Jan. 7, 1958 H. O. IRMSCHER 2,818,985

APPARATUS FOR RECLAIMING CONTENTS OF FILLED ENVELOPE PACKAGES

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Fig. 2.

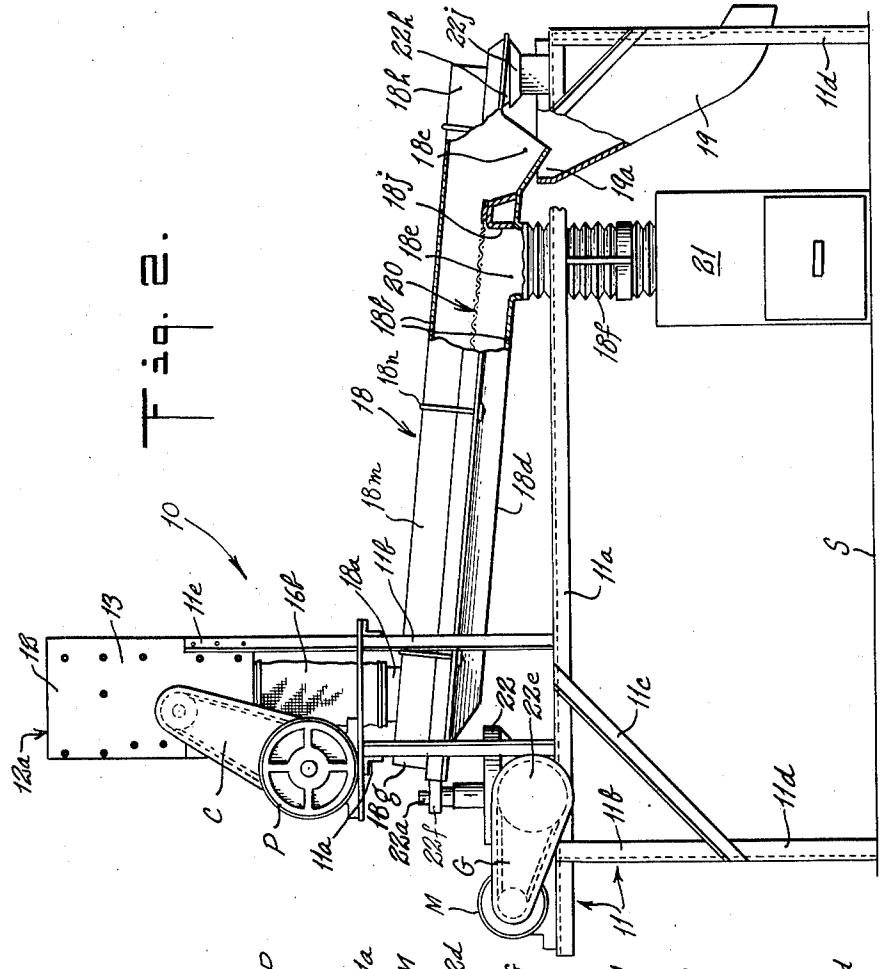
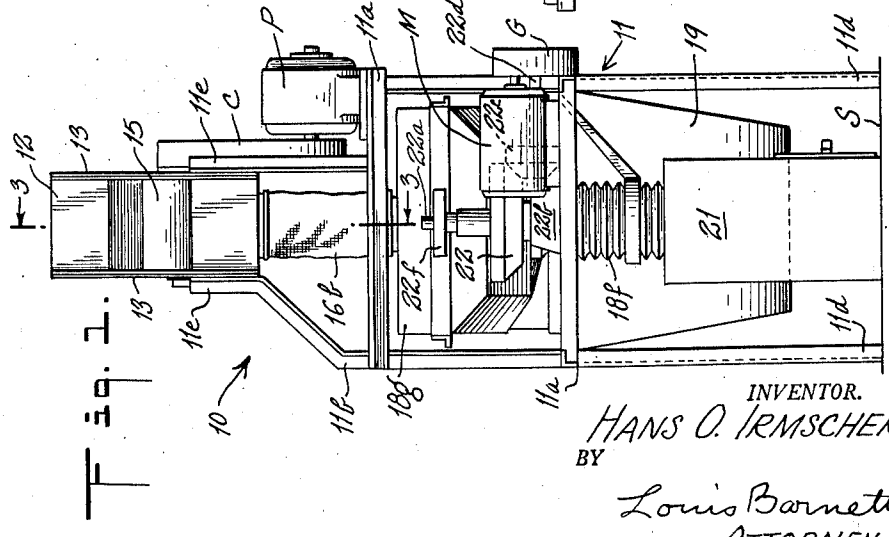


Fig. 1.



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Fig. 3.

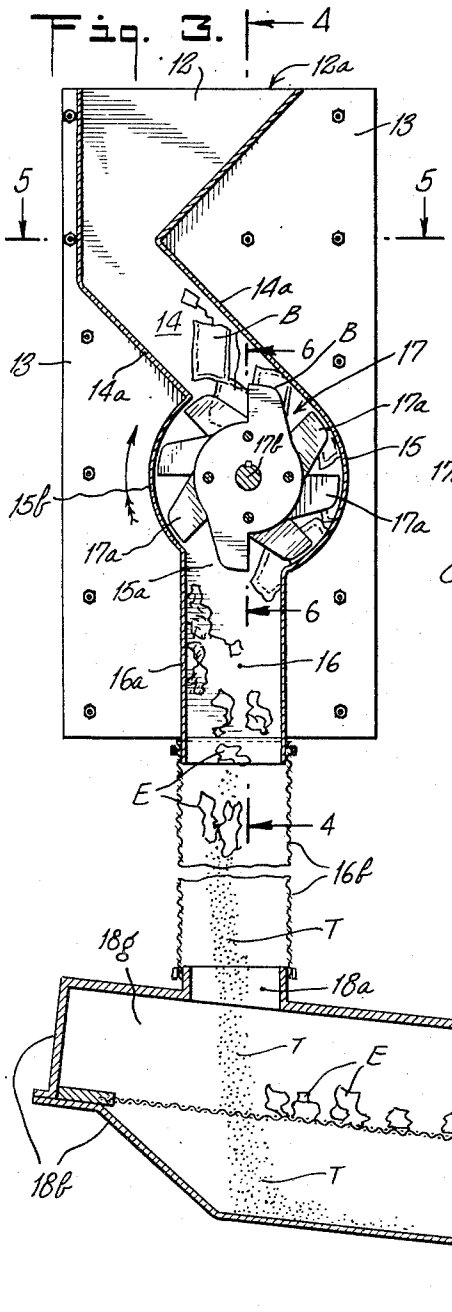
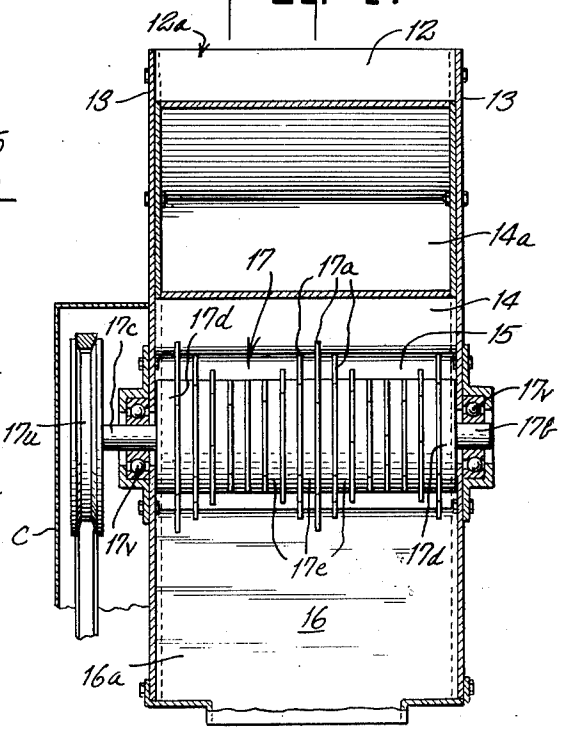


Fig. 4.



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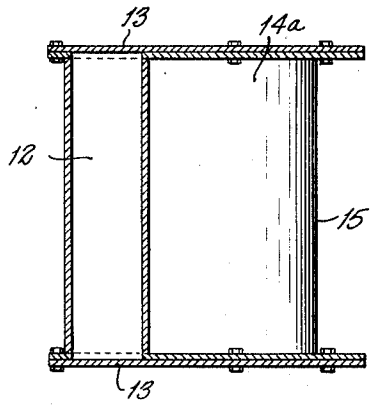


Fig. 5.

Fig. 6.

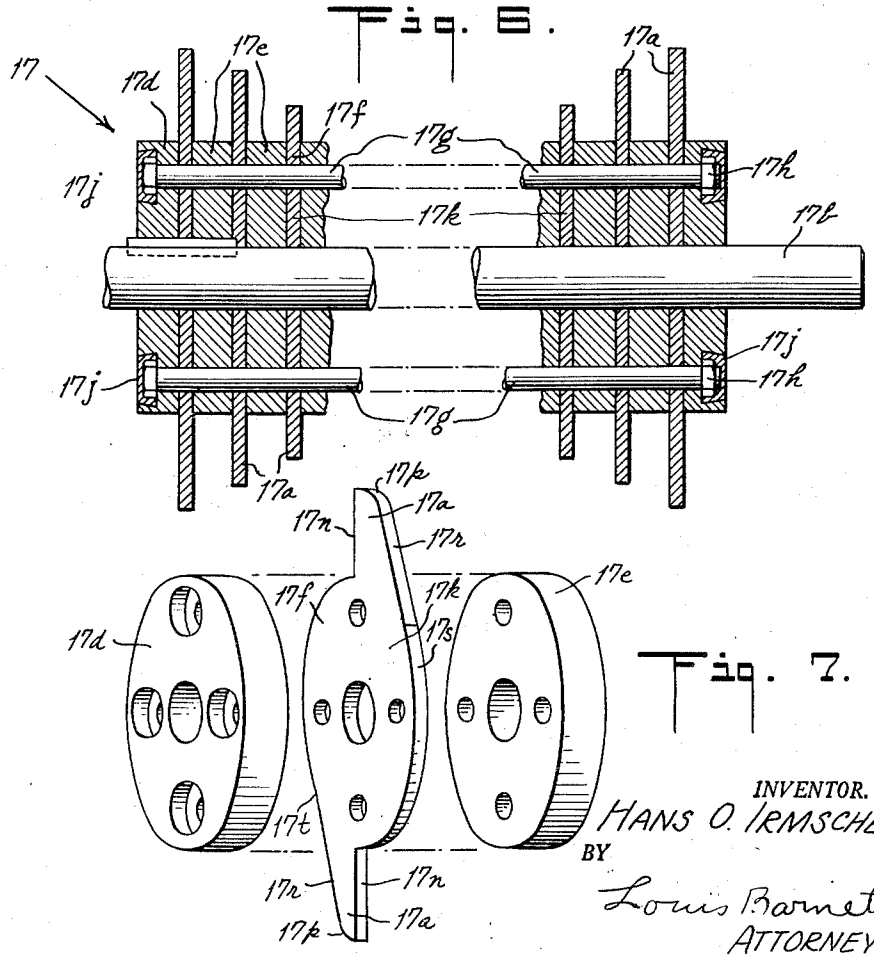


Fig. 7.

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United States Patent Office

2,818,985

Patented Jan. 7, 1958

2,818,985

APPARATUS FOR RECLAIMING CONTENTS OF FILLED ENVELOPE PACKAGES

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Application January 6, 1951, Serial No. 204,762

5 Claims. (Cl. 214—305)

This invention relates to the packaging art, and more particularly is directed to spoilage reclamation of envelope filled packages such as having contents of tea, coffee, sugar, color tinting preparations, seed, cigarettes, or the like products, for disintegrating, that is, tearing (herein after referred to as "exploding") the envelopes to release and empty the contents so that the latter may be entirely separated in usable condition and reclaimed to minimize manufacturing and other spoilage losses.

Among the objects of the invention is to generally improve the art of the character described, which shall comprise few and simple apparatus parts that are readily assembled to form a compact structure, which shall provide a relatively inexpensive apparatus of minimum complexity yet assuring maximum capacity output, which shall be positively capable of separating of the envelope material from the contents of said filled packages so that such contents can be made again available for use in repackaging thereof, which improved method shall produce the results desired, and which shall be practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in steps of the improved method and features of apparatus construction, combinations of elements and arrangement of parts which will be exemplified in the method and construction respectively hereinafter, described and of which the scope of application will be indicated in the following claims.

Figs. 1 and 2 are front and side elevational views, respectively, of an apparatus constructed to embody the invention for disintegrating envelope filled packages of tea, coffee, sugar, color tinting preparations, seeds, cigarettes, or the like, to reclaim the contents of such packages spoiled or made defective during the manufacture thereof, Fig. 2 being shown partly broken away to expose the interior structure adjacent the discharge end of the mechanical separator.

Fig. 3 is an enlarged fragmentary view taken on lines 3—3 in Fig. 1 of portions of the interior construction of the improved apparatus showing the "exploding" means for bursting envelopes to release the contents for separation and reclamation and the inlet end of the mechanical separator.

Fig. 4 is a sectional view corresponding to a cut taken on line 4—4 in Fig. 3 showing the interior structure of the feeding chute, impeller mounting with bearings therefor, and drive transmission assembled to embody the invention with the impact wall of the "exploding" chamber arranged in a down spaced position with relation to said impeller along the path of travel of the envelope packages being processed.

Fig. 5 is a cross-sectional view taken on line 5—5 in Fig. 3 showing details of the feeding chute construction.

Fig. 6 is an enlarged fragmentary sectional view taken on line 6—6 in Fig. 3 showing details of the improved impeller structure embodying the invention, and

Fig. 7 is an enlarged perspective view of one of the impeller member portions with a flanging end and intermediate spacers disassembled from the improved impeller structure shown in Fig. 6.

In the packaging art particularly in manufacturing filled packages formed with envelopes having contents of the character described, as for example, in making tea balls B with filter paper envelopes E, or in packaging sugar or seed in small paper envelopes, or cigarettes and the like relative cheap articles in large quantity production, it has often been found commercially impractical to salvage the contents T of such filled packages which have been spoiled or otherwise found defective due to high labor costs and involvements of relatively slow and tedious hand operations require to reclaim same. It is to this class of reclamation the present invention has been found to have great utility.

Referring in detail to the drawing, 10 denotes a spoilage reclaiming apparatus constructed to embody the invention for "exploding" envelope filled packages B of the character described to release and separate in reusable condition the contents T of such packages B. In the so-called process of "exploding" of envelope filled packages, the envelope E or wrapper is burst, that is, torn to a degree permitting the complete emptying of the contents T yet retaining the torn envelopes E in integral forms for complete separation from the contents in the manner hereinafter described.

From Figs. 1 to 2 it is seen that apparatus 10 may include a supporting frame 11 formed of suitable lengths of spaced apart horizontally and vertically disposed angle irons 11*a* and 11*b*, respectively, firmly secured together in any well understood manner by riveting or welding, and having angularly disposed angle iron bracings 11*c*, lower end 11*d* of said vertically disposed frame angle irons 11*b* serving as legs of frame 11 for suporting apparatus 10 on floor surface level S.

Secured to and extending above extreme upper ends 11*e* of said vertically disposed frame angle irons 11*b*, a suitable gravity down-flow supply feeding hopper 12 having a top inlet 12*a* is supported. The walls of said hopper 12, if desired, may be formed by portions of spaced apart parallelly aligned vertical positioned plates 13. Extending portions of the latter also form vertical walls of an inter-communicating chute 14 which has steeply sloping wall portions 14*a* spaced apart between said plates 13 for directing flow of filled envelope packages B being processed into an impeller casing 15 after passing through chute 14 from hopper 12.

Impeller casing 15 may terminate in a vertically extending passageway 16 which forms an elongated "exploding" chamber having an impact side wall 16*a*, the latter, as seen from Figs. 3 and 4, extending wholly below said impeller casing 15. For simplicity and economy of construction adjoining wall portions forming hopper 12, chute 14, impeller casing 15 and passageway 16 extending between spaced plates 13 may be made from continuous bent sheets.

As is clear from Fig. 3, hopper 12 is constructed and arranged to provide a gravity flow of said filled envelope packages B supplied therein in an offset relation with respect to the successive directional flow through chute 14, and to said casing 15 for accelerating centrifugal propulsion by staggered blades 17*a* of an impeller 17 mounted for rotation within casing walls 15*b* so that manual filling of hopper 12 may be practised with a high degree of safety and accidental entry of foreign rigid articles in hopper 12 will be retarded or practically prevented from reaching the impeller blades 17*a*.

As seen from Figs. 1 to 3, there is provided to extend directly in vertical alignment under passageway 16 top

inlet 18*a* upstanding from one end of a suitable mechanical separator mechanism 18 of any conventional construction, or as here shown, may be of the shaker gravity type comprising an elongated horizontally disposed housing 18*b* which is cradled for rocking or shifting with a longitudinal reciprocating movement while in a slightly sloping position, that is, with a down pitch in an angular relation from said inlet 18*a* to down extending outlet 18*c* provided at the other or discharge end of said housing 18*b*. A receiving funnel 19*a* of a waste discharge hopper 19 is supported on frame 11 wherethrough coarse waste formed from the torn emptied package envelopes E passes after being separated in travelling over upper surface 20*a* of a screen sieve 20 enclosed to extend along a length of said housing 18*b* as shown in Fig. 2. Said coarse waste material E results from "exploding" the spoiled or defectively manufactured envelope packages B being processed. Bottom or under side 18*d* of said housing 18 below sieve 20 may be of U- or V-shaped cross section transversely the length thereof to serve as a trough which has a downwardly projecting outlet 18*e* inwardly of said outlet 18*c* extending to empty into a reclaiming receptacle 21 through a suitable flexible conduit 18*f* for accumulation of reusable contents of the filled envelope packages B being processed.

Passageway 16 which forms the "exploding" chamber has the walls thereof supported in a relatively stationary position which may interconnect with said housing inlet 18*a* through a flexible conduit or other suitable piping 16*b*, constructed of flexible sheet material such as canvas so that when apparatus 10 is in operation to reciprocate housing 18*b* with sieve 20 therein unrestricted relative movement therebetween is permitted. To that end any form of suitable drive may be provided. For example as shown in Figs. 1 and 2, reciprocating means for said separator mechanism 18 may include a vertical extending eccentrically disposed stub shaft 22*a* which is mounted to upstand and turn with large bevel friction pulley 22. The latter may be suitably journalled as at 22*b* to be cooperatively driven by a smaller bevel pulley 22*c* which turns with horizontally disposed shaft 22*d* driven from any suitable power source direct or through belted pulley 22*e* from motor M which when so belted may be provided with a safety closure guard G, said motor M being mounted on frame angle irons 11*a*. Said journal 22*b* and a suitable bearing for said shaft 22*d* may each be mounted on frame angle-irons 11*a* as shown in Figs. 1 and 2.

To provide shaker or oscillating movement to reciprocate mechanism 18 from eccentrically driven stub shaft 22*a*, a suitable end supporting bearing 22*f* in which the latter turns, is provided to extend from head end 18*g* of said mechanism 18. Tail end 18*h* of the latter opposite said bearing 22*f* may be supported for limited sliding movement by slide shoes 22*h* down projecting to ride on guide rail plates 22*j* in cooperation with the requirements of said eccentric drive provided by stub shaft 22*a* and bearing 22*g*, said plates 22*j* being supported on frame angle irons 11*a* as shown in Figs. 1 and 2.

Sieve 20 may terminate at tail end 18*h* of housing 18*b* to communicate with outlet 18*c* extending over outlet 18*e* of said bottom side 18*d*, a baffle plate 18*j* extending across said housing side 18*d* being provided to extend up from said bottom side 18*d* to prevent flowing free contents from passing said outlet 18*e*, as is clear from Fig. 2.

From Figs. 3, 4, 6 and 7 it is seen that impeller 17 may be constructed with a horizontally disposed shaft 17*b* journalled in spaced apart ball bearings 17*r* carried on exterior side of plates 13, said shaft 17*b* being extended at 17*c* beyond one of said plates 13 forming portions of impeller casing wall 15. Said extended shaft end 17*c* may be driven from any suitable power source directly, or belted as shown in Fig. 2 from motor P. When so belted said extended shaft end 17*c* may be provided with a driven pulley 17*u* and a suitable safety guard C which encloses pulley 17*u* and the belted drive belt from motor P, the later being mounted on horizontally disposed frame angle irons 11*a* as shown in Figs. 1 and 2.

Impeller 17 may be constructed and assembled on shaft 17*b* with circular shaped ends or discs 17*d*, intermediate spacer discs 17*e*, similar in size and shape to disc 17*d*, and blade carrier members 17*f* arranged alternately either between successive discs 17*e* or at the impeller ends between discs 17*d* and 17*e* all bolted and rigidly clamped together by suitable spaced apart tie-rods 17*g* extending therethrough. The opposite ends of said tie-rods 17*g* may be provided with suitable means for anchorage in said assembly with said end discs 17*d*. For example threaded end nuts 17*h* counter-sunk into said disc 17*d* may be provided, said nuts 17*h* being leaded securely in position as at 17*j* to present smooth surfaces for eliminating from said impeller assembly the carrying or lodging of dust deposits from the reclaimed contents T.

Blade carrier members 17*f* may each be made with a disc portion 17*k* of substantially the same size and shape as discs 17*e* and 17*d*, and one or a plurality of said blades 17*a* uniformly spaced and integrally formed to project from disc portion 17*k*. Said blades 17*a* for service in the reclamation of the contents T of tea balls having paper or other unwoven sheets forming the filled envelope packages B, may each be made of a length just short of reaching the interior surface of the circularly shaped portion of impeller casing walls 15, and as shown in Figs. 3, 4, 6 and 7, there is provided two diametrically opposite blades 17*a* on each of said carrier member 17*f*, each blade 17*a* having a peripheral edge radial disposed surface 17*n*, a rounded end 17*p* and a peripheral edge surface portion 17*r* sloping to merge, as at 17*t*, into peripheral edge surface 17*s* of said disc portion 17*k*.

In the construction of impeller 17, as shown in Figs. 3 and 4, said blade carrier members 17*f* are arranged with blades 17*a* projecting in successive 45° relation thereby leaving ample space in a spiral path about impeller 17 in the form of a helical pocket for receiving tea balls therein to be processed for reclaiming the contents T after being gravity fed through chute 14 and rotated by the impeller 17 partway along the curved inner surface of impeller casing wall 15 in the clockwise direction as indicated by the arrow in Fig. 3. Then by a combination of forces exerted thereat on the tea balls B carried by the impeller 17, the tea balls are violently shot from against sloping edge surface 17*r* of the impeller blades 17*a* into passageway 16 against the impact side 16*a* as a target and along a considerable surface area thereof below bottom opening 15*a* of said casing wall 15.

It is to be noted that tea balls B as they pass down through chute 14 enter in between the impeller blades 17*a* lodging in the helical pocket thereof singly or in a thin layer and are shot therefrom in a continuous stream, being hurled from the impeller 17, and strike against passageway side walls 16*a* of chamber 16 successively the distance extending along a line the entire width of said side wall 16*a* in repeated sequence to burst each of the envelopes E in explosion fashion due to tearing strains and stresses imposed thereby. Said envelopes E are thus ripped open to free flowing contents therefrom. Said tearing of the sheet material forming the envelopes results in practically producing no fragmentation so that the ripped envelopes E each remain whole, that is, in a single piece, and with spilling contents T drop down in passageway 16, through flexible conduit 16*f*, and onto sieve surface 20*a* for separation of the reusable reclaimed contents T which are accumulated in receptacle 21 from waste envelope material segregated in discharge hopper 19.

The number and condition of tea balls B comprising said stream subjected to hurling action by impeller blades **17***a* constantly vary to a degree sufficient to raise or lower the level of the line on said side wall **16***a* along which impact takes place. To accommodate such variation side wall **16***a* may be extended down to provide an extensive surface area of impact on passageway side **16***a* below the level of casing bottom opening **15***a* as is clear from Figs. 3 and 4.

The practical utility of the invention will now be apparent. The operation of the apparatus **10** constructed as here shown, to embody the invention, has been found highly efficient in taking care of quantity production for disintegrating tea ball filter paper envelopes to release and empty the tea contents T from the envelopes E and to separate said contents T in a usable condition ready for repackaging.

Thus after constructing and assemblying the parts of apparatus **10** as above described and shown in the drawings, motors M and P may be connected to a suitable electric power supply source in the well understood manner to rotate impeller **17** and to reciprocate separator mechanism **18**. Tea balls B that have been defectively manufactured may then be dumped into hopper **12** where they are fed down through chute **14** and carried by the rotating impeller **17** in a clockwise direction within the impeller walls **15***b* at an increase accelerated speed therethrough. Due to the movement thereof with said impeller blade surfaces **17***r* a combination of forces exerted on the rotating tea balls B causing them on reaching bottom opening **15***a* of the impeller casing **15** to leave the impeller blade surfaces **17***r* with considerable force in a stream and to strike the impact side wall **16***a* as above described, "exploding" the tea balls B for disintegrating the filter paper envelopes E thereof to release and empty the contents T from the envelopes E during the travel thereof successively through passageway **16**, flexible conduit **18***f*, and onto sieve surface **20***a* in separator housing **18***a*. The latter which is being reciprocated by motor M completes the emptying of the contents from the torn tea ball envelopes E and causes said contents to flow through the screen sieve **20** hence into the trough housing bottom **18***d*, through flexible conduit **18***f* and from the latter to drop into receptable **21**. The torn envelopes E are diverted by passing along over the sieve top **20***a* and down in discharge waste hopper **19** completely separated from the accumulated contents T in receptacle **21**.

Housing **18**, if desired, besides having said bottom side **18***d* also may be made with a top half cover portion **18***m* which is secured to the housing bottom side **18***d* by suitable releasible closure bands or straps **18***n* as shown in Fig. 2.

The improved method or process embodying the invention as here disclosed is seen to comprise the steps of progressively advancing heat sealed or sewn conventional types of filter-paper enveloped tea balls B, or any of the other aforementioned like filled enveloped packages B, that are defective or from which the contents T are to be reclaimed, in a constant downwardly direction after being dumped in supply hopper **12** at a relatively high level position to lower level through chute **14** into impeller casing **15**. The rotation of impeller **17** then provides centrifugal force in the path of the constant progressive downward movement which as the advancing tea balls reach the level of casing bottom opening **15***a* are shot in angular downwardly directions of relatively wide range, impacting against an extensive surface area of passageway side **16***a* as a target, the latter extending wholly below the level of said casing bottom opening **15***a*.

Hurling of said tea balls B from the impeller blade sloping edge surface **17***r* as has been described above effectuates said wide angular range of directional movement that impacts the tea balls against said extensive surface area of passageway side **16***a* always continuing the movement thereof in constant downwardly direction to a lower level through apparatus **10**.

Satisfactory results have been produced when using an impeller **17** of about 6 inches in diameter rotating at a high speed of approximately 3600 R. P. M., from which the tea balls B after leaving impeller **17** strike violently against passageway side **16***a* the latter being proportioned, sized and located approximately to correspond to said impeller **17** size and assembly dimensions shown in Figs. 3 and 4. On collision with passageway side **16***a* the tea ball envelopes E burst as if they were exploded due to the impact forces to tear and completely rip them open to release the contents T to freely flow down through passageway **16** and into separating mechanism **18**. The screen sieve **20** intercepts the torn envelopes E which continue to move in the downwardly direction on sieve surface top **20***a* while the tea contents T passes through the sieve **20** and continues to move in downwardly direction along the housing trough bottom side **18***d*. Both of these movements take place due to the shaker reciprocation of apparatus **18**. The emptied envelopes finally pass into hopper **21** where they accumulate to be disposed of as waste while the tea contents T finally pass into receptable **21** where it is segregated free from all envelope material in condition available for repackaging.

The novel feature provided by said improved method of having the tea balls B progressively advanced in a constant downwardly direction from start to finish results in a high capacity rate of operation assuring maximum output and provides for a compact arrangement of minimum complexity producing highly efficient results.

The bursting action performed as above described in having the tea balls B lodged in said helical pocket of impeller **17** singly or in a thin layer shot therefrom successively in a continuous stream along a line extending across passageway surface area **16***a* in repeated sequence provides positive impact assuring bursting of the package envelope as required for complete reclamation of the contents.

It is thus seen that there is provided an improved method of manufacture and an apparatus in which the objects of the invention are achived and which are well adapted to meet all conditions of practical use.

As various possible embodiments may be made in the above invention for use for different purposes and as various changes might be made in the embodiments and method above set forth, it is understood that all the above matters here set forth or shown in the accompanying drawing are to be interpreted as illustrative and not in a limiting sense.

Thus having described my invention, I claim as new and desire to secure by Letters Patent:

1. In a spoilage reclaiming apparatus of the character described, an impeller for rotating at high speed on a horizontal axis, a casing surrounding said impeller in close proximity thereto and having an upper chute inlet and a lower passageway outlet, means for rotating said impeller at high speed to project filled envelope articles received through said upper chute inlet in a downwardly directional path into said passageway outlet, said passageway outlet being formed with an impact wall extending in a substantially vertical plane in said path below the level of the path of rotation of said impeller to serve as as target surface area against which said articles collide for bursting the envelopes thereof to free the filling.

2. In the spoilage reclaiming apparatus as defined in claim 1 in which said impeller includes spaced apart staggered blades forming a helical pocket from which said articles are hurled when said rotating means are effective.

3. In the spoilage reclaiming apparatus as defined in claim 1 in which said impeller includes spaced apart staggered blades forming a helical pockets from which said articles are hurled when said rotating means are effective, each blade provided with a radically extending edge

portion and a sloping surface opposite said edge portion extending to merge with the periphery of said disc portion, said blade sloping surfaces serving as hurling means of said articles to the target area.

4. The spoilage reclaiming apparatus defined in claim 1 in which said impeller includes elements formed with hub portions having spaced apart projecting blades, each blade having a radially extending trailing edge and a substantially straight leading edge sloping at an angle to the latter to merge with the periphery of said hub portion, said leading edge being advanced by said impeller rotating means to coact with said articles to effectuate the hurling thereof to said target area.

5. An impeller construction for a spoilage reclaiming apparatus comprising a plurality of disc members rigidly clamped together to form a rotor with alternately spaced apart disc members having projecting blades, each blade provided with a radially extending trailing edge and a substantially straight leading edge sloping at an angle to the latter to merge with the periphery of the adjacent disc, said blades being positioned in staggered relation to form a helical pocket therebetween to extend about the rotor from which articles continuously placed therein are

hurled successively in a continuous stream along a path in a direction of the length of said rotor when rotated.

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