

SHEET FEED MECHANISM

FIELD OF THE INVENTION

The present invention relates to a mechanism for moving a stack of sheet material. In particular, the invention is a mechanism for lifting a stack of sheet media for feeding individual sheets into a feed path.

CO-PENDING APPLICATIONS

The following applications have been filed by the Applicant simultaneously with the present application:

11/482975	11/482970	11/482968	11/482972	11/482971
11/482969	11/482958	11/482955	11/482962	11/482963
11/482956	11/482954	11/482974	11/482957	11/482987
11/482959	11/482960	11/482961	11/482964	11/482965
11/482976	11/482982	11/482983	11/482984	11/482979
11/482990	11/482986	11/482985	11/482978	11/482967
11/482966	11/482988	11/482989	11/482980	11/482981
11/482953	11/482977			

The disclosures of these co-pending applications are incorporated herein by reference.

CROSS REFERENCES TO RELATED APPLICATIONS

Various methods, systems and apparatus relating to the present invention are disclosed in the following US Patents/ Patent Applications filed by the applicant or assignee of the present invention:

09/517539	6566858	6331946	6246970	6442525	09/517384	09/505951
6374354	09/517608	6816968	6757832	6334190	6745331	09/517541
10/203559	10/203560	10/203564	10/636263	10/636283	10/866608	10/902889
10/902833	10/940653	10/942858	10/727181	10/727162	10/727163	10/727245

10/727204	10/727233	10/727280	10/727157	10/727178	10/727210	10/727257
10/727238	10/727251	10/727159	10/727180	10/727179	10/727192	10/727274
10/727164	10/727161	10/727198	10/727158	10/754536	10/754938	10/727227
10/727160	10/934720	11/212702	11/272491	10/296522	6795215	10/296535
09/575109	6805419	6859289	6977751	6398332	6394573	6622923
6747760	6921144	10/884881	10/943941	10/949294	11/039866	11/123011
6986560	7008033	11/148237	11/248435	11/248426	10/922846	10/922845
10/854521	10/854522	10/854488	10/854487	10/854503	10/854504	10/854509
10/854510	10/854496	10/854497	10/854495	10/854498	10/854511	10/854512
10/854525	10/854526	10/854516	10/854508	10/854507	10/854515	10/854506
10/854505	10/854493	10/854494	10/854489	10/854490	10/854492	10/854491
10/854528	10/854523	10/854527	10/854524	10/854520	10/854514	10/854519
10/854513	10/854499	10/854501	10/854500	10/854502	10/854518	10/854517
10/934628	11/212823	10/728804	10/728952	10/728806	6991322	10/728790
10/728884	10/728970	10/728784	10/728783	10/728925	6962402	10/728803
10/728780	10/728779	10/773189	10/773204	10/773198	10/773199	6830318
10/773201	10/773191	10/773183	10/773195	10/773196	10/773186	10/773200
10/773185	10/773192	10/773197	10/773203	10/773187	10/773202	10/773188
10/773194	10/773193	10/773184	11/008118	11/060751	11/060805	11/188017
11/298773	11/298774	11/329157	6623101	6406129	6505916	6457809
6550895	6457812	10/296434	6428133	6746105	10/407212	10/407207
10/683064	10/683041	6750901	6476863	6788336	11/097308	11/097309
11/097335	11/097299	11/097310	11/097213	11/210687	11/097212	11/212637
11/246687	11/246718	11/246685	11/246686	11/246703	11/246691	11/246711
11/246690	11/246712	11/246717	11/246709	11/246700	11/246701	11/246702
11/246668	11/246697	11/246698	11/246699	11/246675	11/246674	11/246667
11/246684	11/246672	11/246673	11/246683	11/246682	10/760272	10/760273
10/760187	10/760182	10/760188	10/760218	10/760217	10/760216	10/760233
10/760246	10/760212	10/760243	10/760201	10/760185	10/760253	10/760255
10/760209	10/760208	10/760194	10/760238	10/760234	10/760235	10/760183
10/760189	10/760262	10/760232	10/760231	10/760200	10/760190	10/760191

10/760227	10/760207	10/760181	10/815625	10/815624	10/815628	10/913375
10/913373	10/913374	10/913372	10/913377	10/913378	10/913380	10/913379
10/913376	10/913381	10/986402	11/172816	11/172815	11/172814	11/003786
11/003616	11/003418	11/003334	11/003600	11/003404	11/003419	11/003700
11/003601	11/003618	11/003615	11/003337	11/003698	11/003420	6984017
11/003699	11/071473	11/003463	11/003701	11/003683	11/003614	11/003702
11/003684	11/003619	11/003617	11/293800	11/293802	11/293801	11/293808
11/293809	11/246676	11/246677	11/246678	11/246679	11/246680	11/246681
11/246714	11/246713	11/246689	11/246671	11/246670	11/246669	11/246704
11/246710	11/246688	11/246716	11/246715	11/246707	11/246706	11/246705
11/246708	11/246693	11/246692	11/246696	11/246695	11/246694	11/293832
11/293838	11/293825	11/293841	11/293799	11/293796	11/293797	11/293798
10/760254	10/760210	10/760202	10/760197	10/760198	10/760249	10/760263
10/760196	10/760247	10/760223	10/760264	10/760244	10/760245	10/760222
10/760248	10/760236	10/760192	10/760203	10/760204	10/760205	10/760206
10/760267	10/760270	10/760259	10/760271	10/760275	10/760274	10/760268
10/760184	10/760195	10/760186	10/760261	10/760258	11/293804	11/293840
11/293803	11/293833	11/293834	11/293835	11/293836	11/293837	11/293792
11/293794	11/293839	11/293826	11/293829	11/293830	11/293827	11/293828
11/293795	11/293823	11/293824	11/293831	11/293815	11/293819	11/293818
11/293817	11/293816	11/014764	11/014763	11/014748	11/014747	11/014761
11/014760	11/014757	11/014714	11/014713	11/014762	11/014724	11/014723
11/014756	11/014736	11/014759	11/014758	11/014725	11/014739	11/014738
11/014737	11/014726	11/014745	11/014712	11/014715	11/014751	11/014735
11/014734	11/014719	11/014750	11/014749	11/014746	11/014769	11/014729
11/014743	11/014733	11/014754	11/014755	11/014765	11/014766	11/014740
11/014720	11/014753	11/014752	11/014744	11/014741	11/014768	11/014767
11/014718	11/014717	11/014716	11/014732	11/014742	11/097268	11/097185
11/097184	11/293820	11/293813	11/293822	11/293812	11/293821	11/293814
11/293793	11/293842	11/293811	11/293807	11/293806	11/293805	11/293810
09/575197	09/575195	09/575159	09/575123	6825945	09/575165	6813039

6987506	09/575131	6980318	6816274	09/575139	09/575186	6681045
6728000	09/575145	09/575192	09/575181	09/575193	09/575183	6789194
6789191	6644642	6502614	6622999	6669385	6549935	09/575187
6727996	6591884	6439706	6760119	09/575198	6290349	6428155
6785016	09/575174	09/575163	6737591	09/575154	09/575129	6830196
6832717	6957768	09/575162	09/575172	09/575170	09/575171	09/575161

The disclosures of these applications and patents are incorporated herein by reference.

BACKGROUND OF THE INVENTION

Sheet material is typically supplied and stored in stacks. To use the individual sheets, they first need to be separated from each other. The paper feed systems in printers, scanners, copiers or faxes are a common examples of the need to sequentially feed individual sheets from a stack into a paper feed path. Given the widespread use of such devices, the invention will be described with particular reference to its use within this context. However, this is purely for the purposes of illustration and should not be seen as limiting the scope of the present invention. It will be appreciated that the invention has much broader application and may be suitable for many systems involving the handling of stacked sheet material.

Printers, copiers, scanners, faxes and the like, sequentially feed sheets of paper from a stack in the paper tray, past the imaging means (e.g. printhead), to a collect tray. There are many methods used to separate single sheets from the stack. Some of the more common methods involve air jets, suction feet, rubberized picker rollers, rubberized pusher arms and so on. In the systems that use a pick up roller or pusher arm, it is important to control the force with which the roller touches the top sheet of the stack to drive, push or drag it off the top. The friction between the top sheet and the pusher or roller needs to exceed the friction between the top sheet and the sheet

underneath. Too much force can cause two or more sheets to be drawn from the stack (known as 'double picks'), and too little will obviously fail to draw any sheets.

Sheet feed mechanisms should also be relatively simple, compact and have low power demands. For example, consumer expectations in the SOHO (Small Office/Home Office) printer market are directing designers to reduce the desktop footprint, improve feed reliability for a variety of paper grades while maintaining or reducing manufacturing costs.

SUMMARY OF THE INVENTION

Accordingly the present invention provides a sheet feed mechanism comprising:

- a chassis configured to support a stack of sheets;

- a top sheet engaging member for engaging the top-most sheet of the stack and moving it relative to the remainder of the stack;

- a stack engaging structure for engaging the stack and biasing its top sheet against the top sheet engaging member, the stack engaging structure having a friction surface extending parallel to the stack engaging structure's direction of travel;

- a lock mechanism mounted to the chassis for limited relative movement thereto, the lock mechanism having a biased contact foot for engaging the friction surface to secure the stack engaging structure to the lock mechanism for movement therewith; and,

- an actuator mounted to the chassis to disengage the contact foot from the friction surface such that the stack engaging structure moves relative to the lock mechanism to press the top-most sheet against the top sheet engaging, then the actuator disengages the contact foot such that it re-engages the friction surface and then moves the lock mechanism relative to the chassis such that the stack engaging structure also retracts a predetermined distance from the top-most sheet engaging member.

A sheet feed mechanism according to the invention has relatively few moving parts and can be embodied in a simple, yet compact arrangement. It requires only a single actuator for engaging the lock mechanism with the other elements being biased using non-powered integers such as springs. Therefore the sheet feed has a small power load on the printer or overall device. As the actuator always retracts the stack a set distance from the top sheet engaging member, the feeder works reliably with paper of different thicknesses.

Preferably the stack engaging structure has a resilient member to lift the stack such the top-most sheet of the stack is biased against the top sheet engaging member, the biasing force of the resilient member decreases as it elevates the stack, such that as the thickness and weight of the stack decreases, the biasing force likewise decreases and the top-most sheet is biased against the top sheet engaging member with substantially uniform force.

Preferably the actuator is a rotating cam. In another preferred form, the top-sheet engaging member is a rubberized picker roller that rotates to draw the top-most sheet from the stack.

Preferably the lock mechanism has a lock arm hinged to the chassis and a first class lever pivoted to the lock arm, the contact foot being on one side of the level and the other side of the lever being configured for engagement with the cam in order to lift the contact foot from the friction surface. In a further preferred form the chassis further comprises a stop formation formed proximate the cam, and the lock mechanism has a bearing structure fixedly mounted to the lock arm, the bearing structure having a bearing surface for abutting the stop, and the lock mechanism also having a resilient member between the bearing structure and the lever arm opposite the contact foot for biasing the contact foot into engagement with the friction surface. In a particularly preferred embodiment the first class lever is generally U-shaped with a first and second side arms separated by a cross piece, and the cam being positioned between the first and second side arms for engagement each

alternatively, wherein the first side arm forms the lever arm that actuates to contact foot to disengage the friction surface, and the second arm provides the bearing surface against which the can acts to push the lock arm and the stack engaging structure such that the stack retracts from the top-most sheet engaging member. In a specific embodiment the pivot is positioned near the first side arm end of the cross piece, the contact foot is positioned near the second side arm end of the cross piece, and the cam rotates such that any friction between the cam and the second side arm serves to urge the contact foot into engagement with the friction surface.

Preferably the stack engaging structure is a stack lifting arm hinged to the chassis along the same hinge axis as the lock arm. In a further preferred form the friction surface is an arcuate section having a centre of curvature on the hinge axis of the lifter arm and fixed for rotation therewith. In a particularly preferred embodiment the stack lifter arm and the arcuate section are mounted to, and spaced apart by, a shaft rotatably mounted to the chassis, the axis of the shaft being collinear with the hinge axis for the lifter arm and the lock arm, and the lifter arm being biased to lift the stack by a coil spring coiled around the shaft. Inserting the hinge shaft through the coil spring is an effective space saving technique. Likewise, configuring the lock arm and the lifter arm to rotate instead of move linearly allows the friction surface along the arcuate section to be shorter.

BRIEF DESCRIPTION OF THE DRAWINGS

Specific embodiments of the invention will now be described by way of example only with reference to the accompanying drawings in which:

Figures 1 to 5 is a diagrammatic illustration of one embodiment of the invention at various stages of its operation;

Figure 6 is a diagrammatic illustration of another embodiment of the invention;

Figure 7 is a perspective view of an inkjet printer and paper feed tray for use with the invention;

Figure 8 is a perspective of the printer shown in Fig. 1 with the paper feed tray and the outer housings removed to expose the components of the invention;

Figure 9 is a perspective of the invention shown in Fig 8 with the majority of the unrelated printer components removed;

Figure 10 is a perspective of the components of the present invention shown in Fig. 9 with unrelated components of the printer removed;

Figure 11 is an elevation showing the drive motor, lock arm and lock surface in isolation;

Figure 12 is the elevation of Fig. 11 at the fully unlocked stage of its operating cycle and with one side of the lock arm removed;

Figure 13 is the elevation shown in Fig. 11 at the re-locking stage of its operating cycle;

Figure 14 is a perspective of the drive motor, lock arm and lock surface at the fully unlocked stage of its operation;

Figure 15 is an elevation of one side of the lock arm and the lock surface in isolation; and,

Figure 16 is an elevation of the drive motor, lock arm and lock surface returned to the start of the operative cycle.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Figs 1 to 5 show one form of the sheet feed mechanism in a diagrammatic form for ease of understanding. The sheet feed mechanism 1 is typically used in a larger device such as a printer or the like and would likely have its chassis 2 integrated with that of the printer. The sheet feed mechanism 1 lifts the stack of sheets 4 to the picker roller 6 that draws a single sheet into the printer sheet feed path (not shown). Instead of a picker roller, the sheet feed mechanism could also lift the stack toward a suction shoe or other sheet engaging means.

Referring to Fig. 1, the stack 4 is inserted into the designated part of the device such as the paper tray of the printer (not shown) while the lift arm 8 is in a lowered position. The lift arm 8 is biased upwards by the lift spring 10 but is held in the lowered position by the lock mechanism 12. The lock mechanism 12 is at the distal end of the lock arm 14 which is hinged to the chassis 2 at the same hinge axis 16 as the lift arm 8. The lock mechanism releasably secures the lock arm 14 to the lift arm 8 via the friction surface 18. The lock mechanism 12 abuts the cam 20 to prevent the lock arm 14 and the lift arm 8 from rotating upwards because of the biasing force of the lift spring 10.

Referring to Fig. 2, the cam 20 rotates clockwise in response to a paper feed request signal from the printer. The cam 20 is positioned within a U-shaped member 22 of the lock mechanism 12. The U-shaped member 22 is hinged to the lock arm 14 at the hinge 24. The hinge 24 is on the cross piece 26 separating the engagement arm 28 and the disengagement arm 30 on either side of the 'U'. The contact foot 32 is attached to the cross piece 26 on the opposite side of the lock hinge 24 to the disengagement arm 30 to form a first class lever. Rotating the cam 20 clockwise uses the friction generated between the cam 20 and the engagement arm 28 to urge the contact foot 32 into firmer engagement with the friction surface 18. This helps to avoid any slippage between the contact foot and the friction surface before the cam 20 engages the disengagement arm 34. Slippage can allow the lift arm 8 to

press the top-most sheet 40 onto the picker roller 6 before other components in the printer feed path are ready to receive a sheet.

As the cam 20 rotates out of engagement with the engagement arm 28, the lift spring 10 pushes the lift arm 8, locking surface 18 and locking arm 14 upwards until the bearing surface 34 abuts the stop 36 on the chassis 2. The cam 20 continues to rotate until it contacts the disengagement arm 30. Further rotation presses the disengagement arm 30 towards the bearing surface 34 against the bias of the lock spring 38. This actuates the lever to lift the contact foot 32 out of engagement with the friction surface 18. This unlocks the lift arm 8 from the lock arm 14. This allows the lift spring 10 to elevate the stack 4 until the top-most sheet 40 engages the picker roller 6 and is drawn away from the remainder of the stack.

Referring to Fig. 3, the cam 20 continues to rotate and allow the lock spring 38 to push the disengagement arm 30 away from the bearing surface 34. This in turn re-engages the contact foot 32 with the friction surface 18 to lock the lock arm 14 and the lift arm 8 together. The picker roller 6 continues to draw the top-most sheet 40 from the stack 4.

Turning to Fig. 4, the cam 20 rotates into contact with the engagement arm 28 to add to the force with which the contact foot 32 presses onto the friction surface 18. At this point, the cam 20 also starts to push the engagement arm 28 and therefore the lock arm 14 and lift arm 8 clockwise against the bias of the lift spring 10. Accordingly, the stack 4 starts to drop away from the picker roller 6 before it draws the new top-most sheet 42 off the stack 4.

Fig. 5 shows the sheet feed mechanism at the completion of its operative cycle. The cam 20 rotates until the high point is in contact with the engagement arm 28. This pushes the lock arm 14 and the lift arm 8 back through a set angle of rotation. In turn, the sack 4 retracts from the picker roller 6 by a predetermined distance. This

distance does not alter regardless of the grade (or thickness) of paper in the stack. Because of this, the lift spring 10 need only compress a small amount and therefore the energy consumed by the mechanism as it indexes through the stack is reduced. Furthermore, as the stack 4 depletes, it weighs less but the spring 10 also decreases its force biasing the stack against the picker roller 6 because it is less compressed. This keeps the force pressing successive top-most sheets against the picker roller substantially uniform.

Fig. 6 is a diagrammatic illustration of another embodiment of the sheet feed mechanism 1. In this embodiment, the hinged lift arm is replaced with a lift structure 44 that has rectilinear movement instead of rotational. The friction surface 18 is on an arm that extends upwardly to be parallel with the direction of travel of the lift structure 44. The lock arm 14 is again hinged to the chassis 2 and has a bearing surface 34 with lock spring 38 to bias the contact foot 32 into locking engagement with the friction surface 18. The disengagement arm 30, lock hinge 24 and the contact foot 32 again form a first class lever.

The embodiment shown does not use a U-shaped member but instead configures the lock arm 14 to act as the engagement arm 28 as well. When the cam 20 contacts the engagement arm 28, it rotates anti-clockwise about the hinge 16. The contact foot 32 maintains locking engagement with the friction surface 18 because the spring 38 continues to bias the disengagement arm 30 in a clockwise direction despite the rotation of the engagement arm in an anti clockwise direction. In fact the bearing surface 34 rotating anti clockwise tends to maintain the gap bridged by the spring 38 so that the biasing force remains relatively uniform.

The embodiment shown in Fig. 6 demonstrates that the invention can adopt many different configurations to suit specific functional requirements and space limitations. Ordinary workers in this field will also appreciate that the cam may be replaced by the solenoid actuator or pneumatic/ hydraulic actuators. Any dual

action actuator that contacts the disengagement arm and the engagement arm in succession will be suitable for the purposes of this invention.

Fig. 7 shows the invention incorporated into a SOHO printer. The printer 46 has a paper feed tray 48 for receiving a ream of blank paper (not shown). The paper feed assembly in the printer draws sheets sequentially from the stack placed in the feed tray 48 and directs it then through a C-shaped paper path past a printhead. After printing the pages are collected from a collection tray (not shown) on top of the feed tray 48.

The lift arm 8 is positioned directly beneath the picker roller 6 with the distal end 50 of the lift arm positioned beneath the leading edge of the stack of sheets (not shown). Initially the lifter arm is held in a fully depressed configuration so that its distal end is flush with the paper support platen 52 in the feed tray 48. The lift arm 8 is forced into this initial position using the lift arm reset lever 54 described in greater detail below.

Turning to Fig. 8, the feed tray and outer housing have been removed for clarity. Again the lift arm 8 is in its lowered initial position so that the distal end 50 lies beneath the leading edge of the paper stack. Coil spring 10 biases the lifter arm upwards about the hinge shaft 16. However the lock mechanism (described below) holds the lifter arm in its initial position until the actuator responds to a request for a sheet.

In Fig. 9 more components of the printer have been removed to expose the lock mechanism. Hinge shaft 16 extends from the lifter arm 8 through the lock spring 10 to the locking assembly 56. On the outer most end of the hinge shaft 16 is the reset arm 58, which is connected to the reset lever 54 via the connector rod 60. The reset arm 58 is mounted to the hinge at shaft 16 via a ratchet engagement that locks the shaft and arm together when rotating clockwise that allows the arm to rotate anti-clockwise while the shaft remains fixed. In this way the user simply depresses the

lifter arm reset lever 54 to draw down the reset arm 58 and therefore the lifter arm 8 against bias of the spring 10.

Also shown in Fig. 9, is the cam drive motor 62 with its output worm drive 64 meshed with the drive gear 66 mounted on the cam shaft 68. One side of the lock arm 14 is also shown and this is described in greater detail below.

Fig. 10 shows the feed mechanism with further components removed for clarity. The lock arm 14 has two side plates 70 and 72 mounted to the hinge shaft 16. The distal ends of the side plates 70 and 72 are connected by the abutment block 74 positioned to abut the stop 36 secured to the printer chassis. Mounted between the side plates 70 and 72 is the arcuate friction arm 18 and the U-shaped member 22. The side plates 70 and 72 are rotateably mounted to the hinge shaft 16 while the arcuate friction arm 18 is fixed to the shaft 16.

Referring to Fig. 11, the cam 20 is shown between the sides of the U-shaped member 22. In response to a sheet feed request, the cam 20 starts rotating clockwise along the engagement arm 28. It will be appreciated that the contact foot is urged into engagement with the arcuate friction arm 18 by any friction between the cam 20 and the engagement arm 28. This is because the contact foot is between side plates 70 and 72 (not shown), to the right of the lock mechanism hinge 24. Of course the lock spring 38 also pushes the contact foot into locking engagement.

Fig. 12 shows the locking assembly in the unlocked condition. The locking assembly 56 is shown with the side plate 70 removed. The cam 20 has rotated to press against the disengagement arm 30 of the U-shaped member 22. The cam 20 initially pushes the entire assembly 56 such that it rotates into engagement with the stop 36. After engaging the stop 36 the cam then rotates the U-shaped member anti-clockwise about the lock mechanism hinge 24. This lifts the contact foot 32, or rather simply unweights it from the arcuate surface on the arcuate friction arm 18. With the arcuate friction arm now free to rotate it is urged in an anti-clockwise direction by

hinge shaft 16. Hinge shaft 16 is under the torque provided by the lifter spring 10 (see Fig. 10). Not shown in Fig. 12 is the elevation of the paper stack by the lifter arm 8 once the arcuate friction arm has been unlocked. The lift arm 8 continues to elevate the stack of paper until the top most sheet engages the picker roller 6.

Fig. 14 shows the locking assembly in its unlocked condition in perspective. The U-shaped member 22 is rotated about the lock mechanism hinge 24 such that the disengagement arm 30 compresses the lock spring 38 against the abutment block 74. The contact foot 32 is levered out the engagement from the arcuate friction arm 18 to allow the lift arm 8 (see Fig. 10) to raise the paper stack.

Fig. 13 shows the locking mechanism 56 as the U-shaped member returns to the lock position. The cam 20 continues to rotate clockwise and allows the U-shaped member 22 to also rotate under the action of the lock spring 38. It should be noted that at this stage abutment block 74 is still against the stop 36. Furthermore, the paper stack is still pressed against the picker roller, which would still be drawing the top most sheet from the stack.

The locked configuration of the U-shaped member 22 and the arcuate friction arm 18 is best shown in Fig. 15. It can be clearly seen that the disengagement arm 30, the lock mechanism hinge 24 and the contact foot 32 form a first class lever whereby the biasing force of the lock spring 38 is amplified at the contact foot 32 by virtue of the mechanical advantage provided by the lever.

Fig. 16 shows the locking assembly returned to its initial configuration. The cam 20 has rotated back into engagement with the engagement arm 28 to rotate the entire assembly 56 about the hinge shaft 16, a small distance away from the stop 36. As the arcuate friction arm 18 and the lock arm 14 are now locked together the hinge shaft 16 is forced to rotate by the cam shaft 20. This in turn rotates the lift arm 8 (see Fig. 10) then by retracting the paper stack a small distance from the picker roller 6. As the cam need only retract paper a very small distance from the surface

of the picker roller in order to prevent it from drawing more sheets from the stack, the power load on the cam drive motor 62 is relatively low. Furthermore, the distance that the stack retracts from the thicker roller will always remain uniform regardless of the grade of paper inserted in paper feed tray. This improves the versatility of the overall feed mechanism.

The invention has been described here by way of example only. Still workers in this field will readily recognise many variations and modifications, which do not depart from the spirit and scope of the broad invented concept.

CLAIMS:

1. A sheet feed mechanism comprising:

- a chassis for supporting a stack of sheets;
- a top sheet engaging member for engaging a top most sheet of the stack and moving the sheet relative to the remainder of the stack;
- a stack engaging structure for engaging the stack and biasing the top most sheet against the top sheet engaging member, the stack engaging structure being hinged to the chassis at a hinge axis, the stack engaging structure having a friction surface extending therefrom in a direction parallel to a locus of the stack engaging structure about the hinge axis;
- a lock mechanism mounted to the chassis, the lock mechanism having a lock arm attached to the hinge axis, and further having a biased contact foot for engaging the friction surface to retard a movement of the stack engaging structure about the hinge axis; and,
- an actuator for engaging and disengaging the contact foot from the friction surface.

2. A sheet feed mechanism according to claim 1 wherein the stack engaging structure has a resilient member to lift the stack such the top most sheet of the stack is biased against the top sheet engaging member, the biasing force of the resilient member decreases as it elevates the stack, such that as the thickness and weight of the stack decreases, the biasing force likewise decreases and the top-most sheet is biased against the top sheet engaging member with substantially uniform force.

3. A sheet feed mechanism according to claim 1 wherein the actuator is a rotating cam.

4. A sheet feed mechanism according to claim 1 wherein the top sheet engaging member is a rubberized picker roller that rotates to draw the top-most sheet from the stack.

5. A sheet feed mechanism according to claim 3, wherein the lock mechanism has a first class lever pivoted to the lock arm, the contact foot being on one side of the lever and the other side of the lever being configured for engagement with the cam in order to lift the contact foot from the friction surface.

6. A sheet feed mechanism according to claim 5, wherein the chassis further comprises a stop formation formed proximate the cam, and the lock mechanism has a bearing structure fixedly mounted to the lock arm, the bearing structure having a bearing surface for abutting the stop formation, and the lock mechanism also having a resilient member between the bearing structure and the lever opposite the contact foot for biasing the contact foot into engagement with the friction surface.

7. A sheet feed mechanism according to claim 6 wherein the first class lever is generally U-shaped with first and second side arms separated by a cross piece, and the cam being positioned between the first and second side arms for engagement each alternatively, wherein the first side arm forms the lever arm that actuates the contact foot to disengage the friction surface, and the second arm provides the bearing surface against which the cam acts to push the lock arm and the stack engaging structure such that the stack retracts from the top-most sheet engaging member.

8. A sheet feed mechanism according to claim 7 wherein the point of pivot of the first class lever is positioned near the first side arm end of the cross piece, the contact foot is positioned near the second side arm end of the cross piece, and the cam rotates such that any friction between the cam and the second side arm serves to urge the contact foot into engagement with the friction surface.

9. A sheet feed mechanism according to claim 1 wherein the friction surface is an arcuate section having a centre of curvature on the hinge axis and fixed for rotation therewith.

10. A sheet feed mechanism according to claim 10, wherein the stack engaging structure is biased to lift the stack by a coil spring coiled around the shaft.