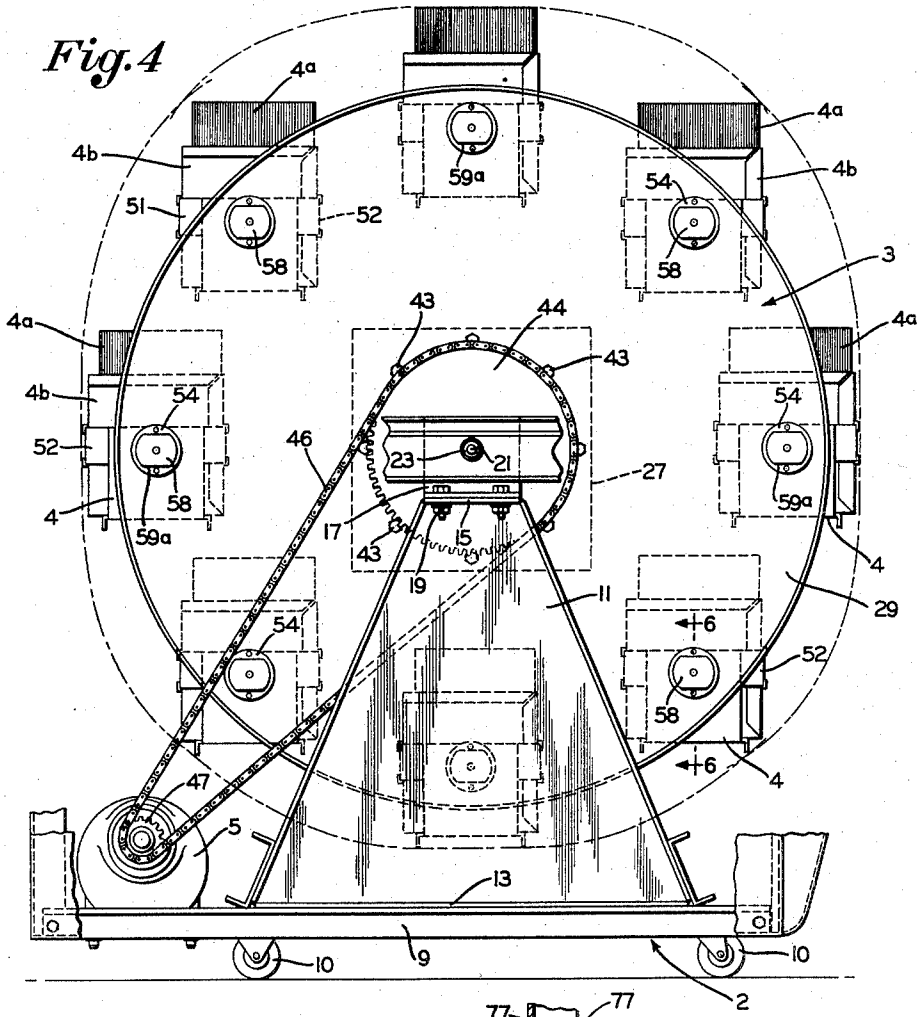
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ROTARY FILING APPLIANCE

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Fig. 4



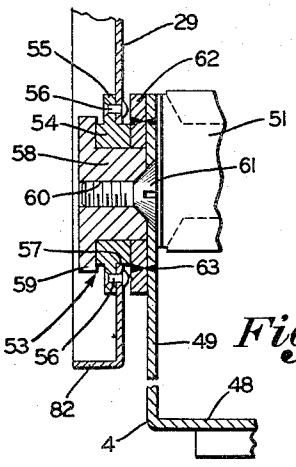


Fig. 6

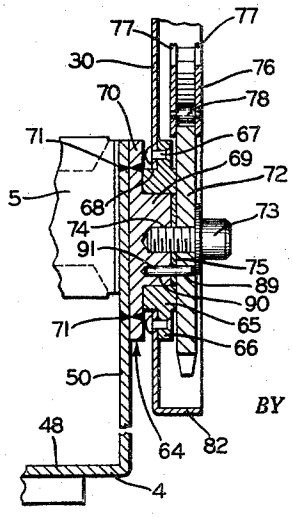


Fig. 7

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ROTARY FILING APPLIANCE

Filed Sept. 30, 1957 4 Sheets-Sheet 2

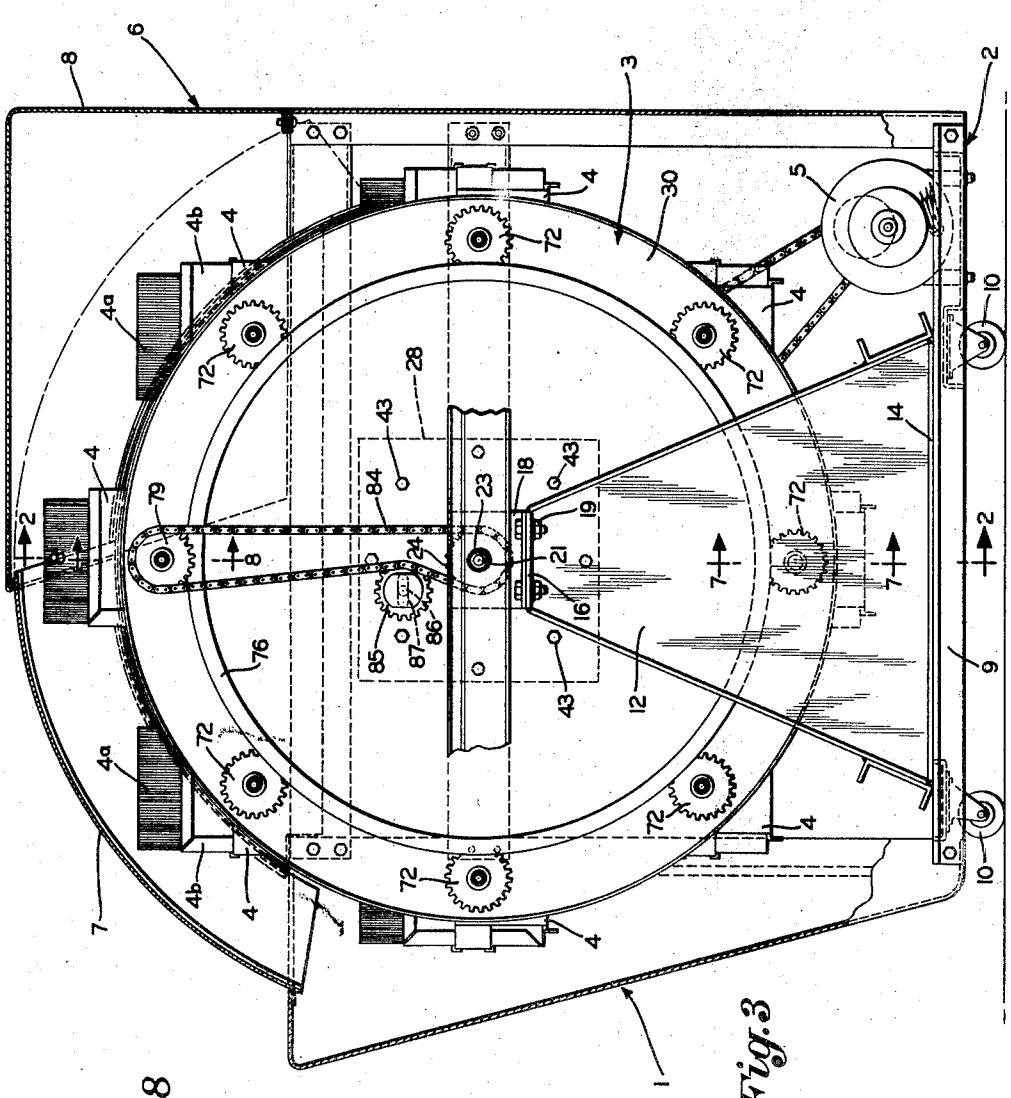


Fig. 3

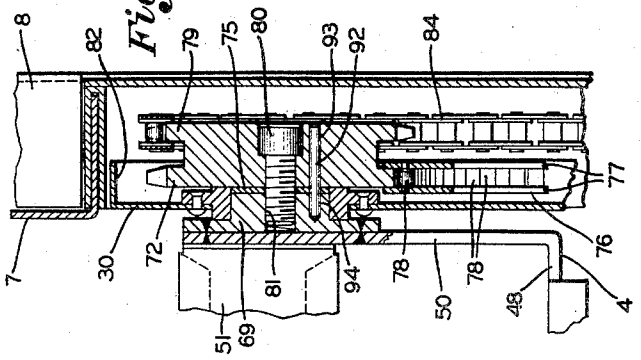


Fig. 8

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ROTARY FILING APPLIANCE

Filed Sept. 30, 1957 4 Sheets-Sheet 3

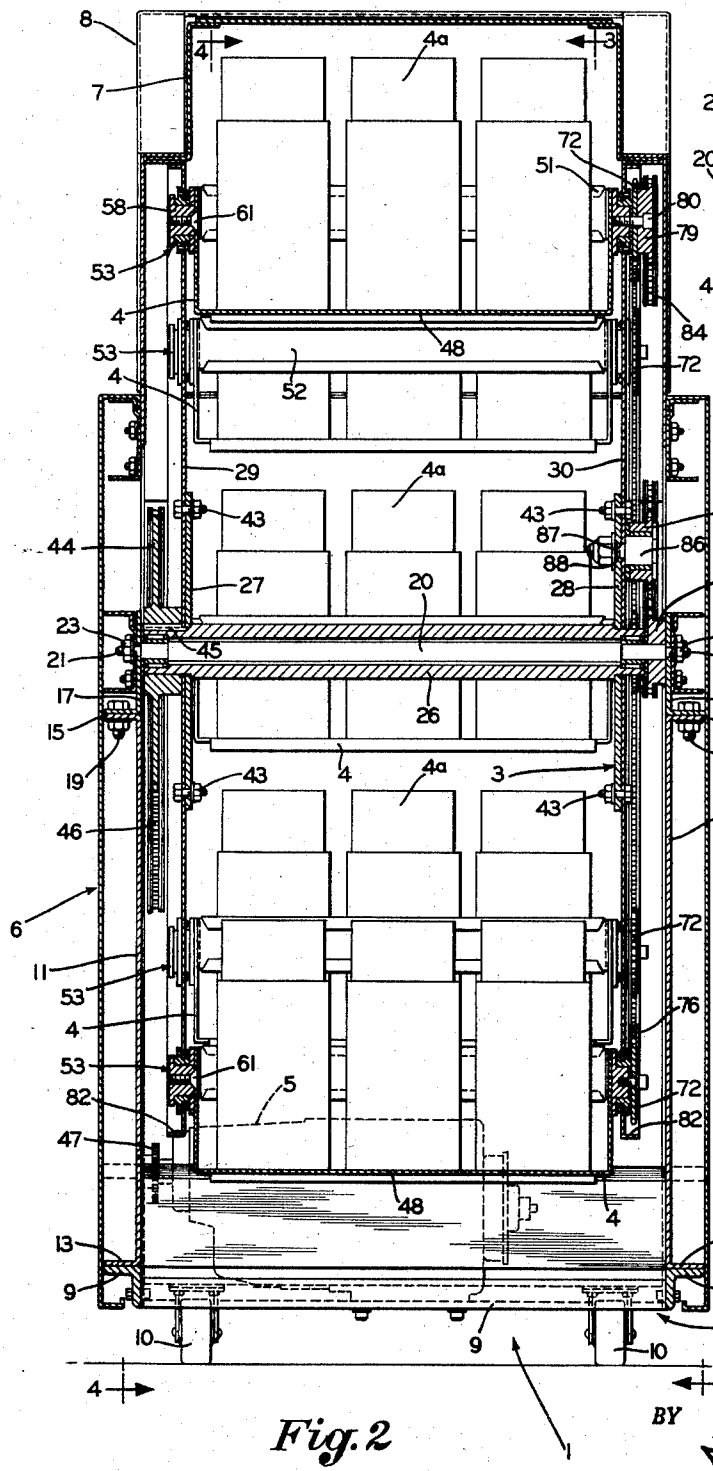


Fig. 2

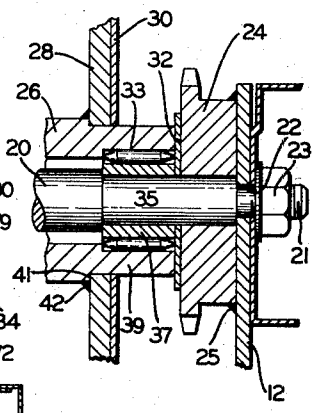


Fig. 9

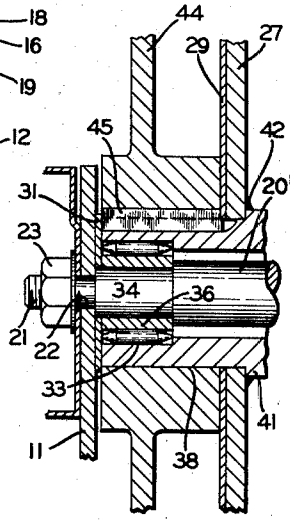


Fig. 10

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ROTARY FILING APPLIANCE

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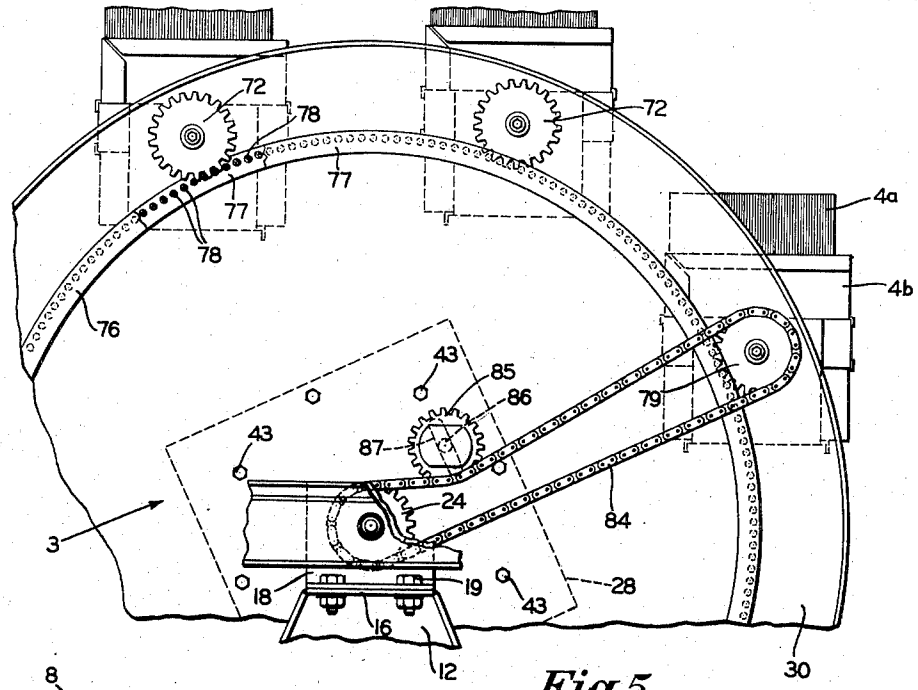


Fig. 5

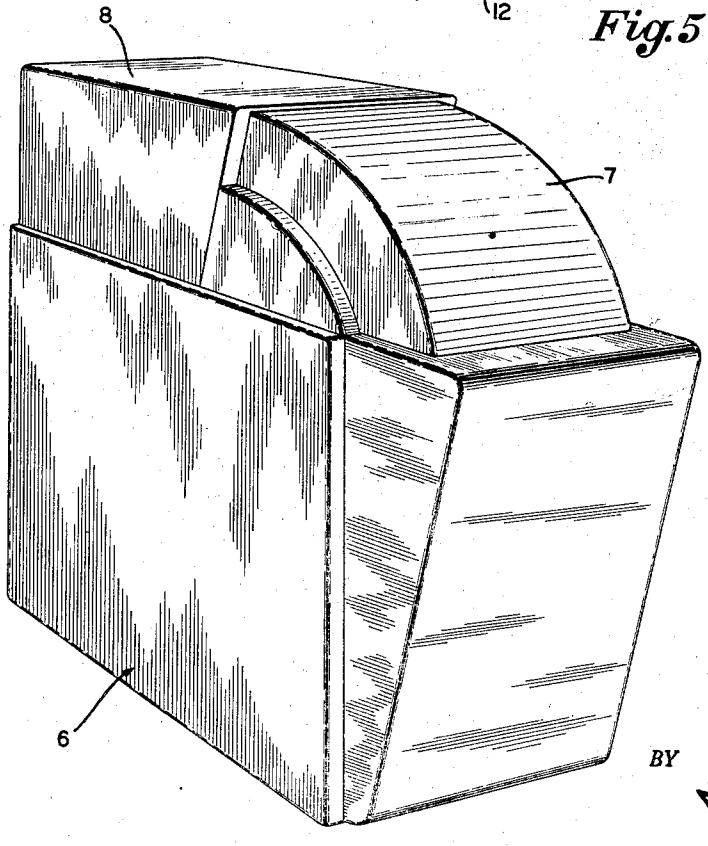


Fig. 1

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United States Patent Office 2,856,254 Patented Oct. 14, 1958

2,856,254

ROTARY FILING APPLIANCE

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Application September 30, 1957, Serial No. 687,118

12 Claims. (Cl. 312—266)

The invention relates to filing appliances, and more particularly to a filing appliance having a rotor carrying a plurality of card-holding trays that are positively maintained in horizontal position and against tilting at all times; and also to such a filing appliance having a compact arrangement of parts occupying a minimum of floor space for a maximum capacity of cards preferably filed on end; and finally to such a filing appliance having mechanisms for making adjustments so as to achieve free operation, absolute stability, and maintenance of the trays in horizontal position, along with freedom from servicing during long periods of operation.

Rotary filing appliances of the "Ferris wheel" type have long been known, which include a plurality of card-holding trays arranged about a horizontal axis for movement through an orbit of travel so that the trays may be successively presented at an accessible opening in the housing of the appliance. In certain prior filing appliances the trays are swingably mounted on carriers with a normally horizontal position sought to be maintained by gravity. However, unbalanced loading of the trays in these prior rotary files may cause the trays to swing out of normal horizontal position, which can result in interference between or jamming of the trays during rotation of the file.

Other prior Ferris wheel type rotary files have been proposed having an individual gear train for each tray in driving engagement with a common gear intended to hold the trays in horizontal position at all times. However, in order to operate satisfactorily, similar gears in each gear train must be absolutely identical and must be assembled and maintained without backlash or wear. Thus, the design, construction and maintenance of such an arrangement is so critical as to be impractical.

Another prior type of rotary file has included a continuous chain extending over and between sprocket gears mounted on the axes of rotation of the trays and also over a fixed sprocket intended to provide stabilization. However, such chain stabilizer arrangements are not effective in achieving absolute horizontal stability for the trays and absolute united or synchronous movement of the trays because of stretching, sagging, and backlash which develop in a chain drive resulting in faulty operation and requiring constant adjustment and maintenance, and frequent replacement of worn or stretched parts.

Furthermore, prior rotary files of the general type to which the present invention relates have not had any provisions for low friction bearing mounts journalling the trays on the rotor coordinated with adjustment means for establishing an exact relationship between each tray and the stabilizing control for the trays which may be adjusted during final assembly of the rotary file so as to achieve free operation, absolute stability, maintenance of the trays in horizontal position, and freedom from servicing during long periods of operation.

Finally, another difficulty encountered in the construction of prior rotary filing appliances is the extra floor space occupied beyond the ends of the trays and rotor for

housing the drive, stabilizer parts and rotor support. This disadvantage of prior files has substantially reduced the number of cards which may be filed in a given unit of floor space.

Accordingly, it is a general object of the present invention to provide a novel and improved rotary filing appliance construction of the type described which eliminates the indicated disadvantages of prior rotary card files of the same general type.

It is another object of this invention to provide an improved rotary card file which includes a mechanism for positively maintaining the several card trays in an absolutely horizontal, non-tilted position at all times regardless of tray loading.

It is another object of this invention to provide an improved rotary card file in which a minimum of maintenance and servicing is necessary during the life of the filing appliance.

It is another object of this invention to provide an improved rotary card file in which each card tray is engaged with a rigid control ring in a permanent manner and is maintained in fixed position with respect to other similar trays, and in which the engagement between the rigid control ring and trays mounts and supports the rigid control ring.

Still another object of this invention is to provide an improved rotary card file in which the card trays are maintained in a level horizontal position by a driving connection between one tray and a fixed member.

Still another object of this invention is to provide an improved rotary card file in which the card trays are maintained horizontal at all times and are synchronized with respect to each other and to the movement of the appliance about its central axis of rotation.

Also, it is an object of the present invention to provide an improved rotary card file of the type described having adjustment means for initially establishing an exact relationship between each tray and the stabilizing control for the trays so that upon establishing such relationship, the file may be operated during long periods of time without further adjustments or maintenance.

Also, it is an object of the present invention to provide a rotary card file of the type described with improved bearing means journalling the trays on the rotor for free and stable operation without servicing during long periods of time.

Moreover, it is an object of the present invention to provide an improved rotary card file having a compact arrangement of rotor supports, rotor drive, tray control and stabilizer means, and mounting means of the trays on the rotor so that a minimum floor space is occupied thereby beyond the requirements of the effective filing space in the trays.

Also, it is an object of the present invention to provide an improved rotary card file including chain means in its drive and stabilizing system in which chain stretch does not affect the positive maintenance of all of the trays in horizontal position or result in deviation from united or synchronous movement of the trays.

Also, it is an object of the present invention to provide an improved rotary card file construction whose proper operation with the trays in horizontal position at all times is unaffected by unbalanced loading of the trays so as to avoid interference between or jamming of the trays as they travel in an orbit during rotation of the file.

Finally, it is an object of this invention to provide a novel and improved rotary card filing appliance which accomplishes the foregoing objects and desiderata in a simple, effective, and inexpensive manner.

These and other objects and advantages apparent to those skilled in the art from the following description and claims may be obtained, the stated results achieved

and the described difficulties overcome by the discoveries, principles, apparatus, parts, combinations, subcombinations, and elements which comprise the present invention, the nature of which is set forth in the following statement, a preferred embodiment of which—illustrative of the best mode in which applicants have contemplated applying the principles—is set forth in the following description, and which is particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

The apparatus of the present invention may be stated in general terms as including a pair of spaced support members extending upwardly from a base, a preferably stationary horizontal shaft extending between and connected to the support members at opposite ends of the shaft, a rotary carrier having a pair of spaced circular rotatable disks mounted on the shaft between the support members forming a spool-like rotor, a series of card trays rotatably mounted on and between the circular disks preferably at equally spaced intervals around the peripheral portion thereof, each tray being provided with an identical first sprocket mounted on the rotating axis thereof, control ring means in driving engagement with and supported and mounted on said first sprockets, one of said trays also being provided with a second sprocket, a stationary third sprocket identical with said second sprocket mounted in fixed rotation to the support members and shaft and having the sprocket axis aligned with the axis of the horizontal shaft, a continuous chain in driving engagement with the second and third sprockets so that rotation of the rotary carrier on the horizontal shaft by a drive motor operatively connected to the rotary carrier positively maintains the trays in a horizontal position at all times, through the actuation of the chain connected second and third sprockets and the interrelated control ring means.

By way of example, a preferred embodiment of the apparatus of the present invention is shown in the accompanying drawings, wherein:

Figure 1 is a perspective view of the rotary filing appliance showing the outer housing thereof:

Fig. 2 is a vertical axial sectional view taken on the line 2—2 of Fig. 3;

Fig. 3 is a vertical transverse sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is an elevational view taken on the line 4—4 of Fig. 2 on the side of the file opposite that of Fig. 3 and omitting the outer housing;

Fig. 5 is an enlarged fragmentary view of a portion of the rotary carrier showing an alternate position of the control chain;

Fig. 6 is an enlarged fragmentary sectional view taken on the line 6—6 of Fig. 4;

Fig. 7 is an enlarged fragmentary sectional view taken on the line 7—7 of Fig. 3;

Fig. 8 is an enlarged fragmentary sectional view taken on the line 8—8 of Fig. 3; and

Figs. 9 and 10 are enlarged fragmentary sectional views of the mounting of the stationary shaft on the support members and of the rotor on the shaft.

Similar numerals refer to similar parts throughout the drawings.

In Fig. 2 a filing appliance is generally indicated at 1. It includes a base and support frame generally indicated at 2, a rotor or rotary carrier generally indicated at 3 mounting a plurality of card trays 4, and a drive means or reversible motor 5.

The assembly including the frame 2, the rotary carrier 3, the trays 4, and the motor 5 is enclosed within an exterior housing or cabinet generally indicated at 6 (Fig. 1). The housing preferably includes an arcuate-shaped movable hood 7 which is shown in the closed position in Fig. 1, and which is retractable into a rear portion 8 of the housing in order to provide an opening for access to file cards 4*a* (Figs. 4 and 5) or other material filed in the various trays 4. Inasmuch as the particular housing illustrated does not constitute a part of the present invention and because various types of suitable cabinets may be used to house the trays and supporting mechanism therefor, the housing 6 is not shown in all of the views of the drawings.

The support frame 2 includes a rectangular base preferably having four angle members 9 secured together at their extremities. The members 9 are mounted on four casters 10 so that the appliance may be readily moved from one location to another. The support frame 2 also includes a pair of spaced support members 11 and 12, the lower ends of which are provided with outturned flanges 13 and 14, respectively, mounted on the base angle members 9 in a conventional manner. The upper ends of members 11 and 12 are provided with flanges 15 and 16, respectively, to which similar brackets 17 and 18, respectively, are bolted by bolts 19.

The support frame 2 also includes a shaft 20 horizontally disposed between the brackets 17 and 18. The shaft 20 is rigidly secured to the brackets 17 and 18 at similar threaded end portions 21 extending through apertures 22 in the brackets where the end portions are retained by bolts 23. The shaft 20 forms a horizontal axis of rotation about which the carrier 3 turns when it is operated. A sprocket 24 is fixedly secured on the shaft adjacent the frame member 12 preferably by a weld 25 between the sprocket and the frame member 12.

The rotary carrier 3 includes a cylindrical member or pipe 26, a pair of spaced gusset plates or hub flanges 27 and 28, and a pair of spaced disk or rotor flange members 29 and 30. The pipe 26 extends between the sprocket 24 and the bracket 17 between which it is mounted for rotation around the shaft 20. Thrust washers 31 and 32, respectively, are disposed between the ends of the pipe and the bracket 17 and sprocket 18. The inner end portions of the pipe 26 are similarly reamed at 33. Likewise, the shaft 20 includes reduced portions 34 and 35 on which needle bearings 36 and 37, respectively, are mounted. The bearings 36 and 37 are disposed around the shaft 20 and within the reamed ends 33 of the pipe so that the pipe is free to rotate on the bearings about the shaft.

The pipe 26 also is provided with reduced end portions 38 and 39 providing shoulders 40 and 41, respectively. The gusset plates 27 and 28 are preferably welded at 42 on the ends of pipe 26 seated against the shoulders 40 and 41 so that the plates are parallel to each other and at a 90° angle to the axis of rotation of the rotor. Thus the assembly of the gusset plates 27 and 28 and the pipe 26 forms a spool-like rotor of rigid construction journaled on bearings 36 and 37 on shaft 20 for free rotation thereon.

The flange members 29 and 30 are centrally apertured and mounted on the pipe 26 adjacent the gusset plates 27 and 28, respectively. The disks and plates are secured together by bolts 43. In addition, a drive sprocket 44 is mounted on the reduced pipe portion 38 to which it is secured by a key 45 in the usual manner. As shown in Fig. 4, a sprocket chain 46 is disposed over and around the drive sprocket 44 and a sprocket 47 on the shaft of the motor 5 whereby the carrier 3 may be rotated in use.

Referring to Figs. 2 and 4, the trays 4 are disposed at equal intervals around the periphery of and between the spaced disks 29 and 30. Each tray 4 includes a bottom wall 48, opposite end walls 49 and 50, and opposite side straps 51 and 52 (Fig. 4) extending between the end walls. The trays 4 preferably support a number of removable card pans 4*b* in which the file cards 4*a* are stored.

Each tray 4 is journally mounted in and between aligned apertures in the disks 29 and 30 in special bearing means constructed for free rotation. One end of each tray 4 is provided with a bearing assembly generally indicated at

53 (Fig. 6) that includes an annular bearing hub 54 having a radial flange 55 secured to the disk 29 by preferably spaced rivets 56 around the aperture 57 in the disk 29 in which the bearing 54 is seated. The bearing assembly 53 also includes a flanged sleeve bearing 58 having an outer flange 59 seated against the outer end of the bearing 54, and having a center threaded bore 60 for receiving a central cap screw 61. The bearing flange 59 preferably has flat wrench-engaging surfaces 59*a* (Fig. 4) to enable the bearing 58 to be tightly clamped and locked to tray 4 when the screw 61 is tightened. The bearing assembly 53 also includes a thrust washer 62 between the hub bearing 54 and the tray end wall 49 to which the washer 62 is spot welded at 63.

The thrust washer 62 provides a socket into which the inner end of sleeve bearing 58 extends so as to accurately locate the bearing 58 with respect to the tray end wall 49 and to prevent relative movement therebetween when the bearing 58 is secured to the tray 4. The thickness of the thrust washer 62 is accurately formed so that an accurate axial spacing is provided between the outer face of the thrust washer 62 and the inner face of the sleeve bearing flange 59 to provide proper axial clearance between these faces and the end faces of the bearing hub 54 when the sleeve bearing 58 is assembled to the tray 4 and the tray mounted on the rotary carrier 3.

This bearing construction for the bearing assembly 53 accordingly provides extensive thrust and annular sliding bearing surfaces for the rotatable mounting of one end of the tray on the rotary carrier flange member 29. The particular construction of the bearing assembly 53, best shown in Fig. 6, thus functions without any repairs, adjustments or maintenance for long periods of time.

Each tray 4 is also mounted on the disk 30 by a bearing assembly generally indicated at 64 (Fig. 7) which includes an annular bearing hub 65 having a radial flange 66 secured to the disk 30 by spaced rivets 67 around an aperture 68 in which the bearing 65 is seated. The bearing assembly 64 also includes a sleeve bearing 69 having an outer flange 70 which is secured to the end wall 50 of the tray 4 by spot welds 71. The axes of rotation of the bearing assemblies 53 and 64 are aligned.

As shown in Fig. 7, a sprocket 72 forms part of each bearing assembly 64 by being secured to bearing 69 by a screw 73 which is seated in a threaded aperture 74 in the bearing 69. The assembly of the sprocket 72 and screw 73 with the side of the sprocket engaging the outer side of the annular bearing 65 retains the bearing 69 within the bearing hub 65. In addition the bearing assembly 64 includes an interior-exterior lock washer 75 clamped between the outer end of the bearing 69 and the sprocket 72, whereby the sprocket and bearing are secured in fixed relation to one another.

The particular construction of the bearing assembly 64 is also important. When the bearing 69, lock washer 75, and sprocket 72 are clamped tightly together by tightening the cap screw 73, an accurate axial spacing is provided between the inner face of the sprocket 72 and the outer face of the bearing flange 70 to provide proper axial clearance between these faces and the end faces of the bearing hub 65.

This construction of the bearing assembly 64 accordingly also provides extensive thrust and annular sliding bearing surfaces for the rotatable mounting of the other end of the tray on the rotary carrier flange member 30, and such construction also functions without any repairs, adjustments or maintenance for long periods of time. The axial length of bearing 69, as shown in Fig. 7, is shorter than the axial length of bearing hub 65 so as to provide a recess for receiving the interior-exterior lock washer 75.

The construction of the bearing assembly 64 has the further important feature of providing for relative rotative adjustment between sprocket 72 and bearing 69. Thus, in making final adjustments in the assembly of the

improved rotary file, cap screw 73 may be loosened and the necessary relation between sprocket 72 and bearing 69 established by relative rotation, whereupon the cap screw 73 is tightened to clamp the parts in adjusted position. This enables the tray 4 to be levelled and the teeth of the sprocket 72 oriented to the proper location for reasons to be hereinafter described.

All of the sprockets 72 have identical size and number and pitch diameter of sprocket teeth. As shown in Figs. 3 and 5, an annular member or control ring 76 is engaged by all of the sprockets 72 and is concentrically disposed with respect to the circle in which centers of the sprockets 72 lie, as well as the axis of rotation of the rotary carrier 3.

Accordingly, rotation of any one of the trays 4 about its axis of rotation drives the control ring a circumferential distance equal to the circumferential distance traversed by any point lying in the pitch line of the sprocket 72 for the particular tray 4 which is rotated. The control ring 76 being a rigid member transmits the same pitch line movement to all of the remainnig sprockets 72 engaged with the control ring 76. In this manner a parallel drive is provided from one tray to all of the other trays through the control ring so that each tray rotates at the same speed and for the same pitch line distance of its sprocket 72.

Referring to Figs. 3, 5, 7 and 8, the control ring 76 is formed of two spaced flat washer-like ring members 77 having a plurality of tooth pins 78 extending therebetween. The pitch line spacing of the control ring pins 78 is the same as the pitch line spacing of the teeth of sprockets 72.

Each of the sprockets 72, as shown is preferably formed from metal plate material so as to provide a uniform or predetermined thickness for the plate sprockets 72 at least adjacent the base of the sprocket teeth. This sprocket thickness is the same, with clearance, as the spacing between the spaced rings 77 of the control ring 76.

In assembling the rotary file, the sprockets 72 are located in driving engagement with the control ring 76 prior to securing the sprockets 72 to the bearing assemblies 64 of the trays. When the control ring 76 and sprockets 72 are in such driving engagement, all sprockets lie in the same plane and the outer periphery of each sprocket 72 below the base of the sprocket teeth is located between the two spaced rings 77 of the control ring 76 (Fig. 7). Likewise, the teeth of the sprockets 72 are engaged with the control ring pins at 78 at the pitch line.

It is important, however, in the final assembly to assure that the control ring pins 78 do not engage the base or root of the space between adjacent sprocket teeth because otherwise some force might be imparted to the control ring 76 to deflect it out of round.

In this manner, the sprockets 72 form the only and sole means of support and mounting for the control ring 76 which may be said to constitute a rigid floating ring positively transmitting an identical drive for and synchronous movement to each of the sprockets 72 when any one of said sprockets is moved or driven.

One of the trays 4 is provided with an additional sprocket 79 as shown in Figs. 3 and 8. The sprocket 79 may or may not be a separate member from the sprocket 72 adjacent which it is mounted; however, they must rotate in unison. As shown in Fig. 8, the sprockets 72 and 79 comprise an integral member attached to the bearing 69 by cap screw 80 seated within a threaded bore 81 therein. The sprocket 79 preferably has the same number of teeth and pitch line diameter as all of the sprockets 72. The sprocket 24 (Fig. 2) attached to the frame member 12 on the axis of rotation of the rotary carrier 3 must have the same number of teeth and pitch line diameter as the sprocket 79.

As shown in Figs. 3, 5 and 8, a continuous sprocket chain 84 extends over and between the sprockets 24 and 79. An adjustable idler sprocket 85 may also be

provided to compensate for chain stretch and to impart required tautness in the chain **84**. The idler sprocket **85** is mounted on a shaft **86** which extends through aligned slots **87** and **88**, respectively, in the disk **30** and the gusset plate **28** (Fig. 2). Thus the chain **84** may be mounted on the sprockets **24** and **79** and then the idler sprocket **85** brought into engagement against the chain to achieve the proper adjustment.

Referring particularly to Figs. 3 and 5, the chain connection or interlock between the fixed sprocket **24** and the sprocket **79** in fixed engagement with one of the trays **4** such as the top tray shown in Fig. 3 performs several important functions.

In the initial assembly, after the chain connection of chain **84** and sprockets **24** and **79** has been established, the cap screw **80** will be loosened (Fig. 8) and sleeve **69** and tray **4** rotatively adjusted with respect to sprocket **79** so that the tray is level in the horizontal position shown, after which the cap screw **8** is permanently tightened and so held in a manner to be later described. Thereafter, the particular tray to which sprocket **79** is attached is held in horizontal or level position at all times regardless of the rotated position of the rotary carrier **3**.

Referring to Figs. 3 and 5, if the rotor as shown in Fig. 3 is rotated clockwise, say approximately 60°, to the position shown in Fig. 5, the chain **84** wraps around the top of fixed sprocket **24** for a similar arcuate distance and unwraps from the right side of sprocket **24** to the same degree. The engagement of chain **84** with similar but rotatable sprocket **79** thus imparts rotative movement to that sprocket and its tray **4** connected thereto in a counterclockwise direction to the same degree, to positively maintain the tray **4** in the horizontal level position shown.

This operation proceeds during any rotation of the rotary carrier **3** in either direction. For instance, if the rotary carrier **3** makes one revolution in either direction, the tray **4** to which sprocket **79** is connected also rotates one complete revolution on its journaled mountings on the carrier disks **29** and **30**. During such one revolution of the rotary carrier, a segment of chain **84** advances or wraps around and a similar segment unwraps from stationary sprocket **24** for a distance equal to the pitch line circumference of the sprocket **24**.

If any stretch occurs in chain **84** during extended operation of the rotary file, it may be compensated for by the quick tightening adjustment of idler **85** in order that the tray **4** connected to sprocket **79** is positively maintained in a horizontal position at all times.

Meanwhile, movement of the tray **4** connected to sprocket **79** transmits identical movement through the control ring **76** to the sprockets **72** and the remaining trays **4** connected thereto so that all of the trays are maintained positively in a horizontal position at all times during and at all positions of rotation of the rotary carrier **3**.

The driving connection or control of synchronized movement of the various trays in a parallel arrangement through the rigid control ring **78** thus prevents any differential movement and cumulative effect thereof in the movement of the trays **4** during rotation of the carrier **3** which would occur were the series of trays **4** connected by a chain drive.

The trays **4** in being positively held in horizontal position at all times, also resist any tilting regardless of the nature of a force imparted to any tray tending to tilt the tray, as, for instance, unbalanced loading or pressure from some external object, such as the hand of an operator or book, ledger, or other similar object pushing against the tray.

When the trays **4** are finally assembled in place between the disks **29** and **30**, it is necessary to level each tray **4** in position and to fix that level position with the corresponding sprocket **72** after the several sprockets **72** have been mounted on the control ring **76**. For that purpose, as shown in Fig. 7, each tray with cap screw **73** or **80** loosened is leveled in position by placing a level on the bottom wall **48**. When a level position is attained, the cap screw **73** or **80** is tightened and aligned holes **89** and **90** are then drilled in the corresponding sprocket **72** and stud bearing **69**, respectively, and a split or lock pin **91** is then driven into the holes **89** and **90** to provide a permanent lock for such adjustment of the trays to horizontal position.

Whenever a sprocket **72** is mounted in place on its bearing assembly **64**, and screw **73** tightened, the internal-external lock washer **75** engages the surfaces of the bearing **69** and the sprocket **72**, thereby making these parts substantially integral so that any rotation of the tray **4** results in a corresponding rotation of the sprocket and vice versa; and when permanently adjusted, the pin **91** fixes and holds the parts thus engaged, locked as described.

In the assembly of the bearing **69** (Fig. 8) and the integral sprockets **72** and **79**, a split pin **92** also may be driven through aligned holes **93** and **94** drilled after the integral sprockets **72** and **79** have been properly aligned with the horizontal position of the tray **4** in the manner set forth above.

As shown in Figs. 2, 6, 7, and 8 the various bearing assemblies **53** and **64**, drive sprockets **72**, and control ring **76** are located within the confines of outturned peripheral flanges **82** provided on the carrier disks **29** and **30**. These flanges **82** are provided to impart rigidity to the disks **29** and **30**. At either side of the flanged disks **29** and **30**, only a very narrow space is occupied at one end of the carrier shaft **26** by the chain motor drive **44**, **46**, **47** for the rotary carrier **3** and at the other end for the chain connection between sprockets **24** and **79**. The pedestal support members **11** and **12** extend upward from the base members **9** immediately adjacent the chain drives, and the cabinet side walls are located immediately at the outer edges of the base angle members **9** and the flanges **15** and **16** at the top of the support members **11** and **12**.

Furthermore, referring to Figs. 6 and 7, the end walls **49** and **50** of the trays **4** are located closely adjacent the inner surfaces of the disks **29** and **30**. Thus, a minimum of floor space is occupied by the unit because of the close location of the cabinet side walls to the end walls of the trays **4**, permitting a maximum number of cards to be filed in the trays for a given unit of floor space.

In assembling the rotary carrier **3**, the various openings in the hub flange plates **27** and **28** are preferably drilled or otherwise formed in the same operation so as to insure alignment therebetween when the hub flanges are welded to the member **26**. Similarly the various openings in the disks **29** and **30** for receiving the bolts **43** and the various bearing assemblies are preferably punched on the same dies so as to establish exact alignment of the openings for receiving the bearing assemblies **53** and **64**.

The rotary filing appliance of the present invention thus provides an improved construction of the Ferris wheel type of rotary file in that a plurality of card holding trays is sustained in a horizontal position at all times, notwithstanding unbalanced loading of the trays. The means for maintaining the trays horizontally stable and against tilting includes a rigid control ring which operatively engages all of the trays rotating about their axes of rotation. The rigid control ring permits only synchronous movement of the trays and prevents any one tray from rotating except with the combined similar movement of all of the trays. The improved construction also includes a drive chain which stabilizes the movement of the control ring and trays and prevents movement of either except when the entire

assembly is rotated about the horizontal axis of rotation of the carrier.

In addition to the foregoing, the improved filing appliance has a compact arrangement of parts which occupy a minimum of floor space for a maximum capacity of cards and more specifically, the means for driving the appliance at the ends thereof are compactly arranged in a minimum amount of space.

Finally, the filing appliance includes low friction bearings for journally mounting the trays on the rotary carrier and during final assembly the horizontal position of the trays may be coordinated with the stabilizing control in a permanent manner with freedom from servicing and maintenance during long periods of operation.

In the foregoing description certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiments of the improved construction illustrated and described herein are by way of example, and the scope of the present invention is not limited to the exact details of construction shown.

Having now described the features, constructions and principles of the invention, the characteristics of the new rotary filing appliance, and the advantageous, new and useful results provided; the new and useful discoveries, principles, parts, elements, combinations, subcombinations, structures and arrangements, and mechanical equivalents obvious to those skilled in the art are set forth in the appended claims.

We claim:

1. In a filing appliance, a rotatable carrier having a pair of spaced disks mounted for rotation on a horizontal axis, a series of parallel file trays rotatably journaled on and extending between said disks, first sprocket means axially mounted on one end of each tray, all of said first sprocket means being similar and being disposed in one plane, rigid control ring means operatively engaging all of said first sprocket means, a second sprocket rotatably mounted on one of the disks and operatively connected for rotation in unison with at least one of said first sprocket means, a third fixed sprocket similar to said second sprocket axially mounted on said horizontal axis, and an endless stabilizing chain in driving engagement with the second and third sprockets, whereby the stabilizing chain and control ring means maintain the trays in horizontal position at all times and the control ring means synchronously drives all said first sprocket means in unison during rotation of the carrier.

2. In a filing appliance, a rotatable carrier having a pair of spaced disks mounted for rotation on a horizontal axis, a series of parallel file trays rotatably journaled on and extending between said disks, first sprocket means axially mounted on one end of each tray, all of said first sprocket means being similar and being disposed in one plane, a rigid control ring formed of two spaced washer-like ring members having a plurality of tooth pins extending therebetween, said first sprocket means each being engaged with the control ring between the ring members thereof and in driving engagement with the tooth pins, said sprocket means and control ring engagement supporting and mounting said control ring concentrically of said horizontal axis, a second sprocket rotatably mounted on one of the disks and operatively connected for rotation in unison with at least one of said first sprocket means, a third fixed sprocket similar to said second sprocket axially mounted on said horizontal axis, and an endless stabilizing chain in driving engagement with the second and third sprockets, whereby the stabilizing chain and control ring maintain the trays in horizontal position at all times and the control ring synchronously drives all of said first sprocket means in unison during rotation of the carrier.

3. In a filing appliance, a rotatable carrier having a pair of spaced disks mounted for rotation on a horizontal axis, a series of parallel file trays rotatably journaled on and extending between said disks, a first toothed sprocket axially mounted on one end of the tray, all of said first sprockets being disposed in one plane having the same number of teeth with identical pitch line diameters, a rigid control ring formed of two spaced flat washer-like ring members having a plurality of tooth pins extending therebetween, said control ring being engaged by said first sprockets between said ring members, said first sprocket teeth being in driving engagement with said tooth pins, said first sprocket and control ring engagement mounting the control ring concentrically of said horizontal axis and forming the sole support for said control ring on the appliance, a second sprocket rotatably mounted on one of the disks and operatively connected for rotation in unison with at least one of said first sprockets, a third fixed sprocket similar to said second sprocket axially mounted on said horizontal axis, and an endless stabilizing chain in driving engagement with the second and third sprockets, whereby the stabilizing chain and control ring maintain the trays in horizontal position at all times and the control ring synchronously drives all said first sprockets in unison during rotation of the carrier.

4. Filing appliance construction as defined in claim 3 in which the first sprockets have teeth with valleys therebetween, and in which clearance is provided between the bottoms of the valleys and the control ring pins when the control ring is in driving engagement with the first sprockets.

5. In a filing appliance, a rotatable carrier having a pair of spaced disks mounted for rotation on a horizontal axis, a series of parallel file trays rotatably journaled on and extending between said disks, a first sprocket axially mounted on one end of each tray, all of said first sprockets being similar and being disposed in one plane, rigid control ring means operatively engaging all of said first sprockets, a second sprocket rotatably mounted axially on one end of one tray, a third fixed sprocket similar to said second sprocket axially mounted on said horizontal axis, and an endless stabilizing chain in driving engagement with the second and third sprockets, whereby the stabilizing chain and control ring means maintain the trays in horizontal position at all times and the control ring means synchronously drives all said first sprockets in unison during rotation of the carrier.

6. In a filing appliance, a rotatable carrier having a pair of spaced disks mounted for rotation on a horizontal axis, a series of parallel file trays rotatably journaled on and extending between said disks, first sprocket means axially mounted on one end of each tray, all of said first sprocket means having similar first sprocket teeth disposed in one plane, rigid control ring means operatively engaging all of said first sprocket teeth, one of said first sprocket means having second sprocket teeth spaced from said first sprocket teeth, a third fixed sprocket having teeth similar to said second sprocket teeth axially mounted on said horizontal axis, and an endless stabilizing chain in driving engagement with the second and third sprocket teeth, whereby the stabilizing chain and control ring means maintain the trays in horizontal position at all times and the control ring means synchronously drives all said first sprocket means in unison during rotation of the carrier.

7. In a filing appliance, a rotatable carrier having a pair of spaced disks mounted for rotation on a horizontal axis, a series of parallel file trays rotatably journaled on and extending between said disks, stabilizing and control means maintaining the trays in horizontal position at all times during rotation of the carrier, and

bearing means rotatably journalling the ends of the trays on said disks, the bearing means at one end of each tray including a bearing hub mounted on one of the disks, a washer member fixed to one end of the tray providing an annular axial recess, a sleeve bearing detachably seated in said recess and having a flange spaced from said washer, and the sleeve bearing being journaled in said hub between said washer and flange.

8. In a filing appliance, a rotatable carrier having a pair of spaced disks mounted for rotation on a horizontal axis, a series of parallel file trays rotatably journaled on and extending between said disks, stabilizing and control means maintaining the trays in horizontal position at all times during rotation of the carrier, and bearing means rotatably journalling the ends of the trays on said discs, the bearing means at one end of each tray including a bearing hub mounted on one of the disks, a flanged sleeve fixed to one end of the tray, a sprocket detachably axially mounted on said flanged sleeve, means for rotatably adjusting said sprocket with respect to said sleeve, means for holding the adjusted sprocket and sleeve in adjusted position, and the hub being journaled on said sleeve between the sleeve flange and sprocket.

9. In a filing appliance, upstanding support members, a stationary shaft mounted on said support members having a horizontal axis; a rotatable carrier, the carrier including a tubular shaft journaled on said stationary shaft, hub plates mounted adjacent the ends of said tubular shaft, and a disk mounted on each hub plate; a series of parallel file trays rotatably journaled on and extending between said disks, stabilizing and control means maintaining the trays in horizontal position at all times during rotation of the carrier; and said stabilizing and control means including a sprocket fixed to one of said upstanding supports axially of said stationary shaft, a similar sprocket axially mounted on one of the trays, and a chain in driving engagement with said sprockets.

10. In a filing appliance, a rotatable carrier having a pair of spaced disks mounted for rotation on a horizontal axis, a series of parallel file trays rotatably journaled on and extending between said disks, each of said disks having an outturned peripheral flange, bearing means journalling the ends of said trays on said disks, said bearing means being located in the space between planes defined by the outer edges of said outturned disk flanges, first sprocket means axially mounted on one end of each tray within the confines of the outturned flange of one disk, all of said first sprocket means being similar and being disposed in one plane, rigid control ring means located within the confines of the outturned flange of said one disk and operatively engaging all of said first sprocket means, a second sprocket rotatably mounted on one of the disks and operatively connected for rotation in unison with at least one of said first sprocket means, a third fixed sprocket similar to said second sprocket axially mounted on said horizontal axis, and an endless stabilizing chain in driving engagement with the second and third sprockets, whereby the stabilizing chain and control ring means maintain the trays in horizontal position at all times and the control ring means synchronously drives all said first sprocket means in unison during rotation of the carrier.

11. In a filing appliance, a rotatable carrier having a pair of spaced disks mounted for rotation on a horizontal axis, a series of parallel file trays rotatably journaled on and extending between said disks, stabilizing and control means maintaining the trays in horizontal position at all times during rotation of the carrier, and

bearing means rotatably journalling the ends of the trays on said disks, first bearing means at one end of each tray including a bearing hub mounted on one of the disks, a washer member fixed to said one end of the tray providing an annular axial recess, a sleeve bearing detachably seated in said recess and having a flange spaced from said washer, the sleeve bearing being journaled in said hub between said washer and flange, second bearing means at the other end of each tray having a bearing hub mounted on the other of said disks, a flanged sleeve fixed to said other end of the tray, a sprocket detachably axially mounted on said flanged sleeve, means for rotatably adjusting said sprocket with respect to said flanged sleeve, means for holding the adjusted sprocket and flanged sleeve in adjusted position, and the hub being journaled on said flanged sleeve between the sleeve flange and sprocket.

12. In a filing appliance, first and second upstanding support members, a stationary shaft mounted on said support members having a horizontal axis; a rotatable carrier, the carrier including a tubular shaft journaled on said stationary shaft, hub plates mounted adjacent the ends of said tubular shaft, and a disk mounted on each hub plate; a series of parallel file trays rotatably journaled on and extending between said disks, stabilizing and control means maintaining the trays in horizontal position at all times during rotation of the carrier; and said stabilizing and control means including a sprocket fixed to said first upstanding support member axially of and adjacent one end of said stationary shaft, a similar sprocket axially mounted on one of the trays, and a chain in driving engagement with said sprockets; each of said disks having an outturned peripheral flange, bearing means journalling the ends of said trays on said disks, said bearing means being located in the space between the planes defined by the outer edges of said outturned disk flanges, sprocket means axially mounted on one end of each tray within the confines of the outturned flange of one disk, all of said sprocket means being similar and being disposed in one plane, rigid control ring means located within the confines of the outturned flange of said one disk and operatively engaging all of said sprocket means; said stabilizing and control means chain and said sprocket and similar sprocket engaged thereby being disposed in a zone closely adjacent the outer edge of the flange of one of the disks and between said disk and said second support member; means for rotating the carrier including a motor and a chain drive operatively connected between the motor and the tubular shaft adjacent the other end of said stationary shaft, and said chain drive being disposed in a plane closely adjacent the outer edge of the flange of the other disk and between said flange and said second support member, whereby the stabilizing chain and control ring means maintain the trays in horizontal position at all times and the control ring means synchronously drives all said first sprocket means in unison during rotation of the carrier, and whereby a maximum tray capacity occupies minimum floor space between said support members.

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