Feb. 20, 1934. G. VAN WORMER 1,947,748

PAPER CLEANING MACHINE

Filed Nov. 12, 1931 3 Sheets-Sheet 1

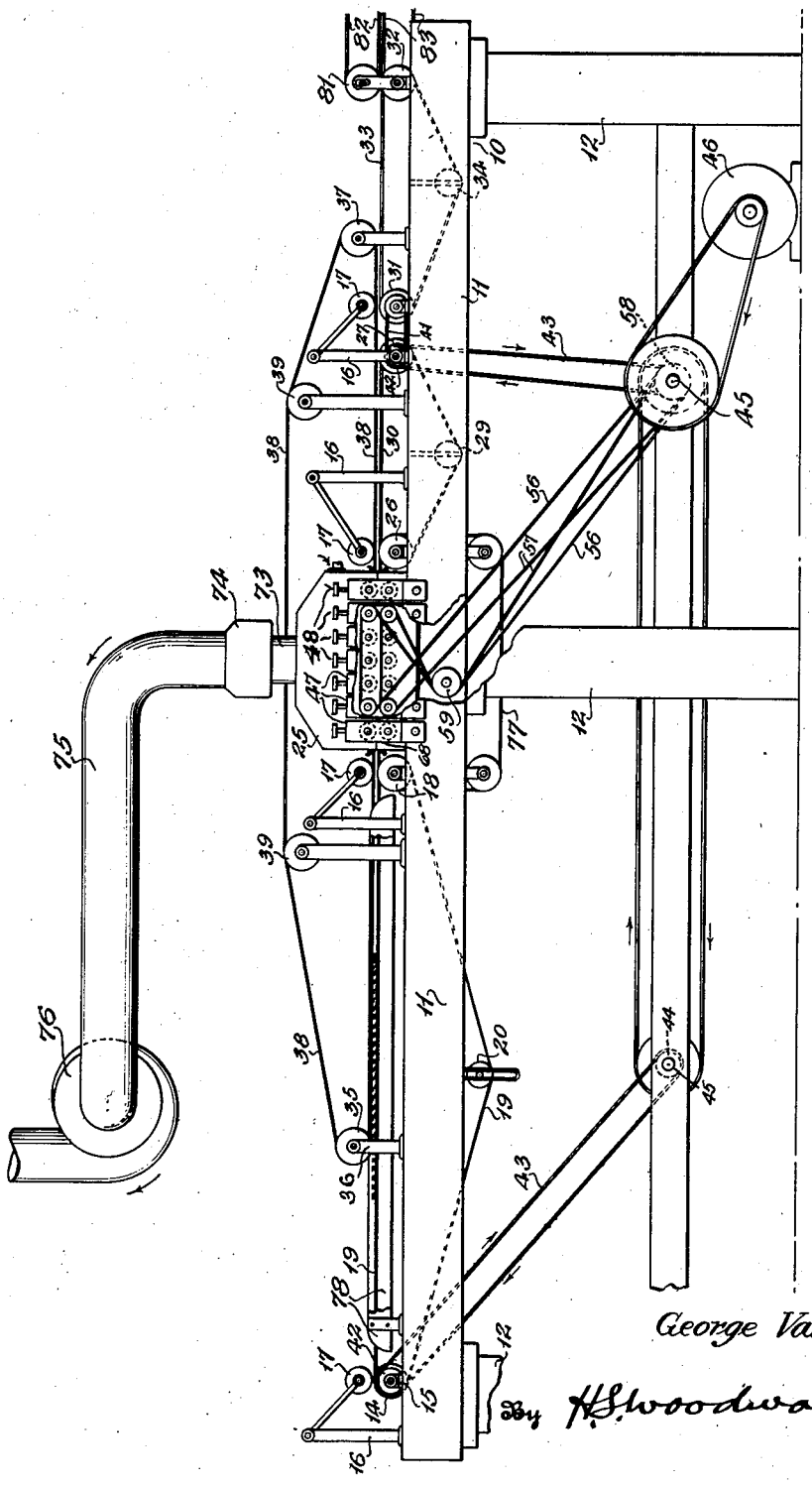


Fig. 1.

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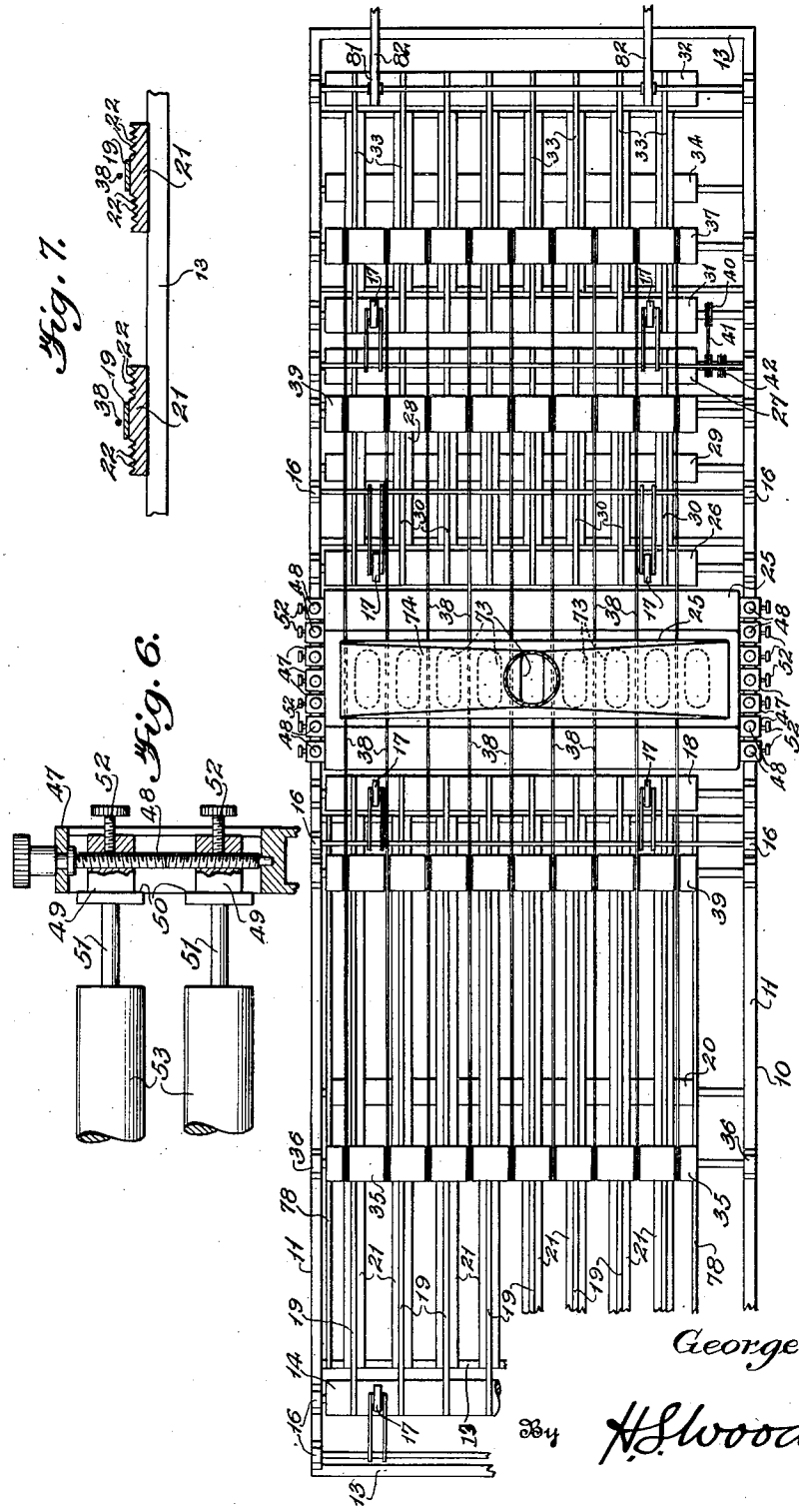


Fig. 2.

Fig. 6.

Fig. 7.

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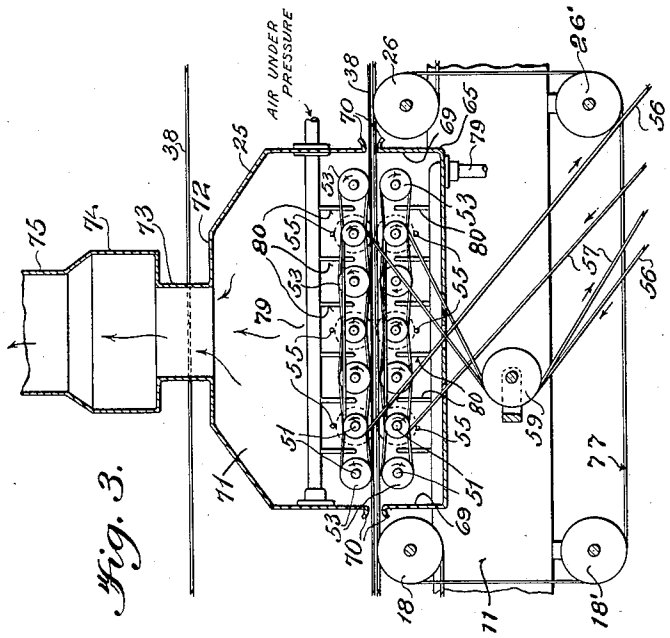


Fig. 3.

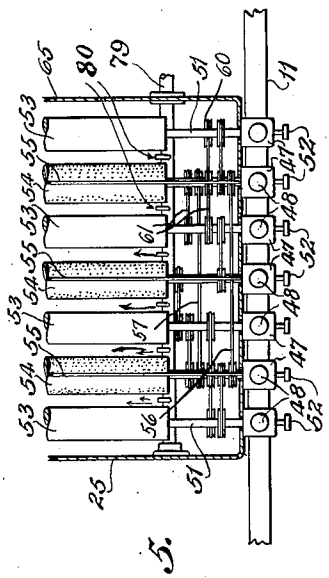


Fig. 5.

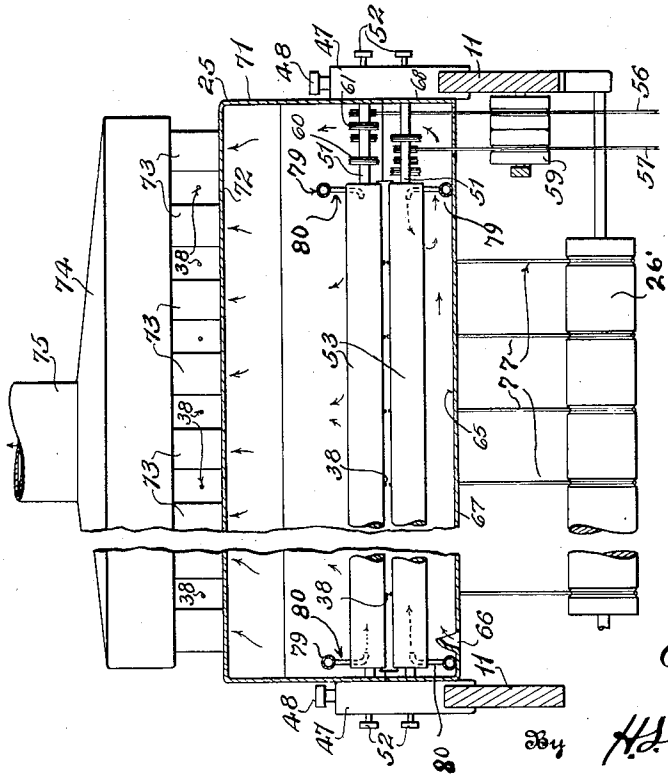


Fig. 4.

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UNITED STATES PATENT OFFICE

1,947,748

PAPER CLEANING MACHINE

George Van Wormer, Hamilton, Ohio

Application November 12, 1931
Serial No. 574,626

3 Claims. (Cl. 15—7)

The invention relates to cleaning machines, and particularly to a machine for cleaning paper in rolls or sheets, to remove dust and adhering particles, and for other treatments.

The machine is of special use to printers in preparing fine stock for use in presses on fine work, to reduce linting of machinery and to avoid flaws in the work such as white spots due to particles becoming interposed between paper and type or plates, dropping of ink-covered fibers or paper particles on the work, and improving the output of the presses generally.

It is an aim to present a machine adapted to be operated by inexperienced operatives in an extremely simple manner and with a minimum liability of derangement or excessive wear.

It is also a purpose to enable the construction of such a machine in a simple form and at a low cost. Another purpose is to present a novel construction in the relation and operation of the feed rolls and cleaning brushes. It is also sought to present a novel construction and arrangement in the pneumatic conveyor devices and housings.

A further purpose is to evolve a novel structure for the mounting of the rolls and brushes in the cleaning unit.

Additional objects, advantages and features of invention reside in the construction, arrangement and combination of parts involved in the embodiment of the invention, as will be understood from the following description and accompanying drawings, wherein

Figure 1 is a side elevation of the machine.

Figure 2 is a top view of the machine with parts broken away.

Figure 3 is a fragmentary longitudinal section showing a schematic view of the belting system for the brushes and feed rolls in the cleaning section, showing also the cleaning chamber in section, and pneumatic conveyor connections therewith.

Figure 4 is a cross section of the machine.

Figure 5 is a fragmentary top view of the belting system at the brushes and feed rolls of the cleaning unit.

Figure 6 is a detail of the mounting of the brushes and rolls of the cleaning chamber.

Figure 7 is a detail section of the tape boards.

There is illustrated a machine comprising a frame 10, including longitudinal side strings 11, supported by legs 12, and including such cross members 13 as desired.

At the paper-receiving end of the machine a transverse plain cylindrical roll 14 is mounted in saddle bearings 15 secured to the upper sides of the strings 11. Mounted on standards 16 at each side of the machine there is a transverse shaft a distance above the roll 14, and on this there are swingingly mounted friction rolls or wheels 17 having rubber or other suitable facings and bearing upon the roll 14 at the upper side thereof. A second feed roll 18 similar to the one 14 except that it is provided with a series of grooves is similarly mounted on the side members of the frame, located a distance inwardly of the one 14, and around the two rolls 14 and 18 a series of endless tapes 19 are extended, adapted to serve as a support for the paper fed to the machine, which paper enters between the roll 14 and the wheels 17. A tape tightening roll 20 is mounted intermediately of the rolls 14 and 18 and at a lower level in the frame 10, engaging the tapes 19. The number of tapes 19 is determined by the maximum width of the paper to be treated in the machine and the spacing of the tapes. Extending longitudinally of the machine between the rolls 14 and 18 there are tape boards 21, one under and supporting each tape adjacent the level of the tops of the rolls 14 and 18 respectively, being slightly wider than the tapes, and their outer edge portions being formed with longitudinal V-shaped ribs 22, so that the paper will be frictionally retarded in a minimum degree when it engages with the faces of the boards. Friction wheels 17 similar to those first described are mounted to bear upon the roll 18.

A cleaning chamber 25 is formed in the machine, extending transversely of the frame immediately inward of the roll 18, and including sets of rolls and brushes as will be described. Immediately beyond and to the rear of the cleaning chamber 25 a third feed roll 26 similar to the one 18 is mounted on the frame, and spaced further to the rear from the cleaning chamber there is another plain roll 27, tape boards 28 being extended between the rolls 26 and 27, and a tape tightening roll 29 is mounted below and intermediate the rolls 26 and 27. Endless tapes 30 are engaged around the rolls 26, 27 and 29. Immediately adjacent and to the rear of the roll 27 another slightly larger feed roll 31 is similarly mounted, its larger size being designed to effect more rapid movement of stock in discharge. At the delivery end of the machine a final feed roll 32 of the same size as the one 31 is mounted, a set of tapes 33 being engaged around these two rolls and an intermediate tightening roll 34. The tapes 19, 30 and 33 are in alined series. A short distance inward of the first roll 14, an upper roll 35 is mounted transversely of the machine on brackets 36 set

upon the side members 11, and a similar roll 37 is mounted just beyond the roll 31 toward the delivery end of the machine. Around these two rolls there are engaged a series of endless strands 38 of cat gut, or other suitable material, their lower reaches passing adjacent or at the level of the tapes carried on the lower rollers and their upper reaches being supported by idler rolls 39. Suitably located friction rolls 17 may be mounted in engagement with the rolls 26 and 31.

The rolls 14, 18, 26, 27, 31 and 32 are all shorter than the distance between the side members 11 of the frame 10, and rolls 27 and 31 have grooved pulleys 40 thereon at one side of the frame by which they are belted together by round belt 41. The rolls 14 and 27 have sprocket wheels 42 thereon receiving chains 43 from sprockets 44 on counter shafts 45 in the lower part of the frame, these being driven from the motor 46.

A longitudinally arranged series of pedestals 47 are mounted on the upper edges of the side members 11, and in each there is revolubly mounted a vertical screw 48 having right hand threads at the lower part and left hand threads on the upper part, a hand wheel being provided at the top of each screw.

The pedestals have vertical guide-ways at their inner sides in which there are slidable bearing blocks 49 provided at their inner sides with step bearings 50 receiving respective shafts 51 of brush or feed rolls to be described. The blocks are threaded through their outer parts to receive the screws 48, there being one block on the upper part of each screw, and one on the lower part of each screw. By rotation of any screw 48 the blocks 49 thereon may be drawn together or separated, as required, both moving commonly from or toward an intermediate level. The outer sides of the pedestals are vertically slotted a distance, and each block has engaged in its outer side a hand set screw 52 extending through the outer slot of the pedestal and having a hand wheel thereon.

Seven pedestals are shown at each side of the machine, and in these are alternated feed rolls 53 and rotary cleaning brushes 54, each pedestal carrying two rolls or brushes of similar function, coacting on an interposed sheet when the machine is in use. There are four rolls and three brushes in each horizontal series, the brushes and rolls alternating. Mounted suitably in the bearing blocks of the brushes there are clearing rods 55 arranged to be engaged by the extremities of the bristles of the respective brushes so that dirt gathered thereon will be dislodged in rotation of the brush. The rods are over the upper brushes, and under the lower ones. The brushes are of slightly greater diameter than the diameter of the rolls 53, although this is not material as the brushes can always be adjusted independently for proper action on the paper to be cleaned. The bristles are preferably good hog bristles, a fairly heavy Siberian bristle of three-quarters of an inch length having been used with good effect, although it may be found desirable to vary the stiffness or use other materials to suit different kinds of materials cleaned. A substantial portion of the shafts 51 of all the brushes and rolls are exposed at the right hand side of the machine which is the side shown in Figure 1, and on these shaft ends there are provided grooved pulleys 60 in sufficient number to enable belting of the rolls and brushes as at 61 to rotate as desired. For this drive, two round belts 56—57 are shown running from suitable pulleys 58 on the counter shaft 45. Belt 56 is crossed between the counter shaft in order to enable operation of the upper set of brushes and rolls and the lower set in opposite directions so that their peripheries move in the same direction next the path of paper being cleaned. Idler pulleys 59 are mounted below the cleaner chamber, a little in advance of a direct line between the counter shaft 45 and the first rolls of the cleaning chamber. The counter shaft rotates clockwise as viewed from the right, which is the same as the direction of all the lower rolls and brushes in the machine. In order to effect better efficiency in the drive, the belt 56 is run from the top of its drive pulley 58 to the front side of the first upper brush pulley from below thence upward and rearwardly over this pulley to the last upper brush pulley, thence down and forwardly over a pulley 59, and thence to the drive pulley 58 again. The belt 57 is run from the bottom of the drive pulley 58 to the first lower brush pulley, thence to the rear lower brush and forward and downward around the idler 59 back to the drive pulley. The brushes and rolls are interconnected by short belts 61 in the upper and lower series so that all upper brushes and rolls turn counter clockwise and the lower series clockwise.

That is to say, the first and the last brush pulley 60 in each series is connected to the pulleys 60 on the next adjacent feed rolls by respective short belts 61 passing around only the two mutually adjacent pulleys, while the central brush pulley 60 is connected by a similar belt 61 to a pulley 60 on the shaft of the next adjacent feed roll. On the shaft 51 of the first and last brushes in each series, therefore, there are three pulleys 60 in each instance, one to receive the belt 56 or 57 as the case may be, and two for the respective belts 61 to next adjacent feed rolls, while one of the inner feed rolls in each series has two pulleys 60, one by which it is belted to the outer brush, and the other by which it is belted to the inner brush. The other feed rolls and the central brush have but one pulley 60 on their respective shafts. In this way, removal of any of the brushes or rolls from its series will involve the removal of only simple short belts, all easily accessible immediately at the pulleys, except in the case of one of the outer brushes where a simple loop of the belt 56 or 57 is to be manipulated. The replacements of the belts in no instance require twisting or peculiar tortuous arrangement, so that there is a minimum liability of incorrect replacement.

The enclosure of the cleaning chamber consists of the bottom pan 65, having an air inlet port 66 at the left hand side, opening through the bottom 67 of this pan. The bottom is apertured to pass the belts 56 and 57 with a moderate clearance. The ends of the pan have upward extensions 68 close beside the bearing blocks 49, and front and rear side walls 69 are extended upwardly between the rolls 18 and 53, and 26 and 53 respectively. These walls have outwardly turned edges or lips 70 which may rest against or lie close to the gut strings 38 and 77 supporting the paper as it enters the cleaning chamber. The top section of the cleaning chamber comprises a hood 71 mounted and constructed with end and side walls to aline with those of the bottom pan, its end walls being slotted to receive the shafts of the rolls and brushes 53—54.

The gut-strings 38 pass over the hood, and are located at close intervals for some work. The hood has a top wall 72 through which there open a multiplicity of small flues 73, which may be ovate in cross section with the major axis

of the oval extending longitudinally of the machine. These flues are located at intervals of about four inches as heretofore practiced. The flues 73 lead through the bottom wall of a manifold T 74, from the upper side of which there leads a flue 75, in which a suction fan 76 may be located at a suitable point.

A number of endless gut strings 77 may also be engaged around the two rollers 18 and 26, and idler pulleys or rolls 18' and 26' below, the upper reaches of these guts extending through the cleaning chamber to support the lower side of paper passing therethrough. It may be found desirable in some cases to omit these strings, as the suction in the upper part of the cleaning chamber will tend to draw the paper upward against the gut strings 38 which will hold it in proper alinement.

Guide bars 78 are mounted at each side of the machine as required, arranged to engage the edges of sheets passing through the machine, to hold them properly in line with the rolls and brushes.

In the chamber 25 there are mounted manifold high pressure air pipes 79 running fore and aft or parallel to the path of the paper, there being four of these pipes, two being located at near each end of the chamber above and below the brushes 54. On these pipes are mounted jet nozzles 80 to discharge air from the pipes and projected toward the plane or path of paper passing through the machine. The ends of these nozzles are turned so as to direct air toward the paper and between the brushes and rolls at such inclination as to lift particles away from the paper at the upper side, and move such particles downwardly from the lower side of the paper, so that they may be carried readily to the flue 75 by the draft drawn outward by the fan 76. Air may be supplied to the pipes 79 by any suitable compressor device, not shown.

At the rear end of the machine, upper tape wheels 81 are mounted over the last roll 32, and tapes 82 may be extended from these wheels and the rolls 32 to any desired point where a "laboy" or other stacking or receiving device may be located.

In use, the motor 46 and fan 76 being in operation and the air jets 80 operated, paper is supplied to the cleaning machine by hand or machine by being entered between the roll 14 and the wheels 17. From there it quickly passes through the opening between hood and pan to the roll 35 whence it is carried between the tapes 19 and gut strings 38 to the cleaning chamber 25. Here it becomes engaged between the first two rolls 53 and is quickly passed between the brushes and succeeding rolls until it passes out of the cleaning chamber between the hood and bottom pan to the rolls 26 and tapes 30. The operation of the fan 76 draws air rapidly inward through the inlet port 66, while the jets 80 project air toward the paper between the brushes and rolls.

When a sheet is engaged entirely across the chamber 25, the air passes toward the right hand side of the machine, where it moves upwardly between the shafts 51 and to the flues 73 to the manifold 74 and conduit flue 75. The brushes quickly loosen any dust and dirt or loose particles on the paper, and the air passing through the chamber as described carries such matter with it, through flue 75, as will be readily appreciated.

I claim:

1. A paper cleaning machine comprising a casing, means to move thin paper web into, across and out of the casing including substantially continuous paper supporting means above and below the path of the paper in the casing, paper brushing devices therein arranged and including exceedingly attenuated and flexible paper surface engaging members to engage a moving sheet in the casing, means to exhaust air from the casing, and air inlet means to admit air to the casing in such location that an air current will be formed across the surface of paper moving through the machine, whereby the air current will entrain the detritus without passing through the web materially.

2. A paper cleaning machine comprising a casing, means to move thin paper web into, across and out of the casing, paper brushing devices therein arranged to engage a moving sheet in the casing, means to exhaust air from the casing and air inlet means to admit air to the casing whereby the air currents will entrain the detritus, said means to move the paper including means to move the paper through the case with one edge close to a side of the case and the opposite edge spaced from the opposite side of the case, the said inlet means being close to said first named side of the case and at the opposite side of the paper from the exhaust.

3. A paper cleaning machine comprising a cleaning chamber, a multiplicity of upper and lower opposed sets of feed rolls adapted to co-engage upon and feed paper between the sets, and alternated rotary brushes arranged to engage the paper between the rolls, means to rotate the rolls, and means to rotate the brushes in the same direction with the adjacent rolls at a higher speed, said rolls and brushes including mounting shafts projecting a materially greater distance at one end than at the other, the chamber having an end wall close to the brushes and rolls, and an opposite wall spaced a material distance from them, whereby to form a wide space for passage of air, said chamber having a bottom spaced below the rolls and brushes and having an air inlet port near the first named wall of the chamber, said chamber having an air outlet in its upper part and means to exhaust air through the outlet.

GEO. VAN WORMER.

DISCLAIMER

1,947,748.—*George Van Wormer*, Hamilton, Ohio. PAPER CLEANING MACHINE. Patent dated February 20, 1934. Disclaimer filed September 26, 1938, by the patentee.

Hereby enters this disclaimer to the part of claim 1 and claim 2 that relates to the paper brushing devices arranged to engage a moving sheet, except where the brushes are made of a fairly heavy hog bristle and are arranged to rotate in the direction in which the sheet is moving; and that part of claim 3 that relates to rotary brushes except where they are made of a fairly heavy hog bristle.

[*Official Gazette October 18, 1938.*]