Nov. 22, 1966 A. P. DURAND 3,286,574

PAPER SLITTING APPARATUS

Filed April 22, 1964 2 Sheets-Sheet 1

Fig. 1

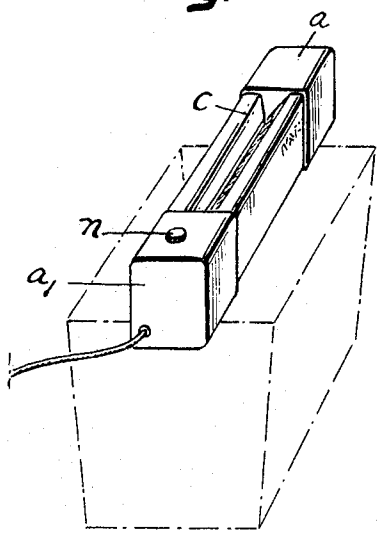


Fig. 3

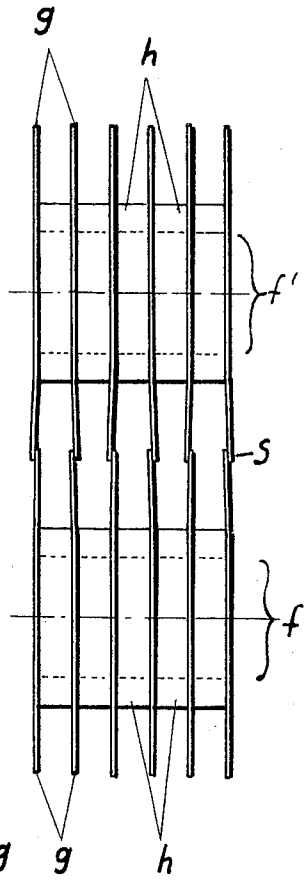
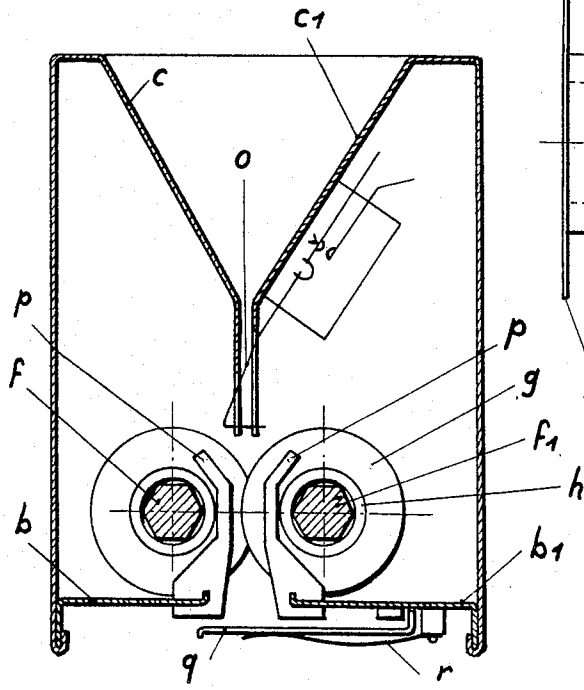


Fig. 2



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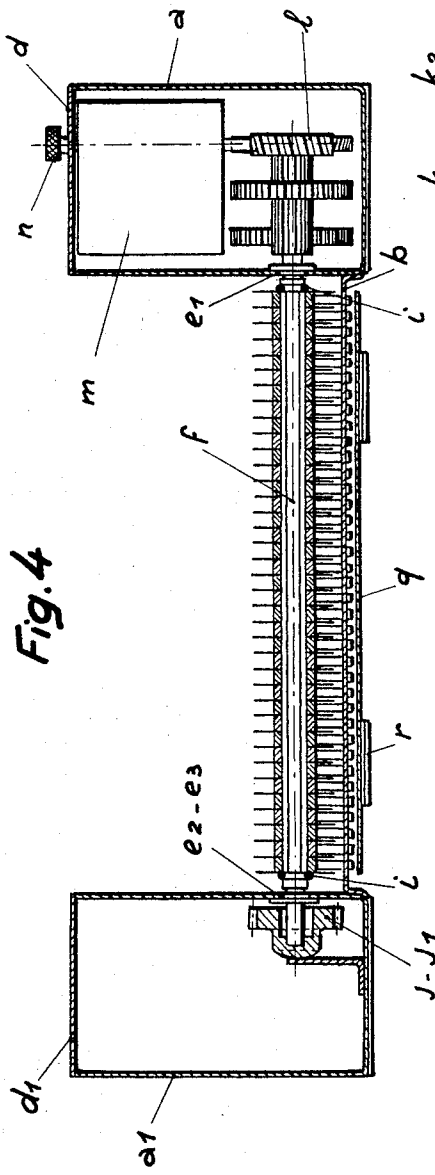


Fig.4

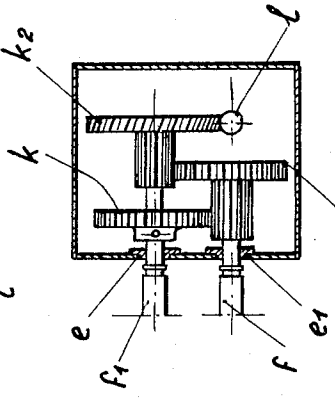


Fig.5

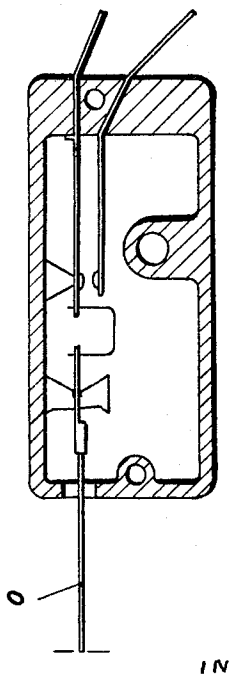


Fig.6

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PAPER SLITTING APPARATUS

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1 Claim. (Cl. 83—501)

The devices used to destroy documents by transforming them into strips too narrow to be legible, available or not for packing, are well known.

These machines commonly have circular knives made by disks alternatively borne by two parallel shafts and separated by washers between adjacent knife disk blades. A paper sheet becomes therefore cut into strips having the width of the washers and separated in two parts, each strip of paper being pinched between two knives. Then each strip becomes squeezed out by means of a guide which is held in suspension between the knives and being somewhat thinner than their distance apart, constraining the strip to glide outwards.

Till now, these machines had the following inconveniences: high cost price for the sake of interleaved massive knives on straight steel, fed by keying, the space occupied hindering the use in offices.

The apparatus, which is the subject of the present invention, removes such inconveniences.

Each knife is replaced by two thin hardened steel washers, rough cut, separated by a separating washer interleaved as wanted for the strip width. The cutting pressure is obtained, without need of precision, by the flexion imposed upon the knives by means of the separately interleaved washers; the shaft is cut from hexagonal steel and the knives cut out with a corresponding hole avoiding all keying; the machine becomes reduced to a piece the size of which makes it possible to put them on paper basket, ordinary or special; it comes to operation by the passing of the sheet, so avoiding the manipulation of a switch whenever a sheet has to be destroyed; a conception such as that gives a very low cost price for the machine and its space occupied is negligible, as it is put on a mounting near each workpost.

In order to set forth the subject of the present invention, however, without limiting there, it follows a description referring to the figures in which:

FIGURE 1 is a perspective view of the machine in operation;

FIGURE 2 is a cross-section of the machine;

FIGURE 3 shows, on a high scale, particulars of knives and interleaved washers;

FIGURE 4 is a longitudinal section through one of the shafts;

FIGURE 5 shows a top view of the reducing device;

FIGURE 6 shows a section of the mini-switch for starting.

The referring to the figures of the drawings serves for concrete embodiment but no absolute limitative description of the machine being the matter of the present invention.

The said machine has a frame constituted by two parts of U shape, a and a^1, assembled by two struts b and b^1 and both bonnets c and c^1; the parts a and a^1 are closed and strengthened by the bonnets d and d^1.

On the internal faces of the parts a and a^1 are mounted the bearings e, e^1, e^2, e^3, made of an appropriate material, such as sintered bronze or plastic, on which are mounted the shafts f and f^1.

These shafts, between bearings, remain rough drawn, with a section other than round, hexagonal for instance, to avoid locking. On this hexagonal part come stacked up alternately resiliently flexible knives g having hexagonal holes and a diameter higher than the space between the bearing-centers (2 mm. for instance), of thin

spring steel, 0.3 mm. for instance, rough cut, and intermediate separating washers h, of appropriate material, for instance rough-injected plastic material, the hole of which can be cylindrical, with a diameter corresponding to the shaft angles, their driving action being not needed. In order to set the knives in proper contact, the intermediate washers h separating the internal knives should have the thickness of the terminal washers i between the external knives, less two knife-thicknesses. To set the knives under pressure and in the same time exempt them from requirement of precision the intermediate washers h, on the contrary, will have overthickness, for instance the same as the thickness of the terminal washers i.

The general arrangement of knives and washers comes fixed on each shaft by appropriate means, two washers i for instance, without the parts have to be clipped one against another, as it is usual on the machines provided with rigid knives, the residual play being highly inferior than the sum of the knife flexion.

Each shaft being individually equipped with its knives and washers, the knives have to be flexed, by hand or by means of an appropriate device, in order to set them as shown in FIGURE 3, where appears the uselessness of initial clipping and thickness accuracy of each knife or washer. The resiliently flexible knives g and the intermediate washers h are not compressed or distorted at the time of their alternate mounting on their respective shafts (f or f_1).

The knife blades g are cut from a thin resilient sheet of steel, similar to double edge thin razor blades.

The knife blades g on one shaft as f are bent alternately to the right or to the left at their lateral point of contact S with the knife blades on the other shaft as f_1.

This is shown in FIG. 3. Each pair of knife blades on one given shaft cooperating together to produce the cutting action is placed in one given plane, but one part of their periphery is situated outside of this plane at the point of contact S since there is resilient flexibility.

For the knife blades on each shaft, the forces tending to straighten out the bent blades and to make them flat annul each other since these knife blades are alternately bent to the left and to the right of this plane. Hence there is no axial thrust in either direction on shafts f and f_1. In the arrangement described, the blades of a first pair of the first two knife blades mounted adjacent each other on one shaft as f_1, interengage between and press against the blades of a corresponding first pair of two knife blades on the other shaft as f, while the blades of the pair consisting of the third and fourth blades on said first shaft f_1 are held between the blades of the corresponding pair consisting of the third and fourth knife blades on the second shaft f and so on.

The shafts f and f^1 set on the bearings e, are jointed by two wheels j and j^1; on the other end, the shaft f^1 bears, keyed, the wheel k, whilst the wheels K^1 and K^2 run free, the latter fed by an endless screw l on the driving-shaft m. The other end of the driving-shaft bears, external to the machine, a milled knob n which enables to aid the rotation if as a result of wrong operating, the rotation would demand of the motor a too strong starting-torque.

The motor starts as soon as a sheet falls between the bonnets c and c^1, by the automatic rocking of the lever o of the mini-interrupter (FIG. 6). As soon as the sheet has gone through, the lever o comes back and the machine stops.

In the machine which has been described till now, the strips would remain clipped between the knives. But they impinge upon the guides p free mounted on the struts b and b^1, of which the thickness is less than the distance between both knives. These guides, which may be metallic or, by preference, made of high strength plastic matter,

like nylon for instance, constrain the strips to leave the knives and lead them to the outlet.

Such arrangement enables the machine to transform a sheet into narrow strips. This will be sufficient to destroy documents, but if such strips have to be used for packing, it will be better to fold them, which is giving them mass and elasticity. For so doing, a flap *q* is articulated under the machine and pushed against the guides by the spring-blade *r*. That flap hinders the outgoing of the strips which, as they have to flex the springs *r*, become folded by buckling and go out zigzag.

The working of the machine, is as follows:

Attention must be given to its low cost price enabling large distribution, the machine being principally constituted by rough-cut parts and rough-injected plastic parts. The resilient flexibility of the knives makes unnecessary any thickness accuracy; knives and washers are simply stacked up, lateral clipping is unneeded, each knife being in flexion of its thickness whilst a whole play, of 1 mm. for instance, becomes distributed over one hundred or two hundred knives, replacing a small part of the theoretical flexion by a tipping.

To assemble the machine, instead of stacking up the parts alternatively on both shafts previously disposed at their final distance, each shaft comes individually mounted, which enables to confine such work to a workman having reduced abilities, like blind people.

The originality of the machine, put on a paper basket, near each person who may have documents to destroy, may be emphasized; a paper basket beside each work post being a necessity in an office, the space occupied by the machine may be considered as negligible; besides that, the starting, each time a document to be destroyed becomes presented, eases the work in a manner which demands less time for destruction than the simple crushing of the sheets.

It also must be said that the machine may be covered by the single fact that old paper, instead of being burnt

or sold at a low price, can be used for packing in the place of expensive fine shavings.

From the foregoing it appears that, the invention is not limited by such duty, neither by the kind of embodiments of the different parts of which have been more specially indicated; it embraces, on the contrary, all modifications.

What I claim is:

In an apparatus for cutting sheets of paper into strips, a pair of spaced terminal mounting boxes, a pair of mutually spaced polygonal drive shafts extending between and terminally mounted in said boxes, a plurality of resiliently flexible metal knife blades of uniform size provided with central apertures registering with the contours of each said shaft and mounted in stacked relation on said shafts, separating washers mounted on said shafts respectively between adjacent blades, said shafts being mounted on said boxes to have the blades on a first said shaft extend with their peripheries extending within the peripheries of the blades on the second of said shafts, and said blades being arranged in successive pairs in such manner that the blades of each pair of blades on the first said shaft have their peripheries extending between the peripheries of the blades of the correspondingly positioned pair of blades on the second said shaft.

References Cited by the Examiner

UNITED STATES PATENTS

1,012,615	12/1911	Dorr	83—167
1,525,590	2/1925	Perrault	83—501
2,656,889	10/1953	Kaplan	83—372
2,770,302	11/1956	Lee	83—166 X

FOREIGN PATENTS

304,557	1/1929	Great Britain.
650,200	2/1951	Great Britain.

ANDREW R. JUHASZ, *Primary Examiner.*