May 14, 1946. M. RUSCH 2,400,263

MACHINE FOR BREAKING UP CARTONS

Filed March 4, 1944

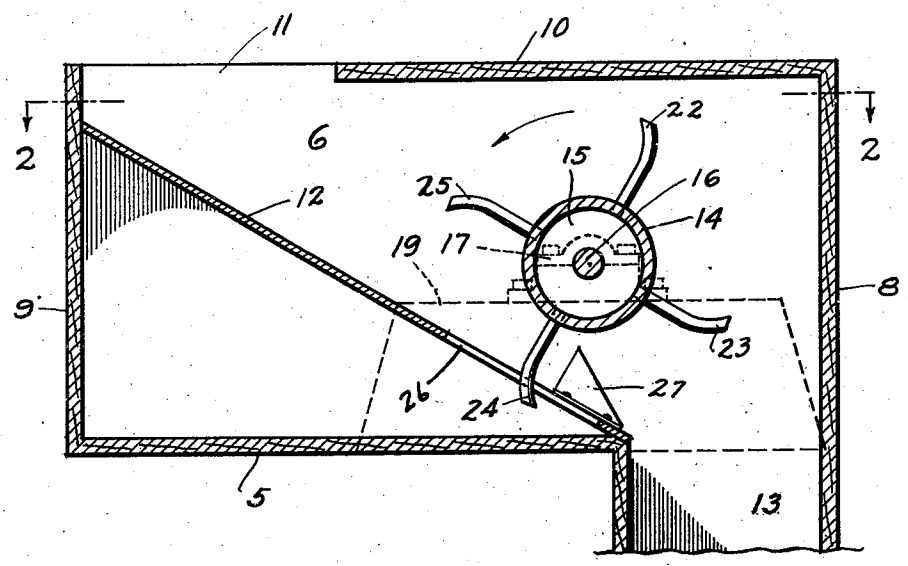


Fig. 1.

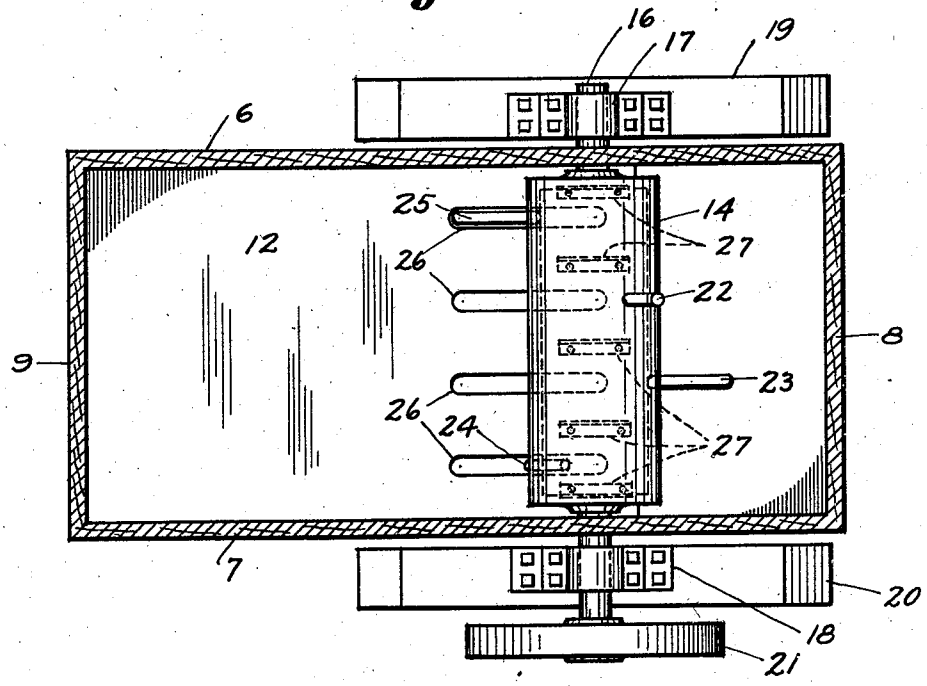


Fig. 2.

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Patented May 14, 1946 2,400,263

UNITED STATES PATENT OFFICE

2,400,263

MACHINE FOR BREAKING UP CARTONS

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Application March 4, 1944, Serial No. 525,130

1 Claim. (Cl. 241—243)

This invention relates to machines for breaking up large pieces of pasteboard and pasteboard cartons for salvage and in preparation for reuse of the material therefrom.

During recent years many kinds of goods are packed and shipped in cartons, and great quantities of the used cartons have been discarded or burned as worthless after the contents have been removed, mainly because of the expense for preparing such material for reuse. In recent months owing to scarcity of material for paper stock to manufacture cartons, attempts have been made to reuse such preused material, but the bulkiness thereof prevented its profitable shipment to factories or centers. Attempts have also been made to compress the old cartons into bales but the many open spaces between the parts have continued to prevent sufficient consolidation for economic shipment, as only a fraction of weight sufficient for carload could be packed in railway cars.

It is important therefore that the used cartons be reduced to fragments for packing and also in order that acid solution may permeate parts and render the material into suitable pulp for reuse. Further attempts have been made to cut the cartons into pieces with knives or cutting blades but it has been impossible to maintain the edges in continued sharpened condition when used on old cartons. It is also important that the edges of sheets of cardboard and carton parts should be cracked and the parts broken in order to absorb the chemicals for reduction.

It is therefore among the objects of this invention to provide a machine whereby large cartons and sheets of cardboard may be rapidly broken into small fragments and also crushed so that the broken material may be compactly pressed into heavy bales for shipment and such parts simultaneously shattered for receiving acids and solutions for reduction into pulp.

After repeated experiments with various constructions of machines including the use of oppositely positioned teeth set closely together, which proved ineffective and inoperative for the purposes desired I have invented a simple and easily constructed machine with a revolving cylinder or drum with arms widely spaced thereon and abutments combined for breaking the cartons into suitable fragments and suitably shattered both for packing and reduction to pulp for paper stock for new cartons.

I have illustratively shown my invention by the accompanying drawing of which Figure 1 is a vertical section view, and Figure 2 is a top plan view taken on lines 2—2 of Figure 1.

Numeral 5 represents a base for a hopper frame and this may be a part of any ordinary floor in a building. 6 and 7 represent sides of the hopper spaced apart for any desired distance by ends shown as 8 and 9. A cover 10 is preferably extended over a portion of the hopper from the rear end 8 toward the front end 9 but a space as 11 is left open for a doorway for the entrance of material to be broken. A floor or wall 12 is provided across the hopper sloping downward from the doorway to the base 5 at a point spaced from the end 8 to leave an opening for a chute 13 for discharge of the broken fragments; such wall being for the purpose of feeding and supporting the materials described.

Numeral 14 represents a drum or cylinder with closure ends 15 rigidly mounted on an axle or shaft 16. This shaft is extended through the drum and outward at both ends through the sides of the hopper and are there rotatably mounted in journal boxes 17 and 18 which are respectively supported on suitable foundations indicated as 19 and 20. Any desired form of pulley as 21 may be affixed to one end of the shaft for rotating the drum, to be driven by any suitable source of power, or the shaft may be driven by direct contact or connection with a shaft from a motor.

Spaced apart at suitable distances in staggered or spiral relation around the drum are arms 22, 23, 24 and 25. With a drum 12 inches in diameter and 3 feet in length it has been found that four arms as indicated will give best results when spaced apart approximately 9 inches axially along the cylinder and in staggered relation one after the other around a cylinder so that they will severally succeed each other in striking the material when the cylinder is rotated.

Between each of the lines of travel of the respective arms and outside the outer lines, abutments 27 are affixed to the floor or wall in spaced relation approximately 9 inches apart; so that as a cylinder is revolved the arms will pass between two abutments. Such abutments have been found satisfactory when constructed of sheet metal with the front edge extended at right angles from the floor or wall to a point near the drum, and in such position they support the cartons and material to be broken against the blows from the arms.

In order to prevent any portion of the cartons or flat pasteboard from binding or clogging between the ends of the teeth and the wall and so stopping or injuring the machine, slots 26 are provided through the wall along the lines of travel of the arms, and the arms are extended to

a greater length than the distances between the cylinder and the wall. Thus as the arms are revolved their outer points project through the slots while the bodies of the arms force the cartons against the abutments and break and crush the same into fragments.

In operation the cartons or other materials to be broken are fed down over the sloping floor or wall while the cylinder is being revolved, and are struck by the respective arms successively are partly crushed and broken and carried against the abutments and further broken and shattered into fragments and passed down the chute into suitable bins for baling. As the arms pass through the broken cartons and sever the same between the abutments the adjacent portions of the cartons tend to rebound backward where they are struck by the next succeeding arm and partially shattered while hurled against the next abutments. The fragments when so struck and broken are also cracked and shattered and the edges frayed in suitable condition for receiving acids and fluids for pulp for paper stock; and the parts so reduced to fragments suitable for close and solid packing into heavy bales.

By the use of such a machine it has been found that the cost of operation in reducing the cartons for reuse is less than half the cost when labor is employed for separately cutting up the material. In compressing unbroken cartons into bales of suitable sizes under a given pressure such bales will weigh only approximately 300 pounds each. Bales with the same dimensions formed with the same power but from the fragments formed with the machine will weigh approximately 1000 pounds and with 50 packed in a railway car full weight 50,000 pounds can be loaded, while but 15,000 pounds of the bales from unbroken cartons can be loaded in the same size car. The advantages of fully loading a car are very important during the times when the supply of such cars is very limited and the demands for railway traffic is excessive, so the economic benefits of this machine can be readily understood.

Having described my invention I claim as new:

A breaking device for cardboard and cardboard cartons, including a housing having an inlet and an outlet for the material, a partition in the housing sloping from the inlet to the outlet and formed immediately adjacent the outlet with a series of spaced slots closed at both ends and terminating short of the outlet, a series of spaced breakers fixed on the partition between the slots and formed to present operative ends transverse the partition in a plane between the ends of the slots, a drum rotative in the casing above the lower end of the partition, and spaced breaker arms arranged in spiral arrangement on the drum and of a length to pass through the slots in the partition in revolution of the drum and past the operative ends of the breakers, the breakers being of triangular form with their apices immediately adjacent the outlet and their operative points adjacent the plane of rotation of the drum.

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