottom opening of the pipe, into the strip of bags emerging from the assembly. After sealing of the transverse partitions and severing of the completed bags, the auxiliary thread 26 passes through the interior of the bag between the two transverse sealing edges, as is apparent from FIG. 7.

The bags produced in assembly I as described above are permitted to drop into the next lower assembly II so that no conveying device is needed between assemblies I and II. As mentioned, the assembly II serves to attach to the bag a holding string and a tag. The principles of such an assembly will first be explained with reference to FIGS. 8 and 9.

According to FIGS. 8 and 9, the bag 23 issuing from the bagging assembly I is provided with a holding string 95 and a tag 96. For this purpose, the tagging assembly is provided with stapling devices 97 and 98 for attaching the holding string and the tag respectively. The operation of the staplers is controlled by a drive shaft 99 which carries the driven clutch portion 10 for connection of the assembly with the vertical main drive shaft 2 (FIG. 1) of the packaging machine. The drive shaft 99 (FIGS. 8, 9) also controls two retaining flaps 100, 101 located in the vertical travel path of the bag 23. The flaps serve to secure proper timing of the assembly operations in dependence upon a given value, for instance the time needed for filling the bag or the duration of dropping travel of the bag from one assembly to the other. For the same purpose, another retaining flap, similar to those shown at 100 and 101, may be located beneath the bag 23' issuing from the tagging assembly, which additional flap delays the vertical bag travel to secure proper attaching of the tag and severing of the tag string from the string supply at the location denoted by 95'. The just-mentioned operation and control of the retaining flaps will be more fully described with reference to the embodiment illustrated in FIG. 10 and dealt with presently.

In the tagging assembly shown in FIG. 10, each filled and sealed bag 115, coming from the bagging assembly, is supplied exclusively by gravity feed as is the case in the embodiment described above with reference to FIGS. 8 and 9. The bag 115 first drops upon a rotatable retaining flap 117 mounted within a guide structure 116. Flap 117 is controlled by a cam 118 which is mounted on a cam shaft 119 and acts upon a cam follower 20.

Follower 20 is spring biased against cam 118 and is mounted on the pivot shaft of flap 117. The guide structure 116 is provided with a stop 125 which causes the bag to tip as is shown for the bag denoted by 115'. Thus the bag, during its falling movement, reaches the position of the bag denoted by 115". In this position, the bag stands vertically upon a plate or stop surface 127 located beneath a plate or stop surface 126 in a given horizontal distance therefrom. Both plates 126 and 127 are controllably displaceable so as to be horizontally movable out of the dropping path of the bag by means of a suitable displacing device (not illustrated) controlled by and connected to the assembly drive shaft 114 which is driven from the main shaft (2 in FIG. 1) through clutch members 10, 7 (FIG. 1). Located beneath plates 126 and 127, also in the dropping path of the bag, is a packaging assembly as denoted by III in FIG. 1.

A stapling device 131 (FIG. 10) serves to attach the holder string 129 to the bag and to a tag 130. The stapler head 132 of device 131 also carries a cutter blade for severing the string from its supply. Located axially opposite stapler head 132 is a platen piece 133 in which a plunger 134 is guided for axial movement. Plunger 134 serves as an anvil for the cutter blade during severing of the string. The proper positioning of plunger 134 is controlled by a cam 136 mounted on a shaft 137 in driven connection with the drive shaft 114 of the assembly.

The movements of the stapler 132 are controlled by an entrainer 139 driven by a shaft 140. Shaft 140, in turn, is driven from the above-mentioned cam shaft 119 which is geared to the drive shaft 114 of the tagging assembly. The entrainer 139 enters into a groove of plunger 141 and cocks the stapling device in opposition to spring force, so that after release of the plunger 141, the stapling and cutting operation is triggered and occurs very rapidly.

The individual tags 130 are pushed by a pusher 144 from a stack 145 so as to enter into the operating range of the stapler head 132. The pusher 144 is controlled by a cam 146 driven through a bevel gearing 147 from the shaft 137.

A hollow shaft 150 is traversed by an axially displaceable pusher rod 151. The rod 151 actuates a tag gripper 152 in such a manner that the gripper is opened in opposition to spring bias when rod 151 is moving in the direction of the arrow C". The axial displacement of rod 151 is controlled by a lever 153 actuated by a pull member 154 from a crank 155 on the drive shaft 114 of the assembly.

The hollow shaft 150 passes coaxially through a drive sleeve 158 which is rotatably journalled but is not displaceable axially. Sleeve 158 is rotatable in both directions. Rotation is imparted by means of a pull rope 159 which has several turns wound about the sleeve 158 and is pulled in one direction by a lever 160 under control by a cam 162 on shaft 114, and in the opposite direction by the force of a return spring 161. Thus, the rotary movement of drive sleeve 158 in both directions is controlled from the drive shaft 114 of the tagging assembly.

The hollow shaft 150 is rotatable and axially displaceable not only in sleeve 158 but also in a stationary bearing 163. The hollow shaft 150 is provided with a double-sided claw-type clutch member with respective claws 164 and 165. Claw 164 can cooperate with a claw 166 on sleeve 168, and claw 165 can cooperate with a claw 167 on the fixed bearing 163. The hollow shaft 150 and hence the appertaining clutch claws 164, 165 can be axially shifted by means of a displacement control member 169. Member 169 is not rotatable and is connected through an angle piece 170 with the pivot bearing for the lever 153. Control member 169 is further linked by an arm 171 to a shaft 172. Rotation of shaft 172 in the direction of the arrow D takes place in opposition to the force of a pulling spring 174 and corresponds to axial displacement of hollow shaft 150 in the direction of the arrow E. These axial movements are controlled by a cam 173 driven by the drive shaft 114 of the assembly; and such axial movements are accompanied by corresponding movements of the components 151, 152 and 153. A rod 175, connected to angle piece 170, carries an eye 176 for guiding the tag string.

The illustrated assembly is shown in an operating stage in which the tag 130 has just been seized by the gripper 152 and the string 129 is just about to be attached to the tag. The bag 115", just previously attached to the string, rests upon the lower plate 127. The next following bag 115 is still being retained by the flap 117 for a short interval of time and will thereafter pass into the operating range of the stapling device 131 and its stapler head 132, after the bag 115" with its tag has dropped from the assembly into the packaging assembly (III in FIG. 1) and the plate 126 (FIG. 10) is shoved into the path of bag travel.

In the illustrated stage of operation, the spring 174 has shifted the hollow shaft 150 with gripper 152 to the illustrated inner limit position and thus has placed the claws 165 and 167 in clutching engagement with each other. This prevents rotation of the gripper as long as the tag, during attachment of the string and subsequent attachment to the bag, must not perform a rotary movement.

When the attaching operations are completed and the string 129 has been simultaneously severed from the string supply, the control cam 173, in the meantime, has turned to such an extent that now the angle piece 170 is shifted in the direction of arrow E. As a result, gripper 152 with tag 130 is displaced out of the operating range of the stapling device into its outermost limit position, while simultaneously the claws 165 and 167 are disengaged and the claws 164 and 166 are placed into clutching engagement with each other. Immediately thereafter, cam 162 causes lever 160 to impart rotary movement to sleeve 158 whose claw 166 turns the claw 164 and the hollow shaft 150 in the direction of the arrow F. The amount of rotary movement of hollow shaft 150 is such that gripper 152 and tag 130 perform an odd number of one-half rotations to wind the thread about the tag a desired number of turns.

Now the cam 173 again returns the hollow shaft 150 with gripper 152 in opposition to the direction of the arrow E. This has the effect that the tag 130, with string 129 wound about it, is placed against the bag so that the longer portion of the tag, previously protruding upwardly, now points downwardly and the upper edge of the tag is as close as possible to the upper edge of the bag.

Subsequent to this operation, the crank 155 acts through connecting rod 154 and angular lever 153 to shift the pusher rod 151 in the direction of arrow C, thus causing the gripper 152 to open.

While the gripper remains temporarily in the outermost limit position then reached, a new bag enters into the operating range of the stapling device and the string 129 is fastened to the bag. The finished bag, with the attached tag 130 and the string wound about the tag, has meanwhile dropped into the packaging assembly (III in FIG. 1), while the new bag, suspended from the string, is advancing from plate 126 downward to plate 127. This provides space for attaching the string supply to a new tag, such attachment taking place in the manner already described, while in the meantime the string of the preceding bag is being cut off the string supply.

The feed of the string supply passing through the eye 176 is preferably controlled independently of the course of the other operations.

Shown in FIG. 11 is the bag 115 with the tag 130 and the string 129 on enlarged scale. When the bag is in the vertical position which it occupies during packaging in assembly III, the tag 130 lies snug against the bag by virtue of the above-described wrapping-around of the string. Hence the bag and the tag form an entity and re-

main in the illustrated position during the subsequent packaging operation.

The close mounting of the tag on the bag obtained with the above-described device has mainly the purpose to facilitate the further processing, such as the packaging of the tagged individual bags in separate wrappings, boxes or cans, so that such subsequent operation can be performed free of trouble. This is particularly important if the finished and tagged bag is to reach the next following assembly III simply by dropping under its own gravity in order to be packaged between two further sheets of envelope material as is the case in the embodiment of the packaging assembly III exemplified in FIGS. 12 and 13 and described presently.

The packaging assembly according to FIGS. 12 and 13 is provided with a pair of sealing rollers **180** which rotate in mutually opposed directions about their respective axes. The roller **180** is driven in the direction of the arrow denoted by F. Driving motion is imparted to the latter roller by a shaft **181** which carries a driven clutch portion **11** for engagement with the driving clutch portion **8** shown in FIG. 1. Two strips of wrapping material **182**, consisting for instance of paper, cellophane or the like, pass between the two rollers **180** and are formed into a pocket. The completed flat bag **23**, with holding string and tag, drops into this pocket. The two wrapper strips **182** are laterally sealed together between the rollers **180** which also form transverse seals corresponding to the length of the bags. As a result, a sealed pocket strip of wrapping material **183** is formed which hermetically seals the individual bags and is severed into individual portions by a cutting device **184**.

FIGS. 12 and 13 further show a different way of combining the tag with the bag into a flat unit. Instead of winding the string about the tag as shown in FIGS. 10 and 11, the string may also be wound about the bag itself. For this purpose, in the device shown in FIGS. 12 and 13, the completed bag is seized on both sides by a swing member **186** rotatable about a pivot **185**. The swing member **186** turns the bag in the direction of the arrow G along a spur gear segment **187**. A spur gear **188** rotatably mounted on the swing member **186** meshes with spur gear segment **187** and thus produces an angular movement of the bag **23** which causes the tag **96** to lie flat against the bag. In this condition, the bag with its tag drops into the pocket formed by the strips of wrapping material **182** and is further processed in the manner described above.

It will be recognized that in a machine as described, the bagging operation, the tagging operation and the final packaging operation are performed by respective subassemblies I, II, III which are individually and independently operable to perform the desired respective functions but are driven from a common main drive in proper timing relation to one another, and are readily disengageable from the main drive. As a result, each individual subassembly can be exchanged as a unit independently of the other subassemblies either to facilitate insertion of a spare assembly if inspection or repair is required, or for the purpose of modifying the operation by substitution of a differently organized subsassembly. In this manner, the individual subassemblies described in the foregoing afford a variety of combinations which permit the use of a corresponding number of different variations in fabrication.

The variations may also comprise a modification of details in the design of the bags such as the type of attachment used for fastening the tag string to the edge of the bag. For example, a further embodiment relating to the assembly II is illustrated in FIGS. 14 and 15. The individual assembly II shown in these illustrations is to be connected by means of its clutch member **10** to the driving clutch member **7** (FIG. 1) of the main drive. The drive shaft **99** of the tagging assembly (FIG. 14) operates, in the manner already described, to actuate the stapler heads **97** and **98** for attaching the tag string **95** to the bag **23** and to the tag **96**.

A particular feature of the device illustrated in FIG. 15, as compared with the tagging assembly shown in FIGS. 8 and 9, is the fact that the tag string **95**, before being stapled to the bag, is laid over the upper edge of the bag by operation of a vertically reciprocable guiding bar **190**. As a result, the string is joined with the bag on both sides of the upper edge. During this operation, the bag is arrested in its dropping movement by the retaining flap **101**. With the sequence of operation performed by the illustrated device, the string is being cut by the device **98** while the tag **96'** (FIG. 15) is being attached by operation of the same device **98**, so that thereafter the flat bag **23'** together with the tag **96** drops out of the assembly into the next fabricating stage.

It will be obvious to those skilled in the art, upon study of this disclosure, that the invention permits of various modifications and combinations other than those specifically illustrated and described herein, without departing from the essential features of the invention and within the scope of the claims annexed hereto.

I claim:

1. A packaging machine for the production, filling and tagging of bags for extractable and dissolvable materials, comprising a bagging assembly having bag material supply means, bag-forming means, bag-filling means, and bag-sealing means; a tagging assembly having string supply means and tag supply means, fastening means for attaching a string to a tag and to a bag issuing from said tagging assembly; a packaging assembly having packaging-material supply means and a device for placing the tagged bags into the packaging material; each of said three assemblies forming an individually operable unit and having a power input shaft for driving the respective assembly unit; a main drive common to all said assemblies and having respective transmissions and coupling means for each of said assemblies, each of said coupling means having a driving portion operably connected to a respective transmission and a driven portion operably connected to the power-input shaft of a respective assembly, said respective driving and driven portions being mutually engageable and disengageable so that a respective one of said transmissions, when a corresponding coupling is in operative engaged condition, is joined with one of said respective assemblies, each of said assemblies with its respective driven coupling portion being removably mounted in said machine and individually engageable relative to said common main drive, said three assemblies being disposed one above the other with said bagging assembly on top and said packaging assembly at the bottom, said three assemblies having respective guide means arranged in descending order and defining together a gravity feed and travel path for the bags, whereby the bags are conveyed exclusively by gravity from said bagging assembly through said tagging assembly and said packaging assembly.

2. In a packaging machine according to claim 1, said main drive having a drive shaft extending vertically along said assemblies, and each of said coupling means comprising clutch means for disengageably interconnecting the respective power-input shaft with said drive shaft.

3. A packaging machine according to claim 1, comprising controllably displaceable stop surfaces located in the bag travel path in proximity to at least one of said assemblies and displaceably mounted so as to temporarily retain the bags along said path, and control means operatively connecting said stop surfaces with said power-input shaft of at least one of said individual assemblies for controlling said stop surfaces to retain and release the bags in dependence upon the operation of said one assembly.

4. A packaging machine for the production, filling and tagging of bags for extractable and dissolvable materials, comprising a bagging assembly having bag-material supply means, bag-forming means, bag-filling means, and bag-sealing means; a tagging assembly having string supply

means and tag supply means, fastening means for attaching a string to a tag and to a bag issuing from said tagging assembly; a packaging assembly having packaging-material supply means and a device for placing the tagged bags into the packaging material; drive means connected with said three assemblies for operating them in a given time relation to one another; said three assemblies each having clutch means engageable and disengageable with said drive means, each of said assemblies being individually and removably mounted in said machine one above the other with said bagging assembly on top and said packaging assembly at the bottom, said three assemblies having respective guide means arranged in descending order and defining together a gravity feed path for the bags in sequence through the respective operations of said bagging assembly through said tagging assembly and said packaging assembly.

5. A packaging machine according to claim 4, said guide means having a stationary stop located in said tagging assembly at one side of said path and extending laterally into said path a distance sufficient to engage one side of a bag dropping through said guide means so as to turn said bag 90° in its falling plane when said side of said bag strikes against said stop for positioning said bag in a predetermined relation to said fastening means for attaching a string.

6. In a packaging machine according to claim 4, said bag-forming means of said bagging assembly comprising a folder sheet structure having folder edges traveled over by the bag material coming from said bag-material supply means to longitudinally fold the bag material into hose shape, a pair of sealing rollers rotatably mounted beneath said folder structure for longitudinally sealing the folded bag material passing between said rollers, said rollers being inclined relative to the horizontal whereby an upwardly open pocket is formed by the bag material ahead of said sealing rollers; and said bag-filling means having a substantially vertical filler pipe extending from above into said pocket for gravity feeding the material to be bagged.

7. In a packaging machine according to claim 4, said bag-filling means comprising a filler pipe having an elongated rectangular outlet opening, said bag-forming means having a folder device for placing the bag material around said pipe to form a hose as said material travels along said pipe, said bag-sealing means being mounted at a point between said folder device and said outlet opening so that said hose is longitudinally sealed and has an elongated rectangular cross section as it travels beyond said opening; and two folder tips located beneath said opening and facing each other on the two respective narrow sides of said rectangular opening, said tips having respective points spaced from each other a distance smaller than the length of said rectangular opening, and second guide means located directly beneath said two folder tips and straddling said hose for guiding the latter, whereby said two folder tips produce a bellows-type fold along both narrow sides of the hose.

8. In a packaging machine according to claim 7, said sealing means comprising a pair of pressure members located beneath said folder tips and engageable with said hose to produce transverse seals for subdividing the hose into individual bags, whereby the bellows-type folds of each bag are closed by respective transverse seals at the top and at the bottom of the bag.

9. A machine according to claim 4, comprising a device for supplying an auxiliary thread, and means for joining said auxiliary thread with said string and with said bag so that said auxiliary thread extends between two mutually opposite sides of said bag.

10. In a machine according to claim 4, said fastening means of said tagging assembly comprising a tag magazine, a gripper for seizing a tag from said magazine, control means connected with said gripper for displacing it from said magazine to said fastening device so as to convey said seized tag to said fastening device, and rotating means for rotating said gripper to wind the fastened tag string about said tag, said gripper and said rotating means being connected with said transmission of said tagging assembly to be controlled by said transmission.

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