

United States Patent

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1,689,668 10/1928 Gray..... 271/57 UX
 1,745,616 2/1930 Hansen..... 271/61
 2,016,711 10/1935 Ford..... 271/43 UX
 2,631,851 3/1953 Jones..... 271/62
 2,790,639 4/1957 Kilgariff..... 271/18

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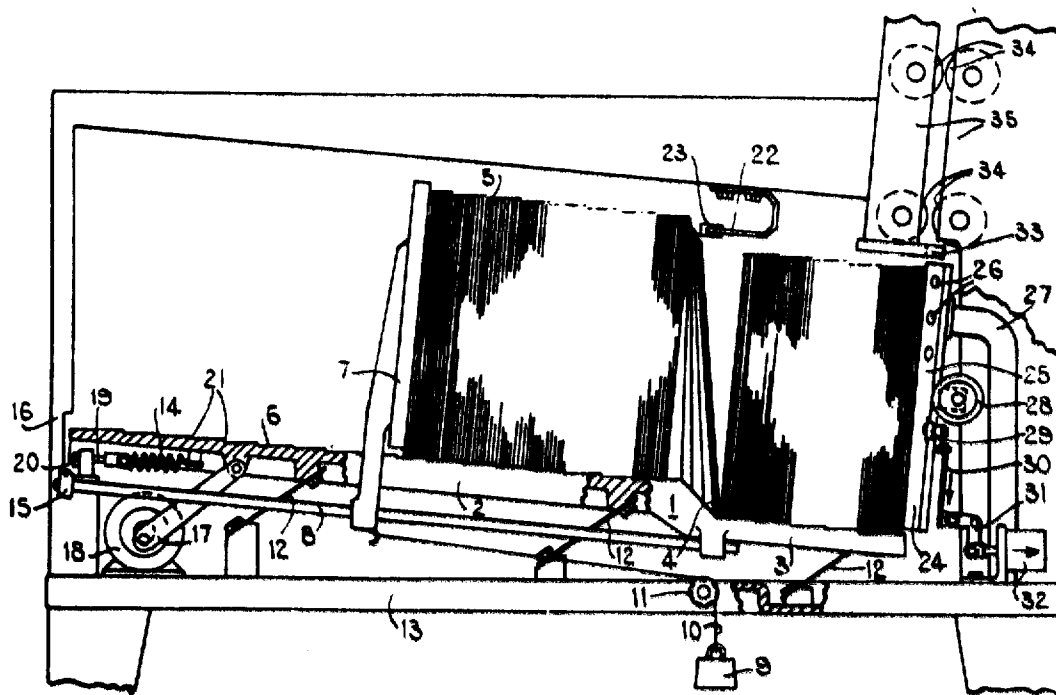
[54] DOCUMENT FEEDING APPARATUS 6 Claims, 1 Drawing Fig.

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 [51] Int. Cl. B65h 1/02
 [50] Field of Search 271/43 A,
 62 B, 26 E, 61

[56] References Cited UNITED STATES PATENTS

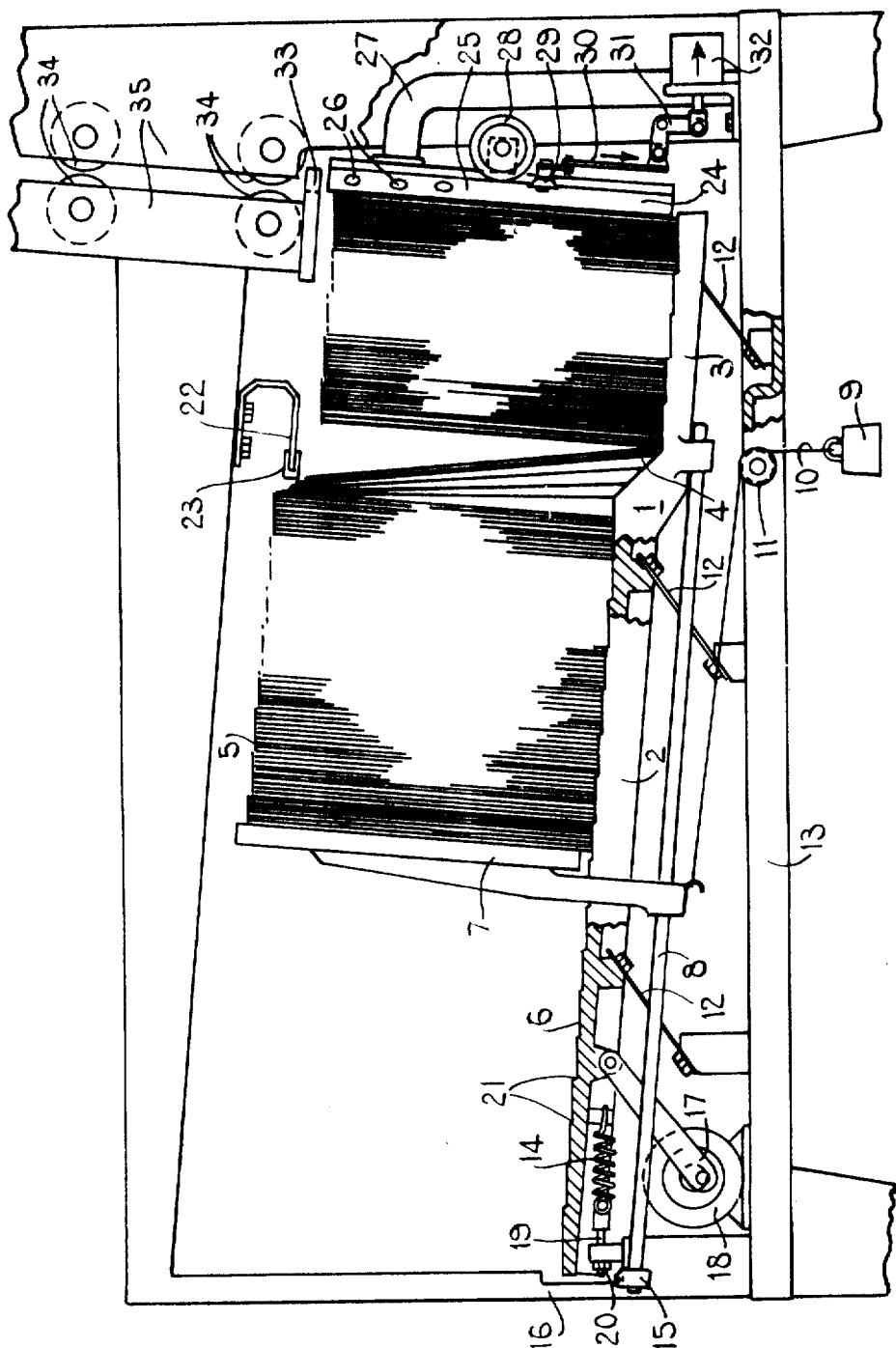
513,678 1/1894 Goss..... 271/84 UX

ABSTRACT: Apparatus is disclosed for feeding documents. The apparatus includes a feed bed having an upper and a lower part connected by a step. Documents are fed along the feed bed from the upper part to the lower part. Positioned above the step is a holdback member which engages the top edge of the leading document on the upper part of the feed bed. Thus the combined action of the step and the holdback member is to allow a trickle feed of documents from the upper to the lower part to maintain a substantially constant number of document on the lower part.



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DOCUMENT FEEDING APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to document feeding apparatus.

SUMMARY OF THE INVENTION

According to the present invention document feeding apparatus includes a feed bed for supporting documents on edge and having an upper part and a lower part with a step therebetween; means operable to feed documents, extending transversely of the direction of feed, along the feed bed from said upper part to said lower part; means operative to restrain movement in the direction of feed of the upper edge of a document while supported on the upper part and to permit movement of the upper edge of said document only when the lower edge of said document has descended at least below the upper part.

BRIEF DESCRIPTION OF THE DRAWING

The FIGURE shows a side elevation of a document feeding apparatus. DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing a document feed bed 1 includes an upper platform 2 and a lower platform 3 joined by a step 4 in the form of a downwardly sloping ramp. Documents 5 are supported on end on the upper surface 6 of the bed 1 and a conventional pressure plate 7 is freely movable along the feed bed 1 on a rod 8. The pressure plate is urged from left to right as shown in the drawing by a weight 9 suspended on a cord 10. The cord 10 passes over a pulley 11 and is secured to the pressure plate 7.

The entire feed bed 1 is supported on leaf springs 12 from a main base member 13. The springs 12 are inclined at an angle to the feed bed 1 and a further tension spring 14 is provided between the feed bed 1 and a lug 15 on the main frame 16 of the apparatus. The tension of the spring 14 is adjustable by a threaded rod 19 and a nut 20 on the lug 15. The feed bed 1 is vibrated on the supporting springs by a link 17 having an eccentric coupling to the shaft of an electric motor 18. The upper surface of the feed bed is lightly toothed, the teeth 21 acting as abutments to prevent substantial movement of the documents in opposition to the normal feeding movement, from left to right as shown in the drawing. To further assist the feeding movement, the feed bed 1 is inclined at a small angle to horizontal, the normal feeding movement being down the slope of the bed 1.

The main frame 16 extends above the feed bed 1 and document-restraining means consisting of a holdback arm 22 is carried by the frame 16 above the step 4 in the bed 1. The end of the holdback arm 22 carries a pad 23 of resilient material facing the direction from which documents are fed along the bed 1, and the arm 22 is proportioned and positioned so that the pad 23 is approximately above the junction of the upper platform 2 and the step 4 of the feed bed 1 and is separated from the surface 6 of the upper platform 2 by a distance slightly less than the height of a document. At the right-hand end of the feed bed 1, as shown in the drawing, a hollow block 24 forms an end wall to the bed. The block 24 forms the feeding member of a document-feeding arrangement substantially as described in detail in British Pat. application No. 23,215/65. Briefly, the block 24 has a bevelled edge 25 in which are formed apertures 26 communicating with the interior of the block 24. A pipe 27 is connected to the interior of the block 24 and is connected to a vacuum pump (not shown). A bevelled feeding roller 28 is set into the bevelled edge 25 of the block 24, and a gripper roller 29, actuated through a linkage 30 and a bellcrank lever 31 by a solenoid 32 is arranged selectively to hold the edge of a document 24 at the feeding face of the stack into frictional driving contact with the feeding roller 28, the edge of the document having been deformed

to lie along the bevelled edge 25 by the vacuum pressure introduced into the interior of the block 24. The feed roll 28 is rotated clockwise, as shown in the drawing, to feed the deformed document past a throat block 33 into conventional pairs of feeding rollers 34 spaced apart along a feeding channel formed by sideplates 35 secured to the main frame 16.

In operation documents are stacked on edge on the upper surface of the feed bed. The leading documents of the stack are arranged on the lower platform 3, the remainder of the documents being stacked on the upper platform 2. The vacuum pump is turned on and the document at the feeding face of the stack, the right-hand end as shown in the drawing, is deformed to bring its edge into contact with the bevelled surface 25 of the block 24. Energization of the solenoid 32 by a utilization device, such as a computer, for example, moves the gripper roller 29 towards the bevelled edge 25 to cause the deformed edge of the leading document to be fed by the feeding roller 28 vertically upwards out of the stack into the grip of the constantly rotating feed rolls 34. The document is then fed under control of the rolls 34 in the conventional manner to a work station (not shown) which is typically a document-reading station whose output is applied to the controlling utilization apparatus, for example, the computer.

As soon as the first document has been fed from the block 24, the solenoid 32 is deenergized and the gripper roller 29 moves away from the feeding roller 28. The next document, which is now at the feeding face of the stack is then deformed by the vacuum pressure and upon reenergization of the solenoid 32 is fed out of the stack in the manner described.

It will be seen that the documents on the lower platform 3 are fed successively from the feeding face of the stack. The documents on the upper platform are restrained by the action of the holdback member 22, the pad 23 of which engages the top edge of the leading document on the upper platform. Thus the action of the holdback member is to prevent the application of so great a pressure on the document to be fed out of the stack that the frictional engagement of the feeding roller 28 is unable to feed the document.

The documents on the lower platform 2 move down the slope of the platform as successive documents are removed from the feeding face of the stack. As these documents move along the lower platform 3, other documents from the upper platform 2 are allowed to slide down the step 4 under the influence of gravity. As the documents from the upper platform 2 descend the slope of the step 4, their upper edges are brought clear of the pad 23 on the holdback member 22 to fall into place behind the documents on the lower platform 3. Thus the combined action of the step 4 and the holdback member 22 is to allow a trickle feed of documents from the upper to the lower platform to maintain a substantially constant number of documents on the lower platform 3.

It will also be appreciated that yet another function of the holdback member 22 is to isolate the documents on the upper platform 2 from those on the lower platform 3. Thus, it will readily be seen that additional documents may be loaded onto the upper platform 2 while the feeding of documents from the lower platform 3 continues undisturbed. In this connection a further advantage of the holdback member becomes apparent. The pressure plate 7 is biased by the weight 9 to apply only sufficient pressure to the back of the document stack to support the documents and to urge them along the surface 6 of the upper platform 2. However, in loading a further supply of documents onto the upper platform, it is common for an operator to apply considerably greater pressure to the stack than would normally be applied by the pressure plate 7. If the upper and lower platforms were not isolated by the holdback member, this increased pressure would be transmitted through the entire stack of documents and would interfere with the correct feeding of documents by the feeding roller 28. If excessive pressure is applied to the stack on the upper platform in the present apparatus, the frictional engagement between the documents and the pad 23 of the holdback member 22 is increased to the point where documents are held on the upper

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platform 2 and cannot descend the step 4. Hence feeding of documents from the lower platform 3 is not disturbed.

Vibration of the feed bed 1 has been found to be effective in ensuring the constant movement of documents along the bed 1. The provision of the teeth 21 in the upper surface of the bed 1 is also of considerable help in preventing the expression of the stack, due, for example, to the presence in the stack of bowed documents, from influencing the smooth feeding of documents, in particular along the lower platform 3.

We claim:

1. Document feeding apparatus including a feed bed for supporting documents on edge and extending transversely of the feed bed, said feed bed including an upper part and a lower part and a step therebetween; means operable to feed documents along the feed bed from said upper part to said lower part; an abutment operative to isolate documents supported on the lower part from forces acting on documents supported on the upper part by engaging the leading face, adjacent its upper edge, of a leading document supported on the upper part of the feed bed and thereby being effective to restrain movement in the direction of feed of the upper edge of the leading document supported on the upper part and to permit movement of the upper edge of said document only when the lower edge of said document has descended the step

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from the upper part toward the lower part.

2. Document feeding apparatus as claimed in claim 1 in which the step of the feed bed consists of a ramp extending from the upper part to the lower part and sloping downwards in the direction of feed.

3. Document feeding apparatus as claimed in claim 2 in which the abutment is operative to permit movement of the upper edge of the leading document only when the lower edge of the leading document has descended substantially the whole of the ramp.

4. Document feeding apparatus as claimed in claim 1 in which the abutment includes a pad of resilient material positioned to engage the leading document.

5. Document feeding apparatus as claimed in claim 1 including means to vibrate the feed bed; and a plurality of abutments on said feed bed operative to engage the lower edges of documents to be fed to prevent movement of the documents on the feed bed in a direction opposite to the direction of feeding.

6. Document feeding apparatus as claimed in claim 1 including means for removing documents in succession from the lower part.

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