

J. D. TOMPKINS.
PROCESS OF CLEANING OLD PAPER STOCK.
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972,294.

Patented Oct. 11, 1910.

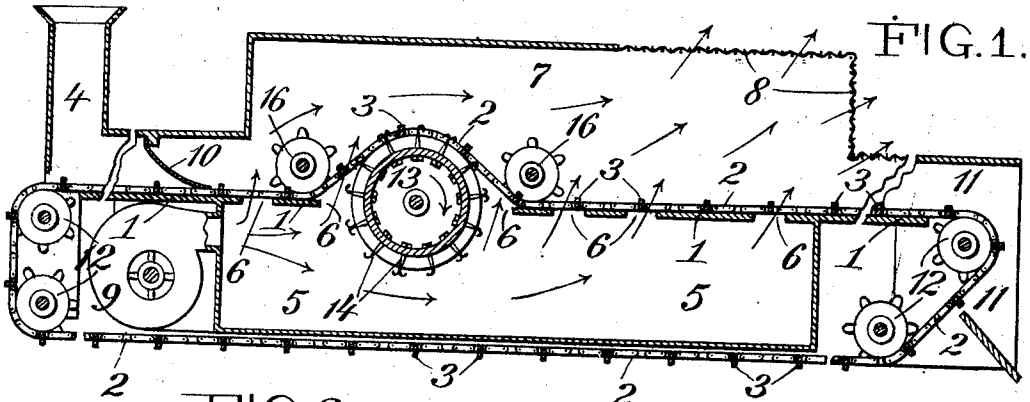


FIG. 2.

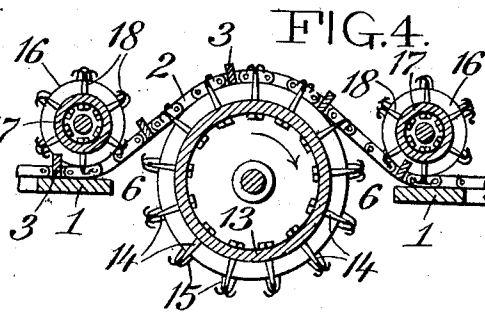
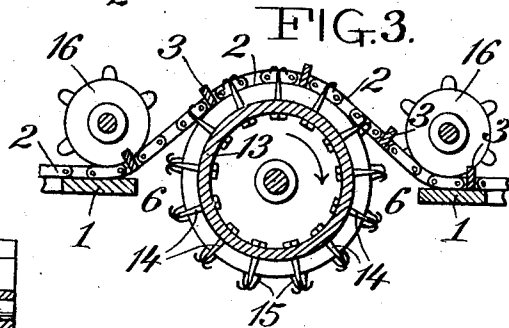
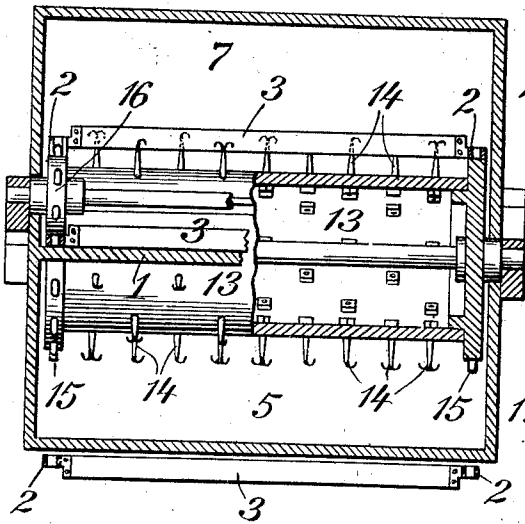
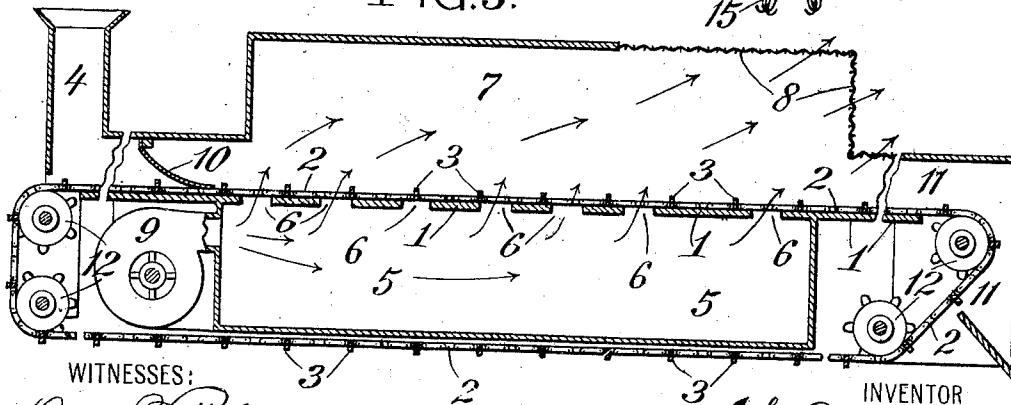


FIG. 5.



WITNESSES:

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PROCESS OF CLEANING OLD PAPER-STOCK.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN D. TOMPKINS, a citizen of the United States of America, residing at Valatie, Columbia county, State of New York, have invented a new and Improved Process of Cleaning Old Paper-Stock, of which the following is a specification.

This invention relates to a process of automatically and continuously cleaning old paper stock by separating from it bits of metal, stones, bones, strings, or other hard or refuse substances which would injure or obstruct pulping or refining engines or apparatus subsequently used for reducing the old paper stock to adapt it to be remade into new paper products.

The accompanying drawings forming part of this specification, illustrate preferred forms of apparatus by which this improved process may be advantageously practiced, and the novel features of the invention will be particularly defined in the appended claims.

In the drawings, Figure 1 is a partly broken-out longitudinal vertical sectional view of a preferred apparatus by using which all foreign substances, including strings, may be automatically separated from the old paper stock. Fig. 2 is a transverse vertical section of the machine and with the main string-catching drum shown partly in front elevation. Fig. 3 is a detail longitudinal section of the conveyer and the string-catching drum, drawn to the same scale as Fig. 2. Fig. 4 is a longitudinal sectional view of a modification showing the upper chain idlers connected to small string-catching drums acting as auxiliaries to the main string-catching drum; and Fig. 5 shows another modification in which the string-catching drum or drums are omitted.

First referring more particularly to Figs. 1, 2 and 3 of the drawings, the numeral 1 indicates a floor and the numerals 2, 2 indicate opposite side chains to which are coupled the ends of transverse ribs or lags 3 which are adapted to travel on the floor 1. Said floor 1, and chains 2, and ribs 3, together constitute a conveyer for the old paper stock which is fed through the end hopper or chute 4 of that solid or imperforate end portion of the floor 1 lying in front of a subjacent chamber 5. This chamber is closed except at its top which is formed by the intermediate portion of the

conveyer floor 1 having series of comparatively large openings 6, through which blasts or currents of air may pass freely upward from the subjacent chamber 5 through the conveyer and preferably into a superposed chamber 7 which may have any suitable open-work or wire gauze rear upper wall portions at 8, permitting free escape of surplus air. A blower 9 discharges air into the chamber 5, and is shown arranged between the upper and lower runs of the conveyer chains 2. A check-valve 10 prevents backward flow into the feed chute 4, of the paper stock and of the air-blasts or currents which rise through the conveyer floor openings 6 into the upper chamber 7. The cleaned paper stock passes from the rear end of the chamber 7 into a hopper 11, which may discharge it into a baling press or directly into a rough-pulping apparatus or into a digester or beating engine later used for preparing pulp from the cleaned paper stock. Sprocket wheels 12, guide the conveyer chain upper run moving rearward over the conveyer floor, and also guide its lower run beneath the chamber 5. Said chamber 5, serves not only as an air-blast receiving and distributing chamber, but serves also as a receptacle for foreign substances separated by gravity from the advancing paper stock under influence of the air-blasts, as herein-after more fully explained. The shaft of any pair of conveyer guiding idlers 12 may be fitted with a driving pulley belted to a power transmitting pulley for actuating the endless chain of the conveyer.

As the more complete paper stock cleaning process involves the separation therefrom of strings as well as of bits of metal, bones, stones, and other heavy foreign substances, the process includes the catching and holding of the strings simultaneously with the separation of said heavy substances. Any approved means or devices may be used for catching and holding the strings. A preferred means comprises a transversely ranging drum or cylinder 13 peripherally armed with radial spikes on teeth 14 preferably having hook-shaped ends. The shaft or axis of the drum 13 is shown about at the level of the conveyer floor 1, and the upper run of the conveyer chain 2, 3, passes over and engages sprocket teeth 15 on the opposite heads of the drum. Idler sprocket wheels 16, 16 running in and over the chain links at front and rear of the drum 13, hold the chains 2,

down quite closely to the conveyer floor 1 directly in front and rear of the drum 13. Fig. 4 of the drawings shows how each opposed pair of idler sprocket wheels 16, may carry an auxiliary drum 17, having hooked teeth 18, and coacting with the toothed main drums 13, 14, for more fully assuring the separation of all strings from the paper stock.

This improved process will be fully understood from the following statement of the complete operation of the illustrated apparatus. It is preferable to first pass the old paper stock through any ordinary duster or thresher thereby reducing it to an advantageously uniform fragmentary condition. It is not necessary to illustrate said duster as any well known form of duster may be used. The dusted paper stock is fed into the chute 4 which delivers it to a solid portion of the conveyer floor 1 over which it is carried forward and past the check-valve 10 by the conveyer flights 3, and to and over that intermediate portion of said floor ranging above the chamber 5, and having the openings 6. These openings 6 are comparatively large and in fact larger than very many of the paper stock fragments being cleaned. The stock being moved over the conveyer floor by the ribs 3 is met or intercepted by air-blasts from the blower 9 passing upwardly through the conveyer floor openings 6, and whereby the forwardly advancing paper stock pieces or fragments are lifted from the conveyer floor 1, and are shaken and fluttered and are when thus air-supported prevented from falling through the waste material openings 6, which many of said fragments would do were it not for the upwardly directed air-blasts passing through said openings 6; from the lower chamber 5, into the upper chamber 7. This lifting and upward and forward fluttering of the air-supported paper stock fragments causes the heavier bits of metal such as nails or bolts, or stones or bones or other foreign substances to be shaken from the advancing stock and to fall by gravity directly through the air-blast openings 6, or if such foreign substances lodge upon imperforate parts of the conveyer floor 1, the conveyer ribs 3 advancing behind them will sweep said refuse substances into the next floor opening 6, through which they will certainly fall because the air-blast is not strong enough to sustain such refuse material. All the heavier foreign or refuse substances thus will fall through the conveyer openings 6 into the lower chamber 5 from which they may at any time be removed, and practically none of the fragmentary paper stock advancing rearward along the conveyer and through the upper chamber 7, will fall through said openings 6, because the stock fragments are lifted or buoyed upward and fluttered and borne rearward by the properly regulated upwardly directed blasts of air passing through said openings and coacting with the advancing conveyer. The toothed main drum 13, or the three toothed main and auxiliary drums 13, 17, 17, while rotating will by their hooked teeth catch the advancing strings which may or may not be floated or fluttered by the air-blasts through the conveyer openings 6, and said drums will wind the caught strings upon them and thus permanently separate the strings from the advancing paper stock, and said strings may at any time be removed from the drums. The old paper stock thus passing through the chamber 7, is practically freed from bits of metal, stones, bones and other heavy foreign substances and also from strings, and the fully cleaned stock is discharged through a rear conduit of any length leading from the chamber 7 and into the hopper 11, from which the cleaned stock may pass into a baling press or into any subsequently used pulp treating apparatus.

Should it not be desirable or necessary to remove strings from the paper stock while the heavy foreign substances are being separated, the string-catching drum 13, or drums 13, 17, 17, will be omitted, substantially as shown in the modified apparatus illustrated in Fig. 5 of the drawings, in which the upper run of the chains 2 carrying the ribs 3, travels flatly over that portion of the conveyer floor 1 above the chamber 5, and having the air-blast openings 6.

The direction of the air-blasts or currents induced by the blower 9, and passing into the lower chamber 5 and thence upwardly through the conveyer floor openings 6 into the upper chamber 7 and rearwardly through said chamber 7, is indicated by arrows in Figs. 1 and 5 of the drawings.

This improved process of cleaning old paper stock may be practiced by using apparatus including only the conveyer floor 1 having the openings 6, and the conveyer chains 2 carrying the ribs 3, and the air-blast inducing means discharging upwardly through the openings 6, and without employing the preferred upper chamber 7, it being evident that the conveyer 1, 2, 3, 6, and the air-blast devices may be set up within a room or any suitable inclosure. The paper stock feeding and discharging chutes leading to and from the stock conveyer also may be removed any desired distance from the conveyer floor portion having the openings 6, and as indicated by the broken-away end portions of the chutes and conveyer in Figs. 1 and 5 of the drawings.

The herein described process is readily distinguishable from the common fanning-mill process of separation while threshing grain or hulling clover or other seeds, in

that the more valuable and useful paper stock fragments would fall through the comparatively large openings 6 of the conveyer floor 1, were it not for the upwardly directed air-blasts which sufficiently buoy up the advancing paper fragments until the conveyer by coacting with the upward and rearward air currents advances the paper stock entirely through the apparatus. The comparatively large openings 6 of the conveyer floor 1, are necessary in order to permit the dropping through of heavy waste foreign substances of any size and shape which often are much larger than the useful paper fragments themselves. In threshing or hulling machines the screen openings through which an air-blast is directed are comparatively small to allow the more valuable grain or seed kernels of substantially uniform small size threshed or separated from the straw or hulls to fall through the screen while the less valuable straw or hull by-products are moved forward by and are discharged from an agitated conveyer belt or carrier.

It may be possible to practice this improved process in one or more of its stages

by using apparatus other than that herein described, hence there is no limitation to any particular style of apparatus by using which the invention may be practically and advantageously carried out.

I claim as my invention:—

1. The process of cleaning old paper stock which comprises conveying the stock forwardly over one or more large openings and then freely fluttering the stock above said openings while supported by means of an air blast, to remove heavy foreign materials by allowing the latter to pass through said openings.

2. The process of cleaning old paper stock which comprises conveying the stock forwardly over one or more large openings and simultaneously removing the strings and then freely fluttering the stock above said openings by means of an air blast, to remove heavy foreign materials by allowing the latter to pass through said openings.

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Witnesses:

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EDWARD SHARP.