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K. WANDEL

AIR SUCTION CRINKLING APPARATUS

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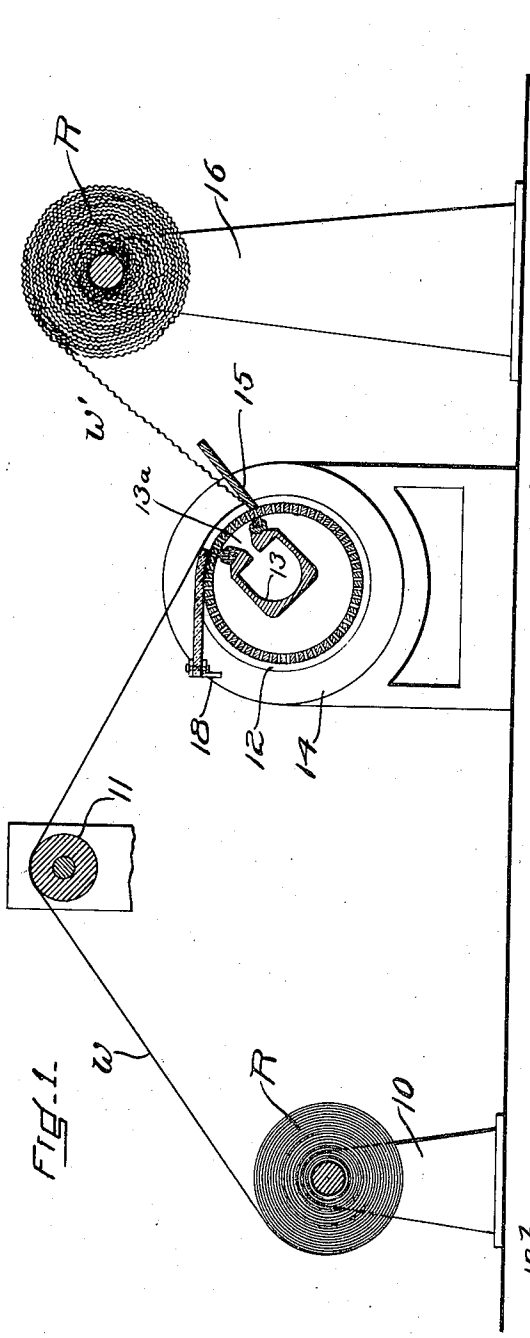


Fig. 1.

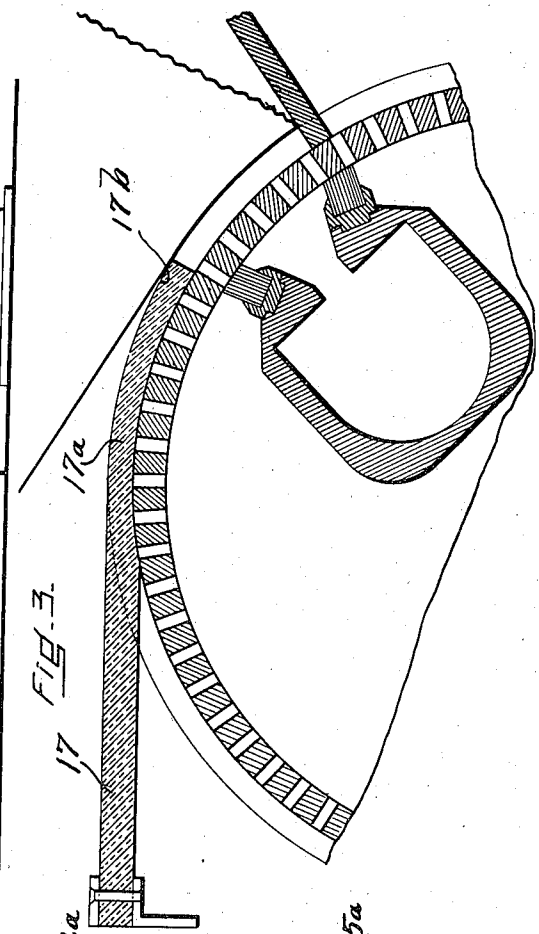


Fig. 3.

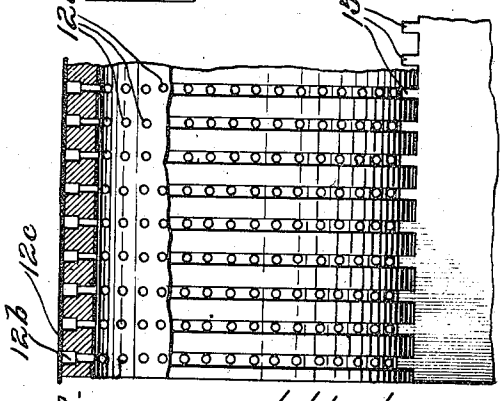


Fig. 2.

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UNITED STATES PATENT OFFICE.

KURT WANDEL, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS, TO ARKELL SAFETY BAG COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

AIR-SUCTION CRINKLING APPARATUS.

Application filed March 6, 1920. Serial No. 363,709.

This invention relates to apparatus for crinkling paper by the employment of air pressure to cause adherence of the paper web to the crinkling drum preliminary to the clearing of the paper from the drum by a doctor or like abutment or other crinkle forming means. More particularly the invention has to do with a type of such apparatus where the air pressure is produced by a suction box or like device mounted within the crinkling drum which is constituted as a hollow shell with apertures therethrough communicating with the suction box as they move thereover. In apparatus of this type as heretofore proposed an objection and difficulty has arisen from the fact that the air suction has been exerted through multiple series of holes through the shell constituting the crinkling drum and these holes extending to the peripheral surface of the drum, the walls of these holes have produced multiple minute ledges or shoulders into which the paper is drawn by suction to a small extent but enough so that as it engages the doctor which must press closely against the surface of the drum, the paper is pinched or caught against these minute ledges, causing a tendency to make minute holes in the crinkled paper. A principal object of the present invention is to provide an improved construction and form of suction roll crinkling drum whereby the paper is supported upon continuous areas of the drum and having in alternation with and in juxtaposition to such areas continuous suction areas adapted to hold the paper closely and uniformly adherent to the drum but without presenting ledges or shoulders that could catch or cause tearing or pinching of the paper. Thus, the invention is not limited, in its broader aspect, to a drum which is perforated and is provided with an internal suction box. The air pressure which holds the paper on the supporting areas of the drum may be produced in various ways not necessarily involving perforations in the drum nor an internal suction box. In conjunction and co-operation with this construction the invention also includes a specially formed doctor presenting a serrated operative edge, the serrations or teeth of which engage and fit into the grooves that constitute the continuous suction areas. The foregoing and other objects and advantages of the invention will more fully appear from the following detailed description, and the distinctive features of novelty will be thereafter pointed out in the appended claims.

Referring to the drawings:

Fig. 1 is a diagrammatic longitudinal vertical section of a paper crinkling apparatus embodying the invention;

Fig. 2 is a partial elevation with a part broken away in section on a larger scale showing a portion of the crinkling drum and of the doctor blade co-operative therewith; and

Fig. 3 is a partial transverse section on a still larger scale showing the essential working portions of the apparatus.

10 indicates a mounting for a roll of paper R from which the web W to be crinkled is supplied, this web being shown as led around an intermediate guide roll 11 to the crinkling drum 12, though this is merely illustrative and the paper might be drawn in a straight path from the roll to the drum. The paper web is however preferably drawn from the paper roll wholly by its adherent engagement with the crinkling drum due to the suction effect to be presently described. The crinkling drum 12 is in the form of a hollow shell with multiple perforations 12^a therethrough communicating with the mouth 13^a of a suction box 13 as the perforations pass over such mouth in the rotation of the drum. The drum 12 is mounted for rotation in a suitable housing 14 and may be driven in any suitable way (not shown). In the operation of the machine air suction to a requisite and predetermined degree is maintained in the suction box 13 by an air pump connection or like suitable device (not shown). The paper is held closely and uniformly adherent to the drum with a pressure that may be determined as required by maintaining the requisite degree of air suction and while thus adhering to the drum it engages a doctor or clearer 15 which is mounted so that its operative edge is in proximity to the forward edge of the suction box mouth resulting in the crinkling of the paper to produce a crinkled web W′ which is led on to a take-on roll R′ mounted on suitable supports 16. In accordance with my invention the holes 12^a are produced in spaced

apart circular series throughout the operative length of the drum and each series communicates with a continuous circumferential groove 12^b formed in the peripheral surface of the drum, these grooves being thus spaced apart along the length of the drum and separated by surface portions 12^c of the drum that are continuous throughout the circumference thereof. 17 indicates a packing member stationarily mounted as indicated at 18 on the housing support and presenting forwardly extending strips or projections 17^a of a dimension to fit in the respective grooves 12^b with the outer sides of such projections lying substantially flush with the surface of the drum as indicated at 17^b, these projections which thus constitute filling pieces terminating in proximity to the rear side of the suction box mouth. The path of the paper web W is such that it covers the portions of the grooves 12^b from the doctor to the packing projections or filler pieces and thus a series of suction areas alternating with continuous surface supporting portions of the drum are provided. It is to be observed that these supporting surface portions of the drum are relatively wider than the suction grooves 12^b and these grooves are of a dimension such that the air suction will not draw the paper materially thereinto, it being understood that for the handling of thinner and lighter grades of paper these grooves will be relatively narrower than for heavier grades. In other words, the paper supporting areas act to hold the paper substantially out of the grooves. The doctor 15 has its operative edge bearing against the paper supporting areas 12^c and is preferably equipped with a series of teeth or projections 15^a which fit into the grooves 12^b and serve the function of co-operating to clear the paper from the drum without tearing or injuring the same even though it may be drawn to some small extent into the grooves 12^b. Such teeth may also be made to serve the function of closing the grooves 12^b at the crinkling point so as to prevent loss of the air suction from this direction, in the absence of other means to effect this result. Thus it is insured that the paper will be cleared from the crinkling drum by the doctor without being caught or pinched against any ledge or obstruction until it is cleared off by the doctor and a perfect and satisfactory crinkled paper product is obtained. I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. Paper crinkling apparatus, comprising a crinkling drum mounted for rotation with a doctor co-operative therewith and equipped for holding the paper adherent to the drum by air suction, such equipment consisting in a series of circumferential grooves in the surface of the drum alternating with continuous circumferential paper supporting areas, said paper supporting areas acting to hold the paper substantially out of said grooves, said grooves having communication with a source of air suction.

2. Paper crinkling apparatus, comprising a crinkling drum having a doctor and a suction device co-operative therewith, said drum presenting a series of continuous circumferential paper supporting areas alternating with a series of suction areas having communication with said suction device, said paper supporting areas acting to hold the paper substantially out of said suction areas.

3. Paper crinkling apparatus, comprising a crinkling drum having a doctor and a suction device associated therewith for causing adherence of the paper to the drum as it engages the doctor, said drum presenting a series of continuous circumferential paper supporting areas alternating with continuous suction grooves having communication with said suction device, the portions of such grooves in communication with said suction device being segregated from the remaining portions thereof to prevent loss of air suction.

4. Paper crinkling apparatus, comprising a crinkling drum having a doctor and a suction device associated therewith for causing adherence of the paper to the drum as it engages the doctor, said drum presenting a series of continuous circumferential paper supporting areas alternating with continuous suction grooves having communication with said suction device adjacent the crinkling point, said paper supporting areas acting to hold the paper substantially out of said grooves, said doctor having projections entering said grooves.

5. Paper crinkling apparatus, comprising a crinkling drum having a doctor and a suction device associated therewith, said drum presenting continuous circumferential paper supporting areas alternating with suction grooves having communcation with said suction device in proximity to the crinkling point, said paper supporting areas acting to hold the paper substantially out of said grooves, and a packing device to segregate such portions of said grooves from other portions thereof, said doctor having projections entering and fitting said grooves for the purpose stated.

6. In a paper crinkling apparatus, the combination of a perforated crinkling drum provided with circumferential grooves in the surface thereof alternating with circumferential paper supporting areas, said supporting areas acting to hold the paper substantially out of said grooves, a doctor cooperative with said drum, and a suction box located within said crinkling drum and communicating with said grooves to hold the paper on said supporting areas.

7. In a paper crinkling apparatus, the combination of a perforated crinkling drum provided with circumferential grooves in the surface thereof alternating with circumferential paper supporting areas, said supporting areas acting to hold the paper substantially out of said grooves, a doctor cooperative with said drum, a suction box located within said crinkling drum and communicating with said grooves to hold the paper on said supporting areas, and means for segregating the portions of such grooves in communication with such suction box from the remaining portions thereof to prevent loss of air suction.

8. In a paper crinkling apparatus, the combination of a perforated crinkling drum provided with circumferential grooves in the surface thereof alternating with circumferential paper supporting areas, said supporting areas acting to hold the paper substantially out of said grooves, a doctor cooperative with said drum, and a suction box located within said crinkling drum and communicating with said grooves to hold the paper on said supporting areas, said doctor having projections entering said grooves.

In testimony whereof, I have signed my name to this specification.

KURT WANDEL.