

MOVABLE STORAGE CABINET

The present invention relates to movable storage cabinets supported on wheels for movement along rails installed on a floor.

5 An already known movable storage cabinet has wheels journaled on its bottom so as to run freely along rails installed on the floor. When such cabinets are used, they can be moved as desired, and an access to the interior of the cabinets can be achieved by providing an opening
10 only in the front side of the cabinet, so that the cabinets can be juxtaposed in close succession to permit an efficient utilisation of the limited space within a compartment.

In the prior art arrangement, the underframe which
15 includes a movable mechanism, and the storage chamber are designed in interrelated manner. In other words, the underframe is specifically designed for a particular storage chamber. Thus, if a variety of sizes, in particular, of the frontage, are required for storage cabinets,
20 there must be designed a separate underframe for each of them. Additionally, an increased number of underframe parts is required for storage cabinets of a particular size, which results in a poor productivity of and a burdensome maintenance of parts.

25 The present invention provides a movable storage cabinet supported on wheels for movement along rails

installed on a floor, said cabinet comprising, in combination, an underframe including inverted channels forming saddles extending parallel to the depth of the cabinet, in spaced relation to each other, the flanges of said channels having aligned apertures for receiving wheel-bearing shafts; shafts engaged through said apertures; wheels mounted on said shafts to engage said rails and support said cabinet; and connection members, having a length sufficient to extend across the space between adjacent saddles, secured to opposite ends of adjacent saddles and interconnecting adjacent pairs of said saddles.

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

15 Figure 1 is a front view of a movable storage cabinet constructed according to one embodiment of the invention;

Figure 2 is a right-hand side elevation, partly cut away of the cabinet of Figure 1;

20 Figure 3 is an exploded perspective view of the underframe shown in Figure 1;

Figure 4 is a plan view of the underframe of Fig. 3 with the drive mechanism assembled therein;

25 Figure 5 is a front view of the underframe shown in Figure 4;

Figure 6 is a right-hand side elevation of the

underframe shown in Figure 4;

Figure 7 is an exploded perspective view of an underframe of another embodiment of the invention; and

Figure 8 is a cross section of a part of the
5 movable storage cabinet using the underframe of Fig.7.

Referring to Figures 1 and 2, a movable storage cabinet includes an underframe 2 on its bottom. A suitable number of stanchions 3 extends along the front and rear

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edges of the underframe 2 and along a transverse centerline which divides the depth of the cabinet. The stanchions are equally spaced crosswise or along the frontage of the cabinet. The upper ends of adjacent stanchions 3 are connected together by top plates 4, and the combination of the underframe 2, stanchions 3 and top plates 4 forms the overall frame of the cabinet 1. A suitable number of shelf plates 5 extend across adjacent posts or stanchions 3, and articles can be placed thereon. The shelf plates in the lowermost level are secured to the stanchions 3 to provide a reinforcement of the cabinet frame. Other shelf plates 5 rest on angular plates 6 which are engaged in and held by selected perforations formed in the sides of the stanchions 3, thereby permitting the vertical to be freely changed. A pair of side plates 7 are secured height of individual shelf plates 5 to the opposite sides of the cabinet 1 in spaced relationship from the three stanchions 3, which are located along each of the opposite sides, and from the opposite sides of the underframe so as to cover them. The cabinet 1 thus formed permits an access to articles from both the front and rear sides thereof.

As shown in Fig. 3, the underframe 2 comprises saddles 8 which extend in the direction of the depth of the cabinet, and connection members 9 which connect the front ends and the rear ends of adjacent saddles. Each saddle 8 is in the form of an inverted channel, and fixtures 11, having corner holes 10, are secured to the front end faces of each saddle 8 as by welding. Adjacent its opposite ends and centrally along the length thereof, the top wall of the saddle 8 is formed with holes 12 which are adapted to receive the stanchions 3. The sides of each saddle 8 are formed with holes 13 which receive the shaft of a drive wheel, intermediate

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axle holes 14, and holes 15 which receive the shaft of a follower wheel, proceeding from right to left in Fig. 3. Pairs of bearing mounting holes 16, 17 are spaced on the opposite sides of the holes 13, 14.

Each connection member 9 is channel-shaped, and, in principle, it has a length which is equal to the spacing between the transverse centerlines of adjacent saddles 8. However, the connection members which are used at the opposite ends of the frontage of the cabinet have an increased length which is, by one-half the width of a saddle 8, greater in length than that of the remaining connection members so as to entirely cover the end faces of the saddles located at the opposite ends of the frontage. The connection members 9 are located in facing relationship toward each other so that they are open to receive the front and rear ends of the saddles 8. The members 9 are engaged with the saddles 8 so that their opposite limbs bear against the top and bottom surfaces of the saddles 8. At its outer end, the upper limb of the connection member 9 which is located at one end of the frontage of the cabinet is formed with holes 18 which are to be aligned with holes 12 formed in the saddles 8 so as to receive the stanchions. The front wall or the bottom of the channel, of the connection member 9, is formed with holes 19 at its ends where it bears against the fixtures 11 so as to be aligned with holes 10 formed in the fixtures. By passing bolts 20 (Figs. 1 and 5) through the holes 19, 10, and threadably engaging nuts, not shown, with the bolts, the saddles and the connection members are fastened together to form the frame which represents the underframe 2 of the storage cabinet. Each stanchion 3 has an end plate secured

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to its lower end in which a threaded bore is formed. By inserting a bolt through the holes 12, 18 from below and threadably engaging it with the bore, each stanchion is firmly secured in position on the underframe 2.

It will be seen that the number of saddles 8 is equal to the number of rows of the stanchions 3 as viewed across the frontage, and the saddles are equally spaced from each other by the same spacing as that between adjacent stanchions as viewed across the frontage. Consequently, a storage cabinet of a different size can be constructed using an increased or decreased number of rows of stanchions and using a corresponding number of saddles 8 and connection members 9. In this manner, the need for the provision of saddles and connection members of different sizes is avoided.

Referring to Figs. 3 to 6, a pair of bearings 21 are threadably secured to the opposite limbs or flanges of each saddle 8, utilizing the holes 16. Each bearing 21 is positioned so that the central bore of its inner race is in alignment with the holes 13 formed in the saddle 8, whereby these central bores can fittingly receive an axle or shaft 22 which has a sufficient length to extend through the pair of bearings 21 and which freely extends through the holes 13 formed in the saddle 8. The shafts 22 supported by the respective saddles 8 and by associated pairs of bearings 21 are coaxially connected together by means of connecting pipes 23. A running wheel 24 is coaxially and fixedly mounted on each shaft 22 inside the channel of each saddle 8, and the wheels 24, which are located at the opposite ends of a cabinet, are provided with a flange. A

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sprocket wheel 25 is coaxially and fixedly mounted on the shaft 22 which is located at the right-hand end of the cabinet, at a location nearer the center of the underframe 2.

Shafts 26 extends through holes 15 formed in each saddle 8 and have a sufficient length to extend through the full width thereof. It is to be understood that the shafts 26 are rotatably supported by suitable bearing means. A running wheel 27 is coaxially and fixedly mounted on each shaft 26 inside the channel of each saddle 8. The wheels 27 located at the ends of the cabinet are provided with a flange.

Bearings 28 are threadably secured to the opposite limbs of the saddle 8 which is located at the right-hand of the cabinet, as viewed in Figs. 4 and 5, utilizing the holes 17. The bearings 28 are positioned so that the central bores of their inner races are aligned with the hole 14 formed in the saddle 8, and these bores fittingly receive an intermediate shaft 29 of a sufficient length to extend through the pair of bearings and which freely extend through the holes 14 formed in the saddle 8, the shaft 29 forming part of a reduction gearing. Coaxially and fixedly mounted on the intermediate shaft 29 are a sprocket wheel 30 located outside the underframe 2 and another sprocket wheel 31 located inside the underframe 2. Sprocket wheels 31 and 25 are substantially of an equal diameter while the sprocket wheel 30 has a reduced diameter. An endless chain 32 extends around the sprocket wheels 31, 25.

As shown in Figs. 1 and 2, a manually rotatable handle 33 is coaxially and fixedly mounted on a shaft which is rotatably disposed between the side plate 7 and the

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stanchion 3 located inwardly thereof, the handle 33 being located outside the side plate 7 of the cabinet 1. A sprocket wheel 34 of a reduced diameter is mounted on the handle shaft between the side plate 7 and the stanchion 3, and an endless chain 35 extends around the sprocket wheels 34, 30. Rails 37 are installed on a floor 36 of the compartment, and a cabinet is freely movable along the rails 37.

In operation, when the handle 33 is manually rotated, a reduction gearing comprising sprocket wheel 34, chain 35, sprocket wheel 30, intermediate shaft 29, sprocket wheel 31, chain 32 and sprocket wheel 25 transmits a rotating drive to the individual shafts 22 through the connecting pipes 23, whereby the individual wheels 24 can be rolled along the rails 37 to move the storage cabinet therealong in a facilitated manner, even if the cabinet has a substantial weight. As will be appreciated, the wheels 24 represent drive wheels while wheels 27 represent follower wheels. Since drive wheels 24 are integrally connected together through the connecting pipes 23, the drive from the handle 33 is evenly distributed among the individual drive wheels, avoiding a wobbling motion of the cabinet and assuring a smooth running thereof. Such movable storage cabinets can be placed on one set of rails 37, and can be selectively moved as desired. A passageway may be formed only between the rows of cabinets as mentioned previously.

The handle 33 can be designed so that it is detachable from its shaft. By attaching the handle 33 to a shaft of a movable storage cabinet to be moved and by rotating the shaft by the handle 33, the storage cabinet can be moved.

Furthermore, a clutch can be disposed between the handle 33 and sprocket wheel 34 so as to connect the handle 33 only to the clutch of the movable cabinet to be moved, whereby the rotating force of the handle 33 is transmitted to the cabinet to be moved.

When a plurality of the cabinets are moved simultaneously, the idling of the handles except the driven handle does not take place, and therefore a required load for moving the cabinets can be reduced. Furthermore, there is no risk that the clothes of the operator standing near the cabinets are taken up by the handle.

In Figs. 7 and 8, there is shown another embodiment of the invention. In this embodiment, as another main component of the underframe 2, a support member 40 to be disposed parallel to the connection members 9 is provided in addition to the saddles 8 and connection members 9. Each connection member 9, which is disposed on the opposite sides of the frontage of each cabinet, covers all the side edges of each saddle 8 and is designed so as to be extended over the opposite saddles 8. In each connection member 9, there is formed an opening 41 in a position more outer and upper than those of the holes 19.

The support member 40 is shaped like an inverted letter U and is narrower and lower than the saddle 8. Attachment holes 42 are formed in the center of the upper surface of the support member 40. The attachment holes 42 in the opposite end portions of the support member 40 are made so as to be in conformity with support member attachment holes 18 formed in an outer ends of each connection member 9 in the edge of the frontage of the cabinet. In the opposite

ends of the support member 40, there are formed bent portions 43. In each of bent portions 43, there is formed a hole 44 which is made in conformity with the hole 41 of each connection member 9. The holes 10 of each of the saddles 8 and the holes 19 of each connection member 9 are overlapped so that the saddles 8 and connection members are made integral by bolts and nuts. The holes 41 of the connection members 9 and the holes 44 of the support member 40 are also overlapped so that the support member 40 is fixed in contact with the outer surface of the saddle 8 in the frontage of the cabinet by bolts and nuts. A framework is constructed of the saddles 8 and connection members 9.

The framework serves as the underframe 2, and each of the stanchions 3 is fixed to the underframe 2 by bolts and nuts which pass through the holes 12 of the saddles 8 except the saddles 8 on the opposite sides of the storage cabinet, the holes 18 of the connection members 9 and the holes of end plates secured to the lower ends of the stanchions 3.

According to the embodiment shown in Figs. 7 and 8, the support member 40 is added as a component of the underframe 2. Therefore, when the support member 40 is disposed along the outer surface of the saddle 8 on the opposite sides of the frontage of the storage cabinet, the stanchions 3 can be shifted in the outer direction to the position of the support member 40 as shown in Fig. 8. Even if the side plate 7 is disposed in proximity to the support member 40 and stanchions 3, there is a sufficient space between the side plate 7 and ^{the} shaft 26 projected from the side of the saddle 8, and a dead space between the stanchions 3 on the side end and side plate 7 can be reduced.

When support members 40 are disposed with a desired space therebetween regardless of the positions of the saddles 8, the stanchions 3 can be disposed with the desired space therebetween regardless of the positions of the saddles 8. Furthermore, when the adjacent connection members 9 are connected by the support members 40, the space between the saddles 8 can be changed as desired. Therefore, the space between the wheels 27 can be also changed as desired.

10 It should be understood that, while the embodiments utilize a manually rotatable handle to transmit a drive to the drive wheels through a reduction gearing, an electric motor may be used as drive means. Alternatively, if the cabinets are of a reduced size, they may be directly
15 pushed forward by hand.

It will be appreciated that with the above-described movable storage cabinet including an underframe, the parts are standardized to reduce the number of different parts so that a variety of storage cabinets
20 having different frontage sizes can be assembled by a corresponding increase or decrease in the number of underframe parts, thus providing interchangeability of underframe parts to improve productivity and to facilitate the maintenance of parts, thereby enabling movable storage
25 cabinets to be provided inexpensively.



- 12 -

CLAIMS

1. A movable storage cabinet supported on wheels for movement along rails installed on a floor, said cabinet comprising, in combination, an underframe including inverted channels forming saddles extending parallel to the depth of the cabinet, in spaced relation to each other, the flanges of said channels having aligned apertures for receiving wheel-bearing shafts; shafts engaged through said apertures; wheels mounted on said shafts to engage said rails and support said cabinet; and connection members, having a length sufficient to extend across the space between adjacent saddles, secured to opposite ends of adjacent saddles and interconnecting adjacent pairs of saddles.
2. A movable storage cabinet according to claim 1, in which the wheels are located inside the channels of the saddles.
3. A movable storage cabinet according to claim 1 or 2, in which said saddles and said connection members are formed with holes; stanchions extending through said holes; and shelves supported on said stanchions.
4. A movable storage cabinet according to any one of the preceding claims, including side plates secured to the



- 13 -

opposite ends of said cabinet; a shaft rotatably mounted through one side plate of said cabinet; a rotatable handle secured to said shaft; and a reduction gearing interconnecting said handle shaft and said wheel-bearing
5 shafts.

5. A movable storage cabinet according to claim 4, in which the reduction gearing includes an intermediate shaft located between the handle shaft and the shafts of the
10 wheels.

6. A movable storage cabinet according to claim 5, in which the intermediate shaft is supported by one of the saddles.
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7. A movable storage cabinet according to claim 4, 5, or 6, in which said rotatable handle is detachable from said handle shaft.

20 8. A movable storage cabinet according to any one of claims 4 to 7, in which clutch means is disposed between said rotatable handle and said reduction gearing.

9. A movable storage cabinet supported on wheels for
25 movement along rails installed on a floor, said cabinet



- 14 -

comprising, in combination, saddles which are formed in the shape of an inverted letter U and have shaft holes for wheels on opposite sides thereof and are disposed spaced in the direction of the depth of said cabinet; connection members for interconnecting adjacent saddles on the front
5 and back sides thereof, and at least one support member which is disposed parallel to said saddles and has holes for fixing stanchions thereto.

10. A movable storage cabinet substantially as herein-
10 before described with reference to the accompanying drawings.

The text of the specification has been reproduced by photocopying the applicants original typescript. It may contain a few amendments which are difficult to read. The original typescript containing these amendments may be inspected on the premises of the Patent Office