United States Patent [19]

Conneally et al.

[11] **3,837,119**

[45] **Sept. 24, 1974**

[54] **REFRIGERATOR DOOR CLOSURE SYSTEM**

[75] Inventors: **Martin L. Conneally,** Lombard; **George Hajduk,** Dolton, both of Ill.

[73] Assignee: **Ardco, Inc.,** Chicago, Ill.

[22] Filed: **May 14, 1973**

[21] Appl. No.: **360,310**

[52] **U.S. Cl.** **49/404,** 16/78, 49/425

[51] **Int. Cl.** **E05d 15/06**

[58] **Field of Search** 49/420, 421, 425, 409; 16/78

[56] **References Cited**

UNITED STATES PATENTS

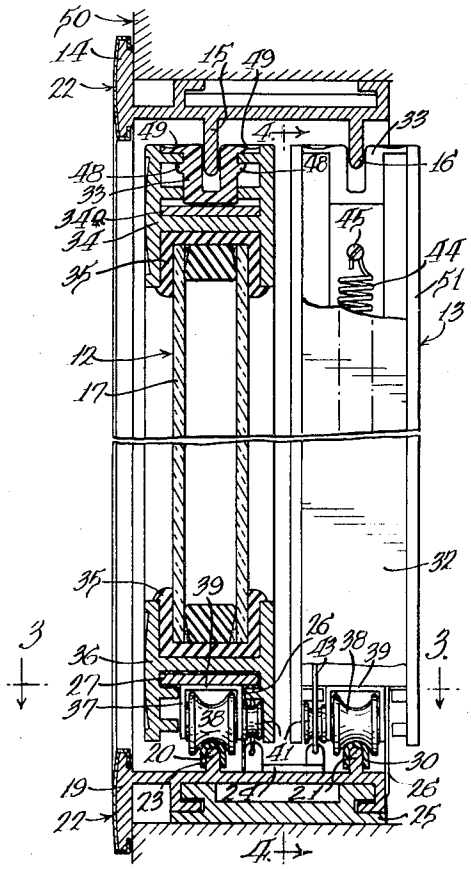
3,255,807	6/1966	Steele, Jr.	49/425 X
3,508,361	4/1970	Ryder	49/425 X

Primary Examiner—Kenneth Downey

[57] **ABSTRACT**

A horizontal sliding glass panel is secured to the door frame by flexible insulating mounting gaskets, a self-contained elastically energized door closing system is concealed in the door frame recess by snap-in cover plates, the door frame is supported by a trolley system riding on a track and powered by the elastic closing system; each door engages a tracking system to form a single labyrinth seal between the track and U-shaped seal gaskets with further cold air barriers provided by wipers at the vertical interface and bottom of the doors, the door assembly being mounted with a bottom leveling pad in a refrigeration unit.

2 Claims, 8 Drawing Figures



PATENTED SEP 24 1974

3,837,119

Fig. 1.

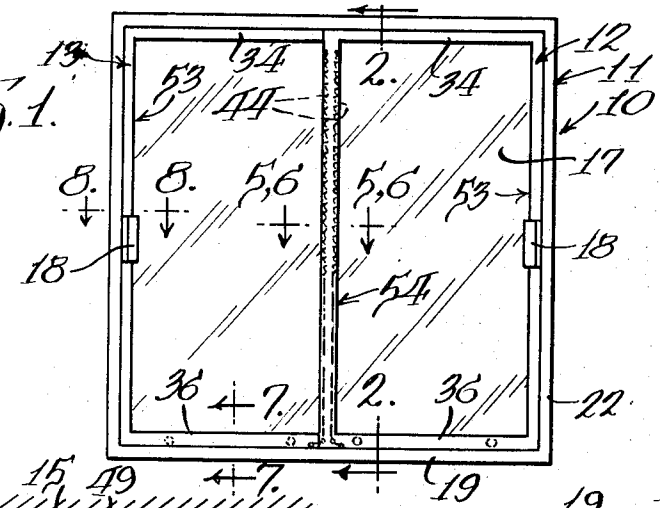


Fig. 2.

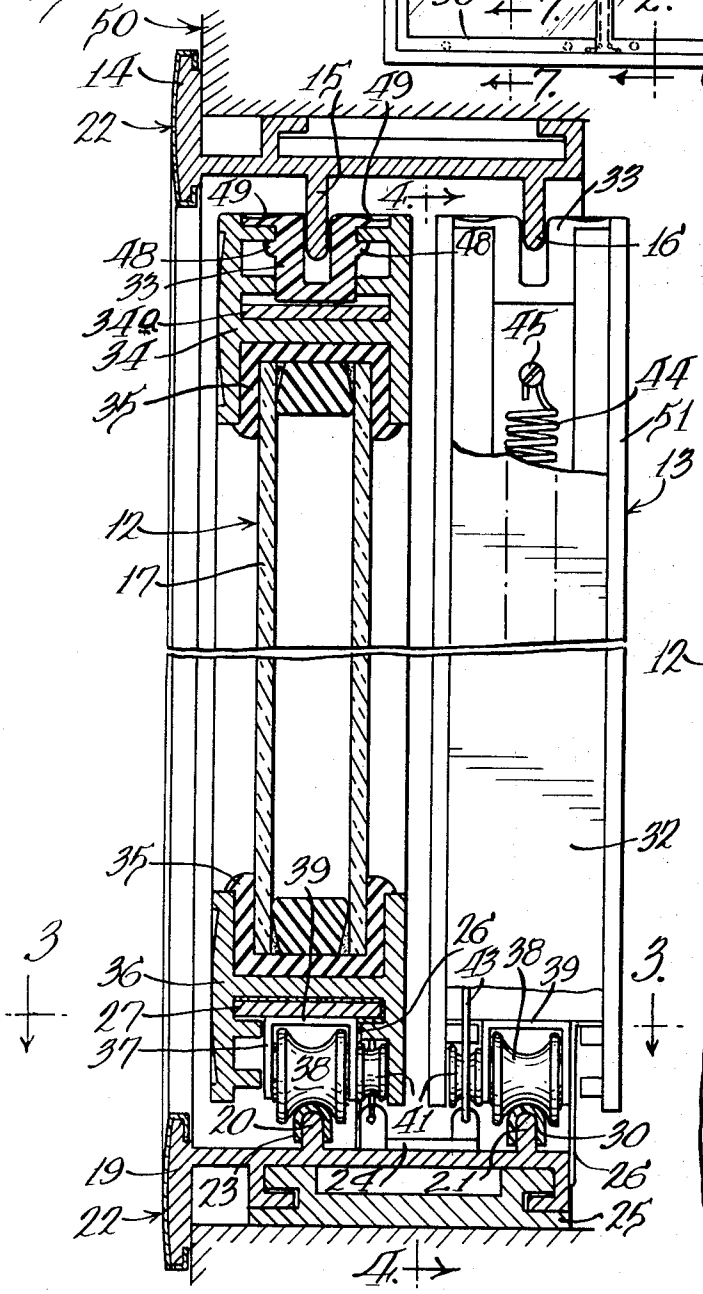
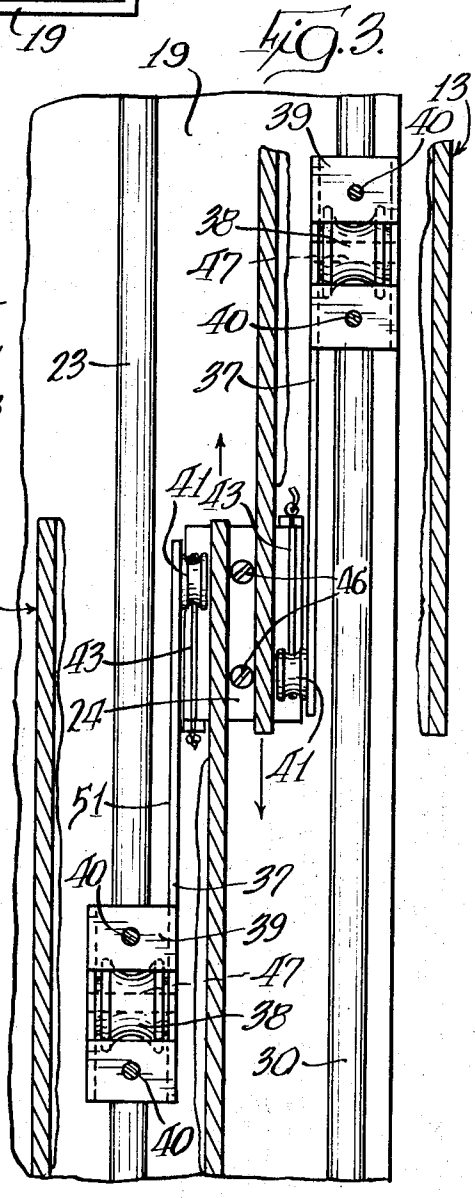
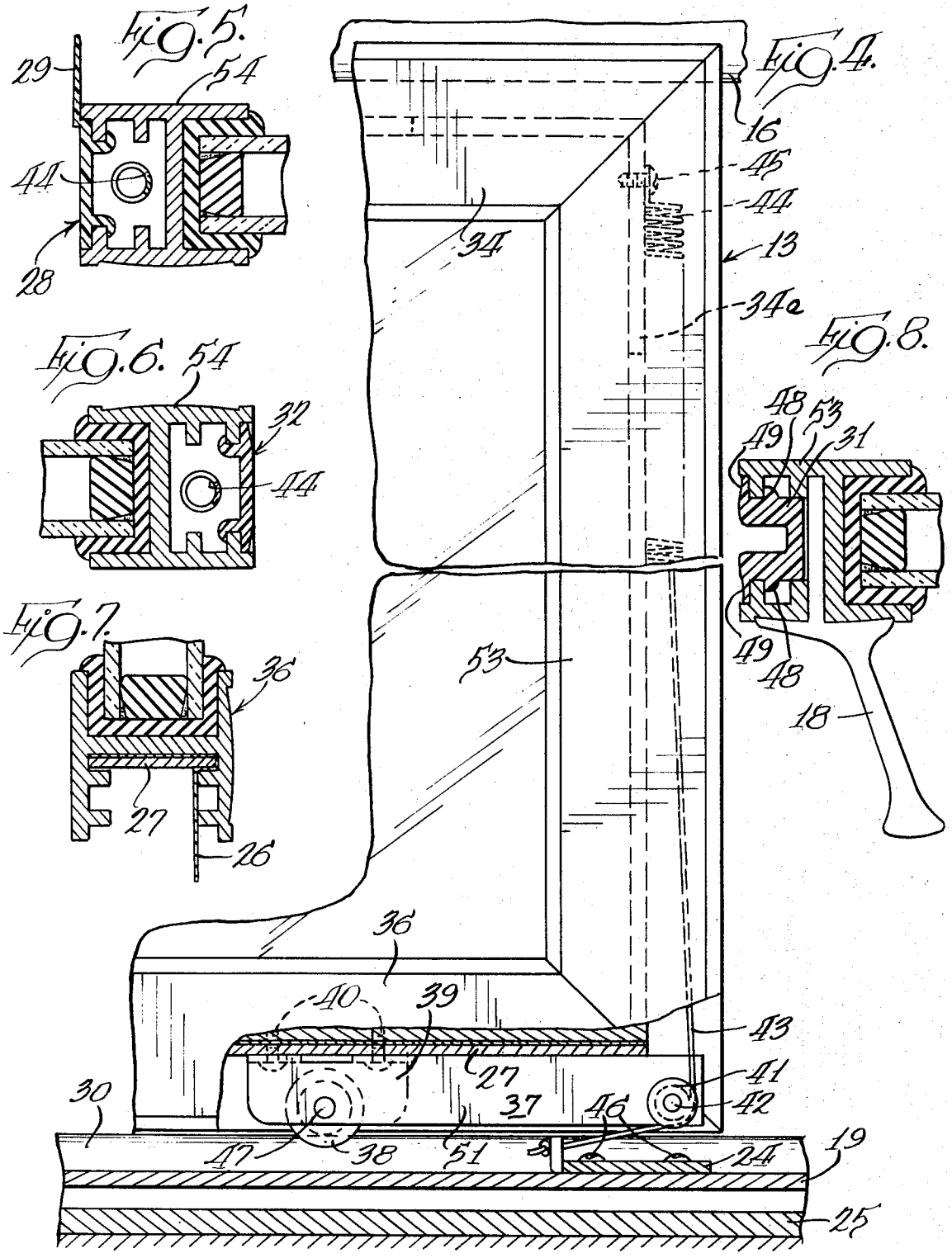


Fig. 3.




FIG. 5.
29
54
44
28
FIG. 6.
54
32
44
FIG. 7.
36
27
26
FIG. 4.
16
45
44
13
34
34a
FIG. 8.
48
53
49
31
49
48
18
53
36
40
39
43
27
41
42
37
46
30
47
38
51
24
19
25

REFRIGERATOR DOOR CLOSURE SYSTEM

BACKGROUND OF THE INVENTION

This invention relates to a glass panel refrigerator door and frame system of the type generally used in display cases in food and beverage stores for storage and display so that customers may easily view and select the merchandise. Door systems embodying the invention are utilized in cool temperature installations, such as for the display of dairy products, beer, soda and the like and for low temperature storage, such as for frozen foods, ice cream and the like.

SUMMARY OF THE INVENTION

The present invention relates particularly to refrigerator door systems of the type in which glass is mounted in the door frame by means of a flexible insulating gasket. The mounting and door frames are formed from plastic, and each mounting frame contains a pair of self-returning, sliding doors. The supporting frame is mounted in the front wall opening of the refrigeration unit and each door is mounted on an individual track which extends along at least the upper and lower interior faces of the mounting frame. The doors cooperate with the tracks to form a closed barrier between the doors and the frame by means of a labyrinth seal on the sides and top of the mounting frame and wipers at the bottom of each door and at the vertical interface between the doors.

The self-contained, self-returning feature of the door is achieved by a trolley system mounted at the base of each door and is powered by the energy created by an elastic member attached within the vertical free side of each door frame and to anchor plates in the base of the mounting frame by means of a cable. The elastic member and connecting cable is concealed in each door frame by means of a snap-in cover plate.

In accordance with the present invention, the glass panels are mounted by means of flexible insulating gaskets in the door frames. The exterior of the door frames is formed to provide a recess to accept snap-in seals on the exterior closing side and top of each door frame which cooperate with the tracking system to form a single labyrinth seal; to accept a reinforcing plate, trolley system and bottom wiper seal on the exterior bottom of each door frame; to conceal an elastic member and connecting cable in the vertical free side of each door frame by means of a snap-in cover plate on the vertical side of the inner door and by means of a snap-in cover plate and cold air wiper on the vertical free side of the outer door. The free end of the elastic member is attached to the upper portion of the vertical door recess. The other end of the elastic member is attached to a cable whereby the elastic member energizes the self-return system when the door is displaced.

In previous refrigerator door assemblies, the door opens outwardly about a hinge, thus providing a large area for cold air leakage. In the present invention, the doors need not be opened fully to retrieve the displayed merchandise. Moreover, the self-returning feature of the present invention provides for rapid and complete closure of the refrigeration unit. Unlike prior self-returning refrigeration doors in which the self-returning feature is provided for by an apparatus located in the bottom member of the mounting frame, the present invention provides a fully enclosed return system which is contained in the door frame. When the self-returning system is contained in the mounting frame, as in prior inventions, rather than in the door frame, there is an ever present danger of malfunction of or damage to the return system. Since these doors are in continual use in the retrieval and storage of merchandise, spillage and dropping of merchandise often result in damage to the lower mounting frame member. Only the tracking system is exposed in the present invention when the door is open; the self-return system is completely concealed at all times while the door is open or closed. Thus the system provides for minimal damage and easy cleanup and maintenance of the entire door system.

DESCRIPTION OF THE DRAWINGS

For a more complete understanding of the invention, reference is made to the accompanying drawings, in which:

FIG. **1** is an elevation view of a refrigerator door assembly embodying the present invention in a closed position;

FIG. **2** is a sectional view, as indicated in connection with FIG. **1**;

FIG. **3** is a fragmentary horizontal sectional view as indicated on FIG. **2**;

FIG. **4** is a fragmented front sectional view of the inner door, as indicated on FIG. **2**;

FIGS. **5, 6** and **8** are sectional views of the vertical door frames, as indicated on FIG. **1**; and

FIG. **7** is a sectional view of the bottom door frame, as indicated on FIG. **1**.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENT

The refrigerator door assembly **10** illustrated in FIG. **1** includes a door support frame **11** with an optional decorative facade **22** extending around the front perimeter thereof, and two sliding doors **12** and **13** mounted in the mounting frame **11**. The preferred installation of the refrigerator door assembly frame **10** in the front wall opening **50** of a refrigeration unit case is by means of securing the top and sides of the mounting frame **11** to the refrigeration case or frame by means of bolts or screws with final support provided by means of the leveler pad **25** which is also secured directly to the refrigeration opening **50.** It will be appreciated that the door frame assembly may be mounted in many types of refrigeration units including free standing or built-in refrigeration units, cabinets or coolers.

Each of the doors **12** and **13** is comprised of generally H-shaped top and bottom frame members **34** and **36** and side frame members **53** and **54** which peripherally support and carry the transparent panels **17** composed of glass or other suitable material. The door frame members **34, 36, 53** and **54** are secured together by corner brackets **34a** at each corner to complete each door frame which contains a transparent material **17,** such as glass, to provide for viewing of merchandise displayed in the refrigeration unit. As illustrated in FIG. **2,** a double paneled dry air sealed glass panel is installed in the door frame **12** and **13** by means of mounting gaskets **35.**

The doors **12** and **13** are mounted in the mounting frame **11** by means of independent tracking systems **15** and **16** extending around the interior sides and top of the mounting frame **11** to provide tracking guidance and cold air barriers at the interface of the doors **12**

and 13 and mounting frame 11. The bottom member of each door 36 is supported by a trolley roller system 37 which rides on wear and cushioning strips 23 and 30 which partially envelop the bottom mounting frame roller tracks 20 and 21. The strips 23 and 30 function to reduce rolling friction and noise as well as provide improved and convenient maintenance of the roller tracks 20 and 21.

The trolley system 37 which supports each door frame 12 and 13, is attached to the bottom member 36 of each door frame 12 and 13 and reinforcing plate 27 by means of screws or bolts 40. As illustrated in FIGS. 3 and 4, the roller system is comprised of a U-shaped roller housing 39, which provides double ended support for the roller shaft 47 which supports the roller 38, and a cable pulley 41 on a shaft 42 mounted on the trolley arm 51.

The door frames 12 and 13 engage the interior top and sides of the mounting frame 11 by means of a snap-in seal 31 and 33 that are mounted in the generally H-shaped door frame members 34 and 53 to form single labyrinth seals. Each snap-in seal 31 and 33 is essentially U-shaped and formed with lock ridges 48 to secure the seal 31 and 33 to the exterior top and closing sides door frames 34 and 53. The exposed surfaces 49 of the seal 48 are formed in a concave shape and provide a backing to secure the seals 31 and 33 in the locked-in position.

Further heat transfer is reduced by the downward facing bottom wiper seals 26 mounted on the reinforcing plates 27, as illustrated in FIG. 7, which minimize cold air loss through the bottom clearance created between the trolley system 37 area of each door frame member 36 and the lower mounting frame member 19. Additional cold air leakage is prevented between the vertical interface of the inner and outer doors 12 and 13 by means of a cold air wiper 29 which extends inwardly along the entire vertical length of the outer door free side frame 12 and contacting the inner door 13. This vertical wiper 29 is secured to the outer door spring cover 28 as illustrated in FIG. 5.

The embodiment of the self-return feature of this invention illustrated and described herein operates in cooperation with the trolley systems 37 which are located in the exterior bottom of each door frame 36. Each trolley system 37 is connected to the bottom door frame member 36 by means of bolts or screws 40 which secure the U-shaped roller housing 39 to the reinforcing plate 27 and bottom door frame 36. The reinforcing plate 27 which extends the entire length of the bottom door frame member 36 is anchored directly into the lower door frame member 36 by means of the profile of the lower door frame member.

The system is powered by the energy generated in elastic member 44 which is attached to the upper section of the interior door frame 12 and 13 by means of a bolt or rivet 45 and comprised of a spring 44 or other suitable elastic member and a return cable 43 which is attached to the door return cable anchor 24. It will be appreciated that the use of longer or more highly elastic members might not require the use of a cable since there would be no danger of a malfunction with the engagement of the pulley 41. The cable anchor 24 is secured to the lower mounting frame 19 by means of bolts or rivets 46 or ultrasonic welding.

The door return cable 43 engages in the pulley 41 so that when the door is displaced from the closed position by pulling the door handle 18, the elastic member 44 is stretched proportionately. When the handle 18 is released the energy created by the stretched elastic member 18 is directed against the pulley 41 by the cable 43 and causes the door 12 or 13 to return to the closed position.

As illustrated in FIGS. 5 and 6, each door return spring and cable 43 and 44 are concealed in the door frame 54 by means of snap-in spring covers 28 and 32.

What is claimed is:

1. A refrigerator door frame assembly which comprises the combination of a mounting frame for attachment within a refrigerator wall opening and inner and outer door, each door including a generally H-shaped cross section door frame, a transparent insulating panel, and means mounting the panel to the interior recesses of the door frame, the interior of the mounting frame having two sets of tracks extending around the interior perimeter thereof to form tracking systems for said inner and outer doors; a generally U-shaped snap-in seal having locking ridges and back plates extending outwardly from the legs of said U-shaped seal, said seal being mounted in the exterior recess of the tops and closing sides of each of the doors and adapted to form single labyrinth cold air seals with the respective top and side tracks; each door being mounted on its respective track by means of the engagement of the U-shaped seal and top track and supported by a trolley system riding on the bottom track, each trolley system being attached to the base of the exterior bottom recess of the door frame and including a downwardly facing U-shaped housing having an arm extending longitudinally from one leg of said U-shaped housing, a roller rotatably mounted in said U-shaped housing and engaging said bottom track, and a pulley rotatably mounted at the end of said arm, each of said doors having an elastic means secured at one end within the outer recess of the free vertical side of the door frame and at the other end to the interior bottom of said mounting frame, each elastic means being sealed in said recess by means of a snap-in cover plate and paid over said pulley, whereby said elastic means is stretched to store energy, as a door is opened, for returning said door to a closed position when released.

2. A door assembly which comprises the combination of a stationary mounting frame and a movable door mounted in said frame, means for supporting said door for translatory movement in said frame and returning said door to a closed position including a track at the bottom of said frame, a trolley attached to the bottom of said door, said trolley having a downwardly facing U-shaped housing and an arm extending longitudinally therefrom beneath said door, a roller rotatably mounted in said housing and in engagement on said track, and elastic means secured at one end within the door on the side in the direction of opening and at the other end to the base of said frame beneath the door, said elastic means being paid about a pulley rotatably mounted at the end of said arm, whereby said elastic means is stretched to provide a returning force when said door is opened.

* * * * *