A door and handle assembly (1) has a door (2) hinged about axis (3) on a door frame (4). A bar (8) is arranged across the door (2) and passes through a spring loaded latch member (5) retractable from recess (7) in the door frame (4) by cam means (8a, 8b, 8c) cooperating with detent means (5b). The bar (8) is moved longitudinally to retract the latch member (5) by actuation of either curved actuating plate (9b, 10b) in the direction of the arrows as shown in (Fig. 1). The plates (9b, 10b) are hinged to the bar (11 and 12) and hinged to flat plates (9a, 10a at 15, 16); the flat plates are screwed to the door. In one modification the plates (9a, 10a) are interconnected by a U-shaped bridge piece which extends around the edge of the door (2) and through which the latch member (5) passes. In a second modification the latch member (5) is hollow and the spring is located inside the latch member.
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DOOR HANDLE AND LATCH ASSEMBLY

TECHNICAL FIELD

This invention relates to a door and handle assembly, a fixture including the door and handle mounted on a door frame and a kit of parts including handle means and a latch member attachable to the door, to enable the door to be opened and closed; the door and handle assembly is more particularly but not exclusively for use in buildings such as domestic dwellings, offices and hospitals.

BACKGROUND ART

Many door handle and latch assemblies have been proposed which rely on a latch member being retracted from a door frame, on which the door is mounted, simultaneously as a handle is actuated, and before opening the door by pushing or pulling on the handle.

It is usual for the latch member to be retracted by rotating the handle in a plane parallel to the door, perhaps, by applying a generally downward force at one end of the handle, or if the handle is a knob-type, by rotating the knob.

Once the latch member has been retracted from the frame it is necessary to apply a further force, either a generally pulling or pushing action to open the door. Therefore, a person wishing to open a door provided with such an assembly must initiate two quite distinct operations in succession. Since such assemblies rely on a rotational action to retract the latch member, this rotational movement has to be converted to a linear movement along the axis of the latch member.

In some instances it may be disadvantageous to have to perform two such distinct operations in order to open a door, for example, if a person is either handicapped or unable to open the door because their hands are otherwise occupied.
Additionally, since rotary motion parallel to the plane of the door has to be transferred to a linear motion, the number of parts required in the door handle and latch assembly may be more than there need be otherwise, with consequential increases in cost and complexity of production.

Other door and handle assemblies have been previously proposed in which a handle is pulled or pushed to retract the latch member. Such assemblies are not widely used in buildings and the reason for this may be that a practical, uncomplicated, inexpensive and user-acceptable design has not yet been achieved.

Some designs have included thin elongate handles arranged to pivot about a horizontal axis at right angles to the hinge axis of the door and are dimensioned such that the plane of the thin handle lies transversely across the door. Where a door handle is horizontal the natural tendency with thin handle parts is to grip them and turn them in a plane parallel to the plane of the door rather than pulling or pushing the end of the handle. Positioning the handle vertically with a horizontal hinge axis may alleviate this problem to some extent since it is not perhaps the usual orientation for a handle which is to be turned in a plane parallel to the door but nevertheless such a design would not entirely obviate the natural tendency to grip (with the thin handle arranged in the palm of the hand) and turn the handle.

Some of these designs may also have been unacceptable because of inherently poor design characteristics relating to reliability, durability, cooperation between components of the design and ease of manufacture of components. For example, some designs have required that the handles of a pair for a door be of non-identical form leading to obvious unnecessary disadvantages such as, for example extra tooling costs, more complicated fitting and general inconvenience as well as, perhaps, undesirable aesthetic characteristics. In fact, the general functional characteristics provided by these designs may have led to cumbersome, unattractive mechanisms where the method of handle actuation is not clear, leaving the user confused into having to "experiment" with the handle in order to find out how to open the door.
Another fault of some previously proposed designs is that the handles of a pair are not both operatively, mechanically connected to the mechanism responsible for retracting the latch member; this can give rise to the possibility of several disadvantages, for example, the possibility of fingers of a user's hand being trapped between the handle and the mechanism, undue wear of components as well as a generally, unbalanced erratic arrangement. Additionally, it is important how the handles are operatively, mechanically connected to the mechanism so that the movement of the handle required to open the door is satisfactory, i.e. not too little and not too excessive, in order to arrive at a balanced arrangement.

It is an object of the present invention to alleviate at least some of the aforesaid disadvantages.

**DISCLOSURE OF INVENTION**

From one aspect of the present invention there is provided a door and handle assembly comprising a latch member movably mounted in the door and biased to project therefrom, in a first position, by resilient means, a bar arranged, in a rest position, transversely across the latch member and across the door, said bar having cam means co-operable with detent means on the latch member, handle means, comprising or including an actuating plate or panel, on at least one of opposing first and second sides of the door, the arrangement being such that, in use, the bar is capable of being moved, on actuation of the handle means, in at least one longitudinal direction across the latch member to retract the latch member from said first position and from engagement with a door frame on which the door is mounted, said movement of the bar causing the detent means to ride on the cam means and thereby retract the latch member against the biasing provided by the resilient means, and on release of the handle means the latch member and the bar are returned to their first and rest positions respectively by the resilient means.

Usually, the plane or main plane of the actuating plate or panel
will overlie the associated side of the door and may be substantially parallel to this side; said plane or said main plane may be curved. Usually, the actuating plate or panel will have an extensive surface, which surface extends both in a direction towards the hinge axis of the door and in a direction parallel to the hinge axis of the door.

Since the handle means comprises an actuating plate or panel the natural tendency to grip (in the palm of the hand) and rotate the handle in a plane parallel to the plane of the door is obviated and in many instances the physical size of the plate or panel will, in any case, prevent the handle being gripped in such manner.

Conveniently, the actuating plate or panel will be of rectangular or square shape in front elevation.

Preferably, the actuating plate or panel is pivotable on the door about an axis and the greatest dimension of the plate or panel is, preferably, parallel to this axis to highlight the fact that the plate or panel is not to be rotated in a plane parallel to the door. The plate or panel is preferably of a substantially rectangular shape having shorter and longer sides in the ratio of about 8:9, but this ratio could be less, for example 11:15 or smaller. The sides will usually be of a ratio, however, lying in the range 2:3 to 8:9. The dimension of the plate or panel parallel to its pivotal axis is, preferably, at least 8 cm and advantageously may be similar to or greater than the span of a human hand (16 to 18 cm) so that in each case it would not be possible to completely grip the plate or panel such that it would lie in the palm of the hand, thus giving an indication that the plate or panel is to be gripped by fingers and thumb along one edge thereof, at least where a free edge of the plate or panel is exposed.

From a second aspect of the present invention there is provided a kit of parts to be attached to a door, said kit of parts comprising a latch member adapted to be mounted in the door and resilient means to bias the latch member to project from the door when mounted therein, a
bar adapted to be arranged in a rest position, transversely across the latch member and across the door with cam means on the bar co-operative with detent means on the latch member, handle means, comprising or including an actuating plate or panel, adapted to be mounted on at least one of opposing first and second sides of the door, the arrangement being such that, in use on the door, the bar is capable of being moved, on actuation of the handle means, in at least one longitudinal direction across the latch member to retract the latch member from said first position and from engagement with a door frame on which the door is mounted, said movement of the bar causing the detent means to ride on the cam means and thereby retract the latch member against the biasing provided by the resilient means, and on release of the handle means the latch member and the bar are returned to their first and rest positions respectively by the resilient means.

Further according to the present invention there is provided a fixture including a door frame and a door and handle assembly as defined in the penultimate paragraph or a kit of parts as defined in the immediately preceding paragraph.

It is an advantage of preferred embodiments of the present invention that an arrangement is provided to enable a door to be opened substantially simultaneously as the latch member is retracted from a door frame, by a single distinct operation such as a push or pull action on the part of a person opening the door.

The present invention may be applicable to a door arranged to be opened by pulling or pushing respectively from one of, or from either of, the first and second sides of the door.

More usually doors are hinged about one of the first and second sides so that, for example, the door can only be opened by a pulling action from the first side or by a pushing action from the second side of the door. Therefore, in some embodiments of the present invention where the handle means is provided on both said first and second sides of the door, a hinge axis may be defined on the first side of the door
so that when the door is mounted in a door frame it co-operates with the frame to be capable of being opened by generally pulling on the handle means on the first side of the door or by generally pushing on the handle means on the second side of the door, the latch member being retractable only by the bar being moved in one longitudinal direction which is from the second side of the door toward the first side. In such an assembly, preferably, a stop is provided, for example, on the door, latch member or bar, to limit the movement of the bar from the first side of the door to the second and thereby to restrain the handle means on said first side from being generally pushed towards said second side when the door is closed.

The bar may project from both the first and second sides of the door, and the handle means may be formed separately to the bar. Conveniently, the handle means may comprise a handle on the first side of the door and a handle on the second side of the door, the handles being formed separately to one another. Each handle may be operatively connected, as by for example a pivotal connection, inter-engaging tongue and notch connection, or by a resiliently deformable member, to a respective end of the bar. Preferably, the handles are identical to one another. In some instances it may be necessary that the door only be opened from one of said first and second sides, in which case handle means may be provided on that side of the door only.

In one embodiment each handle comprises a first handle part in the form of a base plate fastened in a fixed position on the door, through which the bar passes, and a second handle part in the form of a suitably-shaped actuating plate pivotally connected to the base plate about an axis parallel to the plane of the door, which axis is arranged generally vertical in use, and an intermediate portion of the actuating plate may be operatively connected to a respective end of the bar.

The bar may pass through the latch member and the cam means may comprise or include an inclined surface of the bar in engagement or engageable with detent means in the form of a curved surface on the
latch member. Any suitable alternative cam and detent means may be provided to translate the linear movement of the bar to effect linear movement of the latch member.

The resilient means biasing the latch member to said first position may comprise a helical-coiled compression spring in a chamber in the door, at one end of the latch member remote from the portion which projects in the first position. Alternatively, the chamber may be in a cover surrounding the latch member, which cover is mounted or mountable in a mortise recess in the door.

In another embodiment the handle means comprises two handles interconnected by a bridge piece that extends from the first side to the second side of, and embraces the thickness of, the door. Advantageously, a single slot may be provided in the door for mounting the handle means and latch member thereto.

Also, advantageously, the distance apart of the handles may be variable to accommodate different thickness of door, for example by making the bridge piece in two parts which are interconnected in an extendible manner such as by a tongue and groove arrangement.

Further according to the present invention there is provided a door and handle assembly comprising a latch member movably mounted in the door and biased to project therefrom, in a first position, by resilient means, a bar arranged, in a rest position, transversely across the latch member and across the door, said bar having cam means co-operable with detent means on the latch member, handle means, comprising or including an actuating plate or panel, on at least one of the opposing first and second sides of the door, the arrangement being such that, in use, the bar is capable of being moved, on actuation of the handle means, in at least one longitudinal direction across the latch member to retract the latch member against the biasing provided by the resilient means, and on release of the handle means the latch member and the bar are returned to their first and rest positions respectively by the resilient means and in which the or
each actuating plate or panel is pivotally connected on the door and arranged to pivot about an axis generally parallel to the hinge axis of the door.

It is particularly advantageous to provide the arrangement according to the immediately preceding paragraph where the hinge axis of the door is arranged vertically, because this arrangement then allows the vertical length of the actuating plate or panel to be varied to provide a low and/or high operating height to suit different people of different heights and in particular to easily cater for invalids in wheelchairs.

Preferably, the dimension of the plate or panel parallel to the hinge axis is greater than the dimension of the plate or panel in a direction at right angles to this axis to further highlight the fact that the plate is not to be rotated in a plane parallel to the door.

Preferably, an intermediate portion of the or each actuating plate or panel is operatively, mechanically connected to a respective end of the bar thereby leaving a free end portion of the plate or panel spaced from the door, which plate or panel may be gripped by hand.

Preferably, the pivoting axis of the or each actuating plate or panel is fixed relative to the door and the actuating plate or panel does not become disconnected from the door or bar on actuation of said plate or panel.

Handle means may be provided on both sides of the door and be substantially identical to one another.

A stop may be provided on one of the door and bar to limit movement of the bar in a direction from the first side of the door to the second side of the door thereby to restrain the actuating plate on said first side from being generally pushed towards said second side.
Alternatively or additionally a limit stop may be provided on one of the door and bar to limit the movement of the bar in a direction from the second side of the door to the first side after the latch has been retracted. Such a limit stop will prevent the bar from being moved too far and, if the actuating panel or plate itself is not used as this stop, the stop may also fulfill the function of preventing possible damage to the panel or plate (and/or the door) by preventing engagement of a free end of the plate or panel with the door. Depending on the design of the door and handle assembly, the provision of such a limit stop may prevent the fingers of a person on the opposing side of the door from being trapped between the plate/panel and door should two people attempt to open the door substantially simultaneously.

In another embodiment of the present invention the latch member is hollow. Conveniently the resilient means may be provided in the latch member. In order to provide an abutment for the resilient means to act against, a latch cover portion may extend into slots in the hollow latch member for the resilient means to seat against and yet allow the latch member to move axially relative to the cover.

Advantageously, in the interests of simple design the or each actuating plate or panel may be of uniform cross section.

Still further according to the invention there is provided a kit of parts to be attached to a door, said kit of parts comprising a latch member adapted to be mounted in the door and resilient means to bias the latch member to project from the door when mounted therein, a bar adapted to be arranged in a rest position transversely across the latch member and across the door with cam means on the bar co-operable with detent means on the latch member, handle means adapted to be mounted on at least one of opposing first and second sides of the door, the arrangement being such that, in use on the door, the bar is capable of being moved, on actuation of the handle means, in at least one longitudinal direction across the latch member to retract the latch member from said first position and from engagement with a door
frame on which the door is mounted, said movement of the bar causing
the detent means to ride on the cam means and thereby retract the
latch member against the biasing provided by the resilient means, and
on release of the handle means the latch member and the bar are
returned to their first and rest positions respectively by the
resilient means, and in which the handle means is adapted for use on
at least one of opposing first and second sides of the door as
aforesaid so that the door can be opened only from that side and said
handle means being so configured that it can be used in combination
with substantially identical handle means mountable on the other of
said opposing first and second sides so that the door can be opened
from each of said first and second sides on actuation of the
respective handle means.

15 BRIEF DESCRIPTION OF THE DRAWINGS

Three embodiments of a door and handle assembly in accordance
with the present invention will now be described, by way of example
only, with reference to the accompanying diagrammatic drawings, in
which:

FIGURE 1 shows a cross-sectional plan view of the first
embodiment of a door and handle assembly with a latch member shown in
a first position in engagement with a door frame;

FIGURE 2 shows a front view of the door and handle assembly of
FIGURE 1;

FIGURE 3 shows a modified handle arrangement for either
embodiment of the door and latch assembly;

FIGURE 4 shows a simplified perspective view of the second
embodiment of a door and handle assembly;

FIGURE 5 shows a cross-sectional plan view of a third embodiment
of a door and handle assembly with a latch member shown in a first
engagement position with a door frame;

FIGURE 5a shows a view similar to FIGURE 5 with the latch member in a retracted position;

FIGURE 6 shows a front view of the door and handle assembly of FIGURE 5;

FIGURE 7 shows an end view of the door and handle assembly of FIGURE 5, and

FIGURE 8 shows a simplified or sectional view taken on line VIII-VIII of FIGURE 5.

DESCRIPTION OF PREFERRED EMBODIMENTS

Referring to FIGURES 1 and 2 of the drawings, a door and handle assembly generally designated 1 includes a door 2 hinged about axis 3 on a door frame 4. A latch member 5 is mounted in the door 2 and is movable to a limited extent in both directions along axis X-X as shown in FIGURE 1. The latch member 5 is biased by resilient means, in the form of a compression spring 6, so that a left hand portion 5a (as shown in FIGURE 1) projects from the door 2 in a first position. As shown the latch member 5 also engages in a recess 7 in the door frame provided with a usual striker plate 7a.

A bar 8 is arranged in a rest position across the latch member 5 at right-angles thereto along axis Y-Y and across the door 2. The bar 8 extends through an opening 5c in the latch member 5 and cam means, in the form of cutaway straight edges 8a, 8b and 8c on the bar, are co-operable with detent means in the form of a semi-circular projection 5b on the latch member 5. Handle means in the form of identical handles 9 and 10 are provided on first and second sides of the door 2 respectively at opposed locations, and the bar 8 extends through the door 2 from each of said first and second sides and is pivotally connected to this particular embodiment at each end to one
of the handles 9, 10 about a vertical pivot axis 11 or 12 respectively.

As shown in FIGURE 1 the latch member 5 is secured to the door 2 by an edge plate 13, for example, by screws in a manner known per se, and is encased in a cover 14 extending in the door 2, which cover is integral with edge plate 13. The compression spring 6 is seated at the right-hand end of, and inside, the cover 14; it abuts one internal end of the cover 14 and the right-hand end of the latch member 5.

As mentioned, bar 8 extends through the latch member 5, and also the minimum dimension of opening 5c along axis X-X through which the bar 8 extends is equal to the maximum width of the bar along axis X-X. The semi-circular projection 5d, which defines a side edge of opening 5c, is shown in FIGURE 1 engaging transverse edge 8a and inclined edge 8b. The bar 8 extends equal amounts along axis Y-Y from axis X-X and the whole arrangement is generally symmetrical about axis X-X.

Each handle is of two part construction with a first part in the form of a flat base plate 9a, 10a (see FIGURE 2) secured to the door, as by screws, and a second movable part in the form of a curved actuating plate 9b, 10b.

The pivot axes 11, 12 with the bar 8 are provided on intermediate portions 9c, 10c of the curved plates 9b, 10b, and the curved plates are each pivotally connected about a vertical pivotal axis 15, 16 to one of the flat plates 9a, 10a at an end nearest the edge of the door from which latch member 5 projects. The free ends of the handle parts 9b, 10b are provided with vertical ribs 17 and 18. The bar 8 extends through plates 9a, 10a but the upper portion of bar 8 (as shown in Figure 1) is provided with an edge 8d which engages the exterior of plate 9a to prevent handle part 9b from being closed towards plate 9a from the position shown in FIGURE 1.
The operation of the embodiment is as follows. The door 2 is mounted so that a person approaching the door from the second side must necessarily push the door to open it, the door then swinging open through arcuate path Z. The handle part 10b may be gripped and pushed or just pushed, so that it pivots about axes 12 and 16 and forces bar 3 to move longitudinally towards the first side of the door along axis Y-Y, simultaneously as handle part 9b of handle 9 is moved outwardly from plate 9a about pivot 15. This has the effect of warning a person standing on the second side of the door 2 that someone is about to come through the doorway defined by the frame 4. The bar is moved against resistance provided by semi-circular projection 5b resiliently urged into contact with edges 8a, 8b, 8c by spring 6. As the bar 3 moves, the projection 5b rides on inclined edge 8b and away from edge 8a as the latch member retracts, compressing spring 6. The bar travels through opening 5c until edge 8c engages projection 5b at which point intermediate portion 10c and rib 18 engage plate 10a. The latch member 5 is now fully retracted. As soon as the latch member 5 is free from engagement with the door frame 4 the door 2 will open, with the result that the door may be opened with one smooth continuous pushing action. As soon as the handle 10 is released, for example, after the person has walked through the doorway, the latch member 5 is returned to its first position and the bar 3 is returned to its rest position by action of the spring 6 via cam means 8a, 8b, 8c and projection 5b. Handle part 10b is prevented from initially being pulled out instead of pushed to open the door by engagement of stop 8d on bar 3 with plate 9a, preventing movement of bar 3 in a direction Y-Y toward the second side of the door from the position shown in Figure 1.

Alternatively, if the door 2 is opened from the first side, handle part 9b has to be gripped and pulled to move the bar 3 in a similar manner as previously described, one continuous pulling action being required in this case. Similarly, pulling on handle part 9b moves handle part 10b which indicates to a person on the second side of the door 2 that someone is about to come through the doorway. Handle part 9b is prevented from initially being pushed instead of
pulled by engagement of stop 8d with plate 9a.

As the door 2 is closed either by a person or automatically by a
door closer the latch member portion 5a engages the striker plate 7a
5 and displaces the spring 6 somewhat, before seating in recess 7.

The bar does not have to pass through latch member 5 and it is
easy to envisage alternative cam means and detent means within the
scope of the invention.

A modified handle arrangement is shown in FIGURE 4 which shows
one handle 19 and one end of the bar 8. Instead of handle parts 9b or
10b being pivotally connected to the bar 8 as shown in FIGURE 1 the
alternative arrangement in FIGURE 3 may be preferred. A notch 20 is
15 provided in the bar 8 which seats free end 21a of a finger member or
tongue 21 e.g. a stiff leaf spring member, projecting from the inner
face of the movable handle part. The spring member 21 is generally-
shaped with its other end 21b secured to the handle 19, which is of
slightly different appearance to handles 9 and 10 as shown. The
20 operation of the modified arrangement should be self-evident.

It is an advantage of the described embodiment that the position
of attachment of the handles 9, 10, 19 to one side of a door is not
critical, unlike many handles. Handles provided with relatively thin
25 horizontal grip portions usually need to be accurately aligned
otherwise they are displeasing to the eye, but the handles described
which are pivoted in a generally vertical plane (and may be termed
"push or pull pads") are not subject to the same exacting standards by
the eye.

30 It is thought that the embodiment of the door and handle assembly
described lends itself to embellishment of handle design.

Different embodiments of the present invention may include only
35 one handle being provided on the door, and may be used in connection
with doors that can be opened by both a pushing or pulling action from
either side of the door. In the latter case the bar 8 may be designed
to retract the latch when it is moved in either direction along axis
Y-Y. The whole arrangement of the handle assembly may be exactly
symmetrical about axis X-X from the second side of the door, so that
no stop 8d is provided and cam means is provided upwardly of axis X-X
in FIGURE 1 which is a mirror reflection of edges 8a, 8b, 8c.

In some cases, it may not be immediately evident whether the door
is to be pushed or pulled, therefore a written instruction such as
pull or push, as appropriate may be provided on the door or on the
handle.

The first and/or second handle parts may extend generally
vertically upwardly and/or downwardly to any desired length so that
the door may be opened from different levels. For example, so that
small children may open the door the handles may extend downwardly to
within one or two feet from the floor.

The handles may conveniently be fabricated as metal castings, and
the movable handle parts, in particular, may be adapted to be fitted
with decorative or information carrying panels on their exterior
faces.

Figure 4 shows a second embodiment of a door and handle assembly.
In this example, a door d is provided with single slot S as shown.

Handle means H comprises a handle arrangement as shown in FIGURES
1 and 2, or when modified as shown in FIGURE 3, in which the handles
are interconnected by a generally U-shaped bridge piece B. The bridge
piece B is provided with an opening O to receive, and to allow
retraction from the door frame of, the usual latch member (not shown).

The bridge piece B may be rigidly formed with the flat plates 9a,
shown in FIGURE 1 so that they remain at a fixed distance apart
35 corresponding approximately to the thickness of the door, but in this
example the distance between the flat plates can be varied so that
different thicknesses of door may be catered for.

As should be evident from FIGURE 4 the handle means H extends right around the edge of the door; this construction facilitates fitting the handle arrangement to a door and is particularly appropriate for the D.I.Y. market since it can be fitted to a door with a single slot S as shown, instead of the door having to be provided with one slot to receive the latch and another cross slot for a latch retraction bar.

If desired a rebate could be provided on the edge of the door d to seat the thickness of the material of the U-shaped bridge-piece B but usually the thickness of material will be chosen so that bridge piece B can be adequately received in the gap between the door d and door frame.

The handles may be hingedly connected at the centre of bridge piece B on line A-A or fixed together by cranking parts of the bridge piece B together. As shown the bridge piece B comprises two parts with overlapping edges on axis A-A; one handle part is provided with tongues T which fit into slots on the other handle part and the distance apart of the flat plates can be varied by pulling the tongues T further out of their slots. In this way the handle arrangement may be fitted to doors which vary in thickness and the flat plates can be screwed to the door in a similar manner to that shown in FIGURE 2.

Figures 5 to 7 show a further embodiment of a door and handle assembly. This design is very robust and has been designed to further reduce any possibility that the fingers of a user's hand might be trapped inbetween the handle and the door. This embodiment is generally similar in form to that shown in Figures 1 and 2 and, therefore, will not be described in full detail. However, there are some important differences between the two designs which will now be described.

Firstly, referring to Figures 5 to 7, the door and handle
assembly 100 comprises substantially identical handle means 102 and 103. Each handle means has a decorative cover portion 104, 105 engaged over a main handle part 106, 107. A bar 108 arranged transversely of the latch member 109 passes through a hollow shell 100 of the member 109 and has angled ends 108' terminating in part-spherical tips 108''. The tips 108'' are slidably located in slots 111 of U-shaped section in the main handle parts 106, 107.

Each handle part 106, 107 has an end 106', 107' which is outwardly directed from the door and arranged so that even when the handle part is in the closed position with the end 106', 107' in its position nearest the door (end 107' in Figure 5) there is still a large clearance between the end 106', 107' and the door so that there is no danger of fingers being trapped.

Each handle part 106, 107 has an end 106'', 107'' which is part-spherical and provides a fixed pivotal axis for the handle means 102, 103. The end 106'', 107'' is seated by a snap-fit engagement in an extension 112' of door plate 112, the extension 112' being of hook-shaped cross-section. The ends 106'', 107'' pivot in the extension 112'.

The bar 108 passes through an opening 112'' in the plate 112 and the plate 112 has inwardly directed portions 112''' bent at right angles to the main plane of the plate 112 which extend up to a latch housing or cover 113.

Instead of the latch spring being provided between the cover and latch in this embodiment a spring 114 is provided within the hollow shell 110 of latch member 109. The spring 114 is located between a left hand abutment 115 (as shown in Figure 5) and two right hand abutments 116, 117. Vertically offset rectangular slots 118, 119 are provided in the latch shell 110 (see Figure 8) and the abutments 116, 117 are generally square teeth integral with, and projecting from, the cover 113 through slots 118, 119 into the hollow latch shell 110.
Detent means is provided by a part 120 of the latch shell 110. Lower parts 121, 122 are supports for the handle means 102, 103.

Operation of this door and handle assembly should be evident from the description with reference to the embodiment shown in Figures 1 and 2 of this specification.

It is to be understood that the choice of particular terminology used herein to describe features and function should not be construed as unnecessarily limiting and that the scope of such features and function includes suitable or obvious generic replacements.
CLAIMS

1. A door handle assembly comprising a latch member movably mounted in the door and biassed to project therefrom, in a first position, by resilient means, a bar arranged, in a rest position, transversely across the latch member and across the door, said bar having cam means co-operable with detent means on the latch member, handle means, comprising or including an actuating plate or panel, on at least one of opposing first and second sides of the door, the arrangement being such that, in use, the bar is capable of being moved, on actuation of the handle means, in at least one longitudinal direction across the latch member to retract the latch member from said first position and from engagement with a door frame on which the door is mounted, said movement of the bar causing the detent means to ride on the cam means and thereby retract the latch member against the biassing provided by the resilient means, and on release of the handle means the latch member and the bar are returned to their first and rest positions respectively by the resilient means.

2. A door and handle assembly as claimed in Claim 1 in which the actuating plate or panel is pivotable on the door about an axis.

3. A door and handle assembly as claimed in Claim 2 in which the greatest dimension of the plate or panel is parallel to the pivoting axis of the actuating plate or panel.

4. A door and handle assembly as claimed in claim 1 in which handle means is provided on both said first and second sides of the door and in which a hinge axis is defined on the first side of the door, so that when the door is mounted on a door frame it co-operates with the frame to be capable of being opened by generally pulling on the handle means on the first side of the door or by generally pushing on the handle means on the second side of the door, the latch member being retractable only by the bar being moved in one longitudinal direction which is from the second side of the door toward the first side and, preferably in which a stop is provided on one of the door and bar to
limit the movement of the bar from the first side of the door to the second side thereby to restrain the handle means on said first side from being generally pushed towards said second side.

5. A door and handle assembly as claimed in any of the preceding claims in which the handle means is formed separately to the bar and in which the handle means comprises at least one handle operatively connected to an end of the bar in which the or each handle comprises a first handle part in the form of a base plate fixedly fastened on the door, and the bar passes through the first handle part, the respective handle also comprising a second handle part in the form of the actuating plate pivotally connected to said base plate about an axis parallel to the plane of the door, which axis is generally vertical in use; and an intermediate portion of the actuating plate is operatively connected to said end of the bar, and preferably in which said operative connection is an interengaging tongue and notch connection and preferably in which the handle means comprises a handle on the first side of the door and a handle on the second side of the door, the handles being formed separately to one another, and preferably in which the handles are substantially identical, and preferably in which the cam means comprises or includes an inclined surface of the bar in engagement or engageable with detent means in the form of a curved surface on the latch member, and preferably in which the resilient means comprises a helical-coiled compression spring in a chamber, at one end of the latch member remote from the portion which projects in the first position.

6. A door and handle assembly as claimed in any one of the preceding claims in which the handle means comprises two handles which are interconnected by a bridge-piece that extends from the first side to the second side of, and embraces the thickness of, the door, and preferably in which a single slot is provided in the door for mounting the handle means and latch member thereto, and preferably in which the bridge piece has an opening for the latch member and preferably in which the distance apart of the handles can be varied to accommodate different thickness of the door and preferably in which the bridge
piece comprises two parts interconnected by a tongue and groove arrangement.

7. A kit of parts to be attached to a door, said kit of parts comprising a latch member adapted to be mounted in the door and resilient means to bias the latch member to project from the door when mounted therein, a bar adapted to be arranged in a rest position, transversely across the latch member and across the door with cam means on the bar co-operable with detent means on the latch member, handle means adapted to be mounted on at least one of opposing first and second sides of the door, the arrangement being such that, in use on the door, the bar is capable of being moved, on actuation of the handle means, in at least one longitudinal direction across the latch member to retract the latch member from said first position and from engagement with a door frame on which the door is mounted, said movement of the bar causing the detent means to ride on the cam means and thereby retract the latch member against the biasing provided by the resilient means, and on release of the handle means the latch member and the bar are returned to their first and rest positions respectively by the resilient means, and in which the handle means is adapted for use on at least one of opposing first and second sides of the door as aforesaid so that the door can be opened only from that side and said handle means being so configured that it can be used in combination with substantially identical handle means mountable on the other of said opposing first and second sides so that the door can be opened from each of said first and second sides on actuation of the respective handle means.

8. A door and handle assembly comprising a latch member movably mounted in the door and biassed to project therefrom, in a first position, by resilient means, a bar arranged, in a rest position, transversely across the latch member and across the door, said bar having cam means co-operable with detent means on the latch member, handle means, comprising or including an actuating plate or panel, on at least one of the opposing first and second sides of the door, the arrangement being such that, in use, the bar is capable of being
moved, on actuation of the handle means, in at least one longitudinal direction across the latch member to retract the latch member from said first position and from engagement with a door frame on which the door is mounted, said movement of the bar causing the detent means to ride on the cam means and thereby retract the latch member against the biassing provided by the resilient means, and on release of the handle means the latch member and the bar are returned to their first and rest positions respectively by the resilient means and in which the or each actuating plate or panel is pivotally connected on the door and arranged to pivot about an axis generally parallel to the hinge axis of the door.

9. A door and handle assembly as claimed in claim 8 in which an intermediate portion of the or each actuating plate or panel is operatively, mechanically connected to a respective end of the bar thereby leaving a free end portion of the plate or panel spaced from the door, which plate or panel may be gripped by hand.

10. A door and handle assembly as claimed in claim 8 or 9 in which the pivoting axis of the or each actuating plate or panel is fixed relative to the door and the actuating plate or panel does not become disconnected from the door or bar on actuation of said plate or panel.

11. A door and handle assembly as claimed in any one of claims 8 to 10 in which handle means is provided on both sides of the door and the handle means are substantially identical to one another.

12. A door and handle assembly as claimed in claim 11 in which a stop is provided on one of the door and bar to limit movement of the bar from the first side of the door to the second side of the door thereby to restrain the actuating plate or panel on said first side from being generally pushed towards said second side.

13. A door and handle assembly as claimed in claim 11 or 12 having a limit stop on one of the door and bar to limit movement of the bar in a direction from the second side of the door to the first side after
the latch has been retracted.

14. A door and handle assembly as claimed in any one of claims 11 to 13 in which the bar has angled ends terminating in part-spherical tips, which tips are slidably located in slots in each of the handle means.

15. A door and handle assembly as claimed in claim 1 or in any one of claims 8 to 14 in which the latch member is hollow.

16. A door and handle assembly as claimed in claim 15 in which the resilient means is inside the latch member.

17. A door and handle assembly as claimed in claim 16 in which a portion of a latch cover extends into slots in the hollow latch member to provide an abutment for the resilient means and yet allow the latch member to move axially relative to the cover.

18. A door and handle assembly as claimed in any one of claims 8 to 17 in which the or each actuating plate or panel has outwardly directed ends.

19. A door and handle assembly as claimed in any one of claims 8 to 18 in which the actuating plate or panel is square or rectangular.

20. A door and handle assembly as claimed in any one of claims 8 to 19 in which the greatest dimension of the plate or panel is parallel to the pivoting axis of the plate or panel.

21. A door and handle assembly as claimed in any one of claims 8 to 20 in which the actuating plate or panel is of size having two sides of a ratio lying in the range 2:3 to 8:9.

22. A door and handle assembly as claimed in any one of claims 8 to 21 in which the dimension of the actuating plate or panel parallel to the pivoting axis is at least 8 cm.
23. A door and handle assembly as claimed in claim 22 in which said plate or panel dimension is within the range of 8 cm to 18 cm.

24. A door and handle assembly as claimed in any of the preceding claims in which the actuating plate or panel is of uniform cross section.
INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 85/00001

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all.)
According to International Patent Classification (IPC) or to both National Classification and IPC

IPC: E 05 C 1/14

II. FIELDS SEARCHED

Classification System | Classification Symbols
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IPC | E 05 C

Document types searched other than Minimum Documentation to the extent that such documents are included in the Fields Searched

III. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of Document, with indication, where appropriate, of the relevant passages | Relevant to Claim No.
|---|---|---
X | US, A, 2485042 (FRIEND) 18 October 1949 see the entire document | 1-5, 7-13, 15, 16, 18-24 |
| X | US, A, 2479256 (RADCLIFFE) 16 August 1949 see the entire document | 1, 2, 4, 5, 7-13, 15-19 |
| A | FR, A, 2125817 (MULLER-CARRANZA) 29 September 1972 see figure 5 | 14 |

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IV. CERTIFICATION

Date of the Actual Completion of the International Search 1st April 1985
Date of Mailing of this International Search Report 10 MAI 1985
International Searching Authority EUROPEAN PATENT OFFICE
Signature of Authorized Officer G.L.M. Kindenbergh

Form PCT/ISA/210 (second sheet) (January 1985)
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