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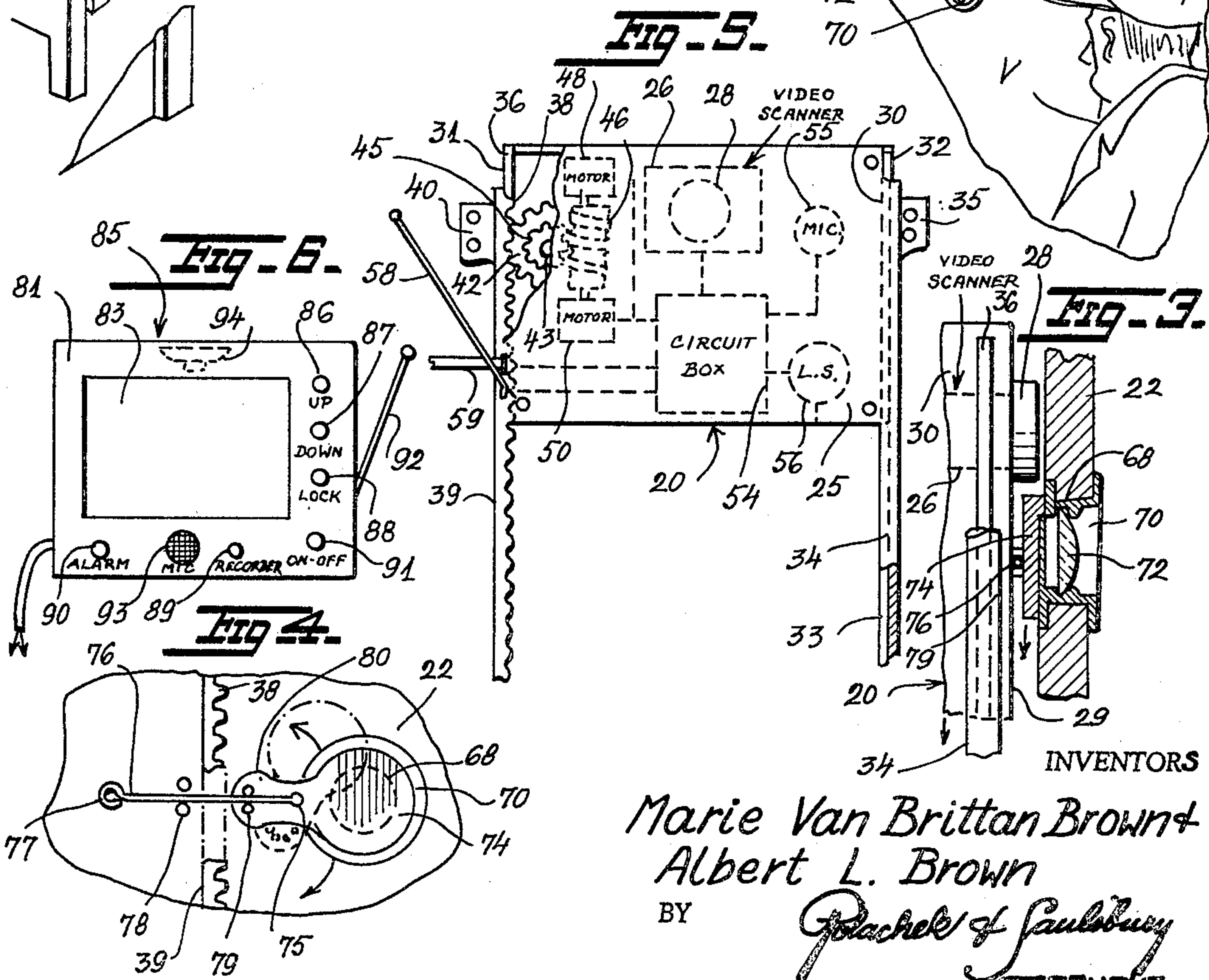
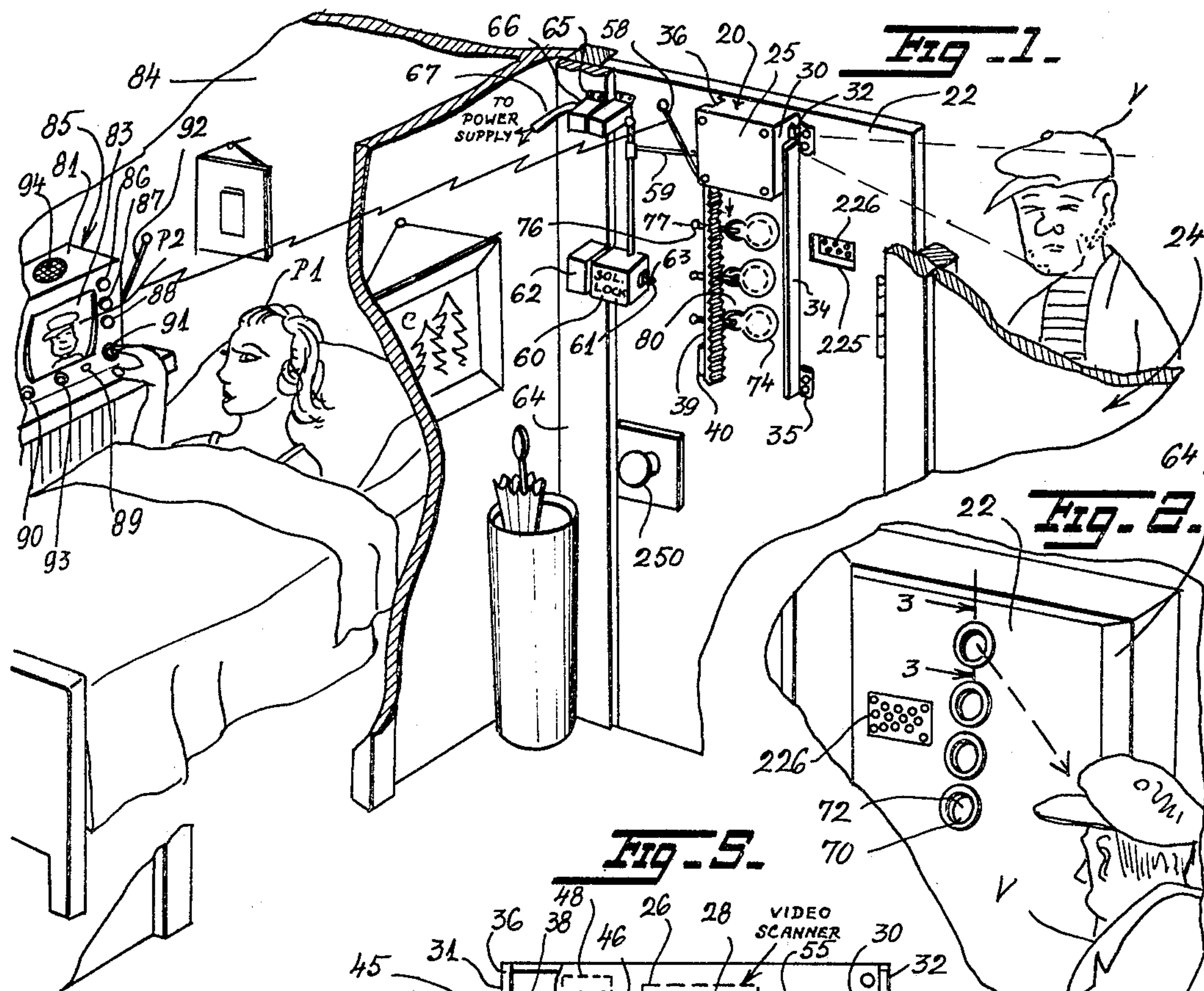
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3,482,037

HOME SECURITY SYSTEM UTILIZING TELEVISION SURVEILLANCE

Filed Aug. 1, 1966

3 Sheets-Sheet 1



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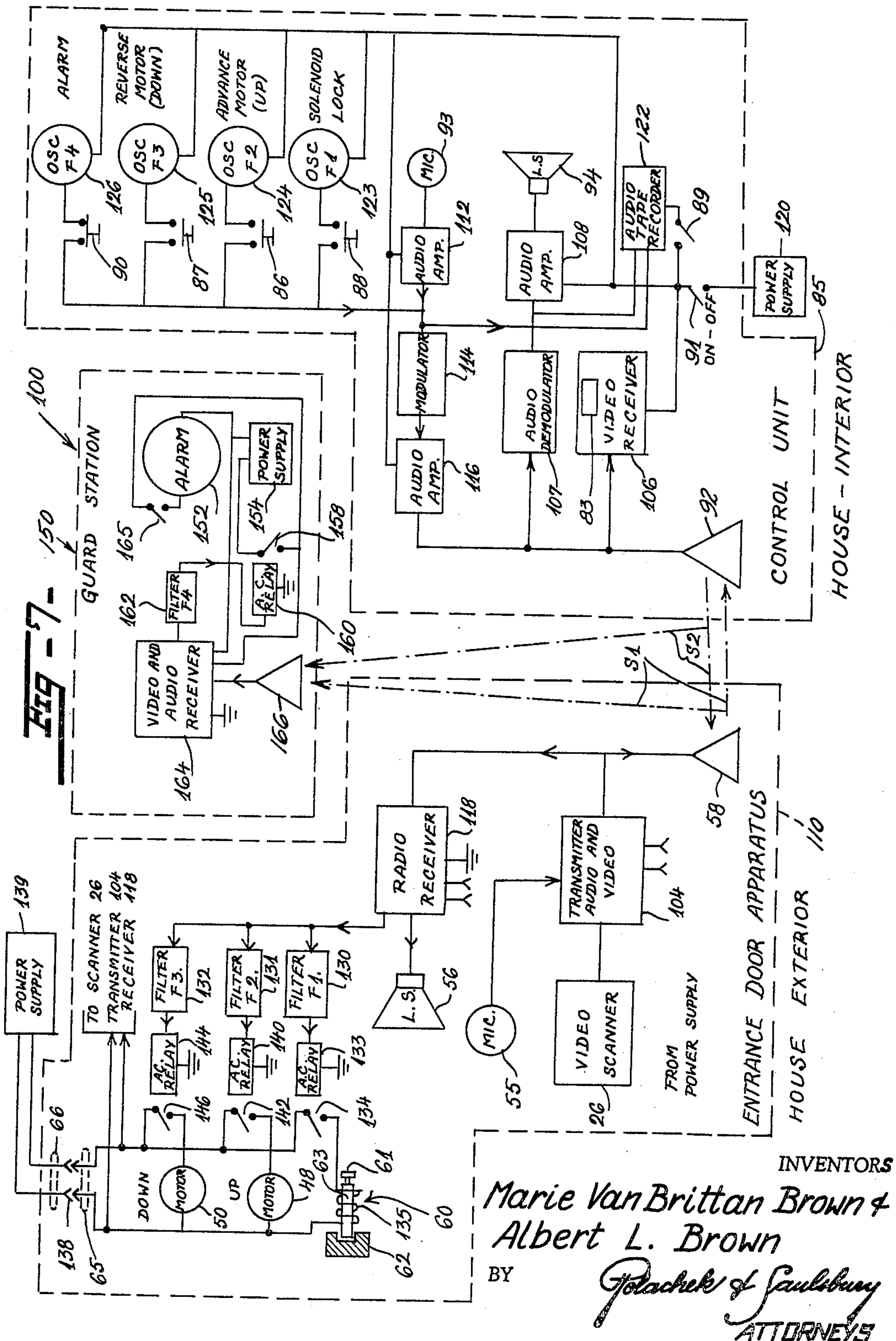
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3



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## HOME SECURITY SYSTEM UTILIZING TELEVISION SURVEILLANCE

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1 Claim

### ABSTRACT OF THE DISCLOSURE

A video and audio security system for a house under control of an occupant thereof. The system includes a video scanning device at the entrance door of the house to scan a visitor outside the door, and includes audio intercommunication equipment inside and outside the door for conversing with the visitor outside the door. A lock is provided for the door with releasing means for the lock manually controlled by the occupant of the house.

This invention relates to a home security system, and more particularly concerns a system including apparatus mounted at an entrance door of a house, and other co-operating apparatus located remotely in a room of the house.

According to the invention a video scanning device is mounted on an entrance door of a house or apartment to scan a visitor standing at the door. A video picture is transmitted by wireless to a video receiver located in a bedroom or other room of the apartment or house so that an occupant of the house can see who is at the door. The apparatus includes audio intercommunication equipment so that the house occupant can converse with the visitor if desired. The door is equipped with a radio controlled lock which can be actuated by the house occupant to unbolt the door if entry of the visitor is desired. Audio recording means are provided for recording the conversation with the visitor standing at the door. A radio controlled alarm may also be provided for alerting a guard, policeman or watchman at a security station. The alarm will be actuated by and under the control of the house occupant. The security station may be equipped with video and audio receiving equipment to monitor the video and audio signals passing between the apparatus at the entrance door and the house occupant. The monitoring of these signals will occur under control of the house occupant. The video scanning device at the door can be stationary with an optical arrangement for scanning the field of view at the entrance door. Alternatively, the scanning device can be movable under control of the house occupant for varying the scanned field of view.

It is therefore a principal object of the invention to provide a security system for a house, under control of an occupant thereof.

A further object is to provide an entrance door of a house with video equipment for scanning a visitor at the door, and with audio intercommunication equipment at the door so that an occupant of the house can converse with a visitor at the door.

A further object is to provide a security system for a house, the system having devices operable by an occupant of the house, such as devices including an alarm to alert a guard at a security station, video and audio receiving equipment for monitoring video and audio signals, audio recording apparatus, a solenoid controlled safety lock at the entrance door, motor means for moving a scanning device at the entrance door, etc.

For further comprehension and of the objects and advantages thereof, reference may be had to the following description and accompanying drawings and to the ap-

ended claim in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

FIGURE 1 is a perspective view with portions broken away of parts of a security system embodying the invention, shown installed at an entrance door of a house and in a bedroom of the house.

FIG. 2 is a fragmentary perspective view of the front of the entrance door illustrating the arrangement of the apparatus thereat.

FIG. 3 is an enlarged fragmentary sectional view taken on line 3-3 of FIG. 2.

FIG. 4 is a rear elevational view of part of the entrance door.

FIG. 5 is an enlarged rear view of part of the apparatus at the entrance door.

FIG. 6 is a front view of a video-audio receiver and control unit employed in the system.

FIG. 7 is a diagram of the security system.

FIG. 8 is a perspective view of a security scanning device and part of an entrance door upon which the device can be mounted.

FIG. 9 is a side view of the scanning device of FIG. 8, shown mounted on the entrance door part of which is shown in vertical section.

FIG. 10 is a top view of the scanning device of FIGS. 8, 9, and

FIG. 11 is a sectional view, partially in side elevational taken on line 11-11 of FIG. 10.

Referring now to FIGS. 1-6, the security system includes a rectangular cabinet 20 shown movably mounted on the rear of entrance door 22 of a house or apartment 24. The cabinet has a removable rear cover 25 providing access to components inside the cabinet. In the cabinet is a video scanner 26 such as conventionally used in television systems. The scanner has a lens barrel 28 projecting out of the front side 29 of the cabinet and slightly spaced from the rear side of the door 22; see FIG. 3.

On one side 30 of the cabinet is a vertical ridge 32 which fits slidably in a groove 33 formed in a vertical rail 34 secured by brackets 35 to the rear side of the door 22. On the other side 31 of the cabinet is a slot 36 in which extends teeth 38 of a stationary rack gear 39 mounted vertically on the door by brackets 40. A spur gear 42 mounted on a horizontal shaft 43 is meshed with the teeth 38 of the rack gear. On shaft 43 is a worm gear 45 meshed in axially vertical worm 46, the worm is supported by axially aligned shafts of two motors 48, 50 inside the cabinet; see FIG. 5. The motors are electrically connected to a circuit box 54 in the cabinet. Also connected to the circuit box is a microphone 55, a loudspeaker 56 and the video scanner 26, as indicated by dotted lines in FIG. 5. A television antenna 58 is mounted on side 31 of the cabinet and is connected to the circuit box. An electric cable 59, connected to the circuit box, extends out of the cabinet and is connected to a solenoid operated bolt lock 60. This lock has a bolt 63 engageable by an associated catch member 62 mounted on the jamb 64 of the door. Knob 61 on the bolt enables manual retraction and extension of the bolt. Cable 59 is also connected to an interlock switch plug 65 mounted on the door. This plug is engaged by an associated interlock switch receptacle 66 mounted on the door jamb 64. Power supply cable 67 is connected to receptacle 66.

By the arrangement described, electric power is brought to the motors 48, 50 for driving the cabinet 20 up and down at the rear side of the door. In the door is a line of vertically spaced holes 68 in which are mounted rings 70. Lenses 72 are fitted in the rings. Each lens is covered by a plate 74 eccentrically and pivotally supported



by a pin 75 on the door. At each plate 74 is a wire spring 76. Each spring extends horizontally and has one end secured by a screw 77 to the door. Each spring extends horizontally between a pair of spaced pins 78; see FIG. 4. The right free end of each spring extends between a pair of pins 79 mounted on a short lever 80 integral with plate 74 and extending to the left as shown in FIG. 4. By this arrangement, the plate 74 can be pivoted away from its normal position covering a hole 68 in the door. When the cabinet 20 is driven up or down, the scanner lens barrel 28 will engage each plate 74 in turn to displace it from the covered hole 68. When the lens barrel passes the deflected plate, this plate will be returned by spring 76 to normal position covering a hole 68.

At a guarded location such as a bedroom 84 remote from entrance door 22 is a control unit 85 of the system housed in part in cabinet 81. Thus unit has a video receiving screen 83 best shown in FIGS. 1 and 6. On the cabinet 81 are controls 86, 87 which control up and down movements respectively of the cabinet 20 containing scanner 26 and other components of the system. A door lock control 88, audio recorder control 89, alarm control 90, and ON-OFF switch control 91 are also provided on the unit where they can be conveniently operated by an occupant P1 of the house or apartment 24. An antenna 92 on the unit 85 is used for receiving video signals and for both receiving and transmitting modulated radio frequency signals. A microphone 93 and loudspeaker 94 are also provided on control unit 85.

FIG. 7 shows system 100 digrammatically employing components already mentioned in connection with FIGS. 1-6. The entrance door apparatus 110 includes video scanner 26 connected to audio-video transmitter 104 which is connected to antenna 58. Microphone 55 is also connected to an input of the transmitter. The combined audio-video signal S1 is transmitted, from antenna 58 and is picked up by antenna 92 at the control unit 85. Antenna 92 is connected to video receiver 106, and a picture appears on screen 83 of the video receiver. Antenna 92 is also connected to an audio demodulator 107 which removes the audio signal from signals S1 and applies it to audio amplifier 108 so that it is heard on loudspeaker 94.

For audio intercommunication purposes, microphone 93 is connected to audio amplifier 112. The amplified audio signal is modulated in modulator 114 and the modulated carrier drives audio amplifier 116. A modulated radio frequency carrier signal S2 is applied to antenna 92 and is radiated by this antenna. Signal S2 is picked up by antenna 58 and applied to radio receiver 118 forming part of apparatus 110. The received audio frequency signal is reproduced at loudspeaker 56.

For control purposes there is provided ON-OFF switch 91 at unit 85 in circuit with power supply 120 and audio tape recorder 122, video receiver 106, audio amplifiers 108 and 112 and oscillators 123-126. The oscillators all emit different signal frequencies F1-F4. In series with each oscillator is a pushbutton control switch 88, 86, 89, 90, respectively, connected to modulator 114. When one of these switches is closed at the control unit 85, the associated oscillator connected to modulator 114 applies a signal thereto be modulated on the radio frequency carrier applied to amplifier 116.

At the apparatus 110 are selective filters 130, 131 and 132 tuned to frequencies F1, F2 and F3 respectively. Filter 130 is connected to a relay 133 having normally open contacts 134. Contacts 134 are connected in series with solenoid 135 which retracts bolt 63 of solenoid lock 60. The bolt is manually set into engagement with catch member 62 of the lock. When solenoid 135 is energized the bolt 63 retracts to open the lock. Contacts 134 and solenoid 135 are connected in series with plug 65 which engages contacts 138 in receptacle 66 terminating at power supply 139.

Filter 131 is connected to relay 140 which has normally open contacts 142 connected in series with motor 48

and plug 65. Filter 132 is connected to relay 144 which has normally open contacts 146 connected in series with motor 50 and plug 65. The plug 65 and receptacle 66 constitute an interlock switch which cuts off the power supply from components in apparatus 110 when the door 22 is open.

The system 100 also includes apparatus 150 at a guard station. This apparatus has an audible or visual alarm 152 connected in series with power supply 154 via a manually operable switch 165 and normally open contact 158 of a relay 160. The relay is connected to filter 162 tuned to the same frequency F4 as oscillator 126. The filter is connected to the output of video and audio receiver 164. Receiver 164 has an antenna 166 which receives both signals S1 and S2 radiated between antennas 58 and 92.

In operation of the apparatus shown and described in FIGS. 1-7 relating to the security system, the switch 91 will be closed to alert the control unit 85 for action. The solenoid controlled lock 60 will be set by manually pushing bolt 63 into engagement with catch 62. When the door 22 or 22a is closed, the interlock switch 65, 66 will pass power to energize the scanner 26, transmitter 104 and radio receiver 118. The tape recorder and oscillators at unit 85 will be normally deenergized. They will preferably be transistorized so as to become activated instantly when any of the switches 86-90 is closed. The video receiver and audio and radio amplifiers are energized by the power supply when switch 91 is closed. Suppose now that a visitor V comes to the door 22 or 22a. The occupant P1 of the house will see picture P2 of the visitor on the screen 83 as shown in FIG. 1. By pushing either buttons 86 or 87 the drive motors 48 or 50 will be energized to drive the cabinet 20 up or down to obtain the best view of the visitor. If door 22a is employed, the motors 48, 50 and controls 86, 87 will not be required. The occupant P1 will interrogate the visitor V as to his business by speaking into microphone 93. The occupant P1 will hear the reply via loudspeaker 94. The microphone 55 at the door is sensitive enough to pick up the visitor's reply at the door, passage 225 passes sound waves through door 22 or 22a. The visitor will hear the occupant's inquiry from loudspeaker 56 via passage 225.

If the visitor is to be admitted, the occupant will press button 88 which will result in withdrawal of bolt 63 from catch member 62 to open the lock 60. Then the visitor can turn door knob 250 to open the door.

Suppose the visitor V is a prowler or other undesired person, the occupant P1 can press recorder button 89 to obtain an audio record on tape of the interrogation and reply of the visitor. If the occupant P1 feels that a real danger exists of some unlawful act or entry, the occupant will press the alarm button. This will activate the alarm 152 at the guard station. At the same time the receiver 164 will display the picture of the visitor and the audio signals passing back and forth between the occupant and the visitor can be heard at receiver 164. The guard or policeman at the guard station will thus be able to monitor the audio and video signals and can keep the entire situation under surveillance to take whatever protective action may be required.

It will be noted that the oscillators 123-126 generate the appropriate signals for operating the lock 60, motors and alarm. Filters 130-132 pass the selected signals for operating the lock or motors. Filter 162 passes the signal F4 to activate the alarm 152 and also to activate the receiver 164. Thus the occupant P1 is able to obtain police help if desired and to keep control of the situation at the entrance door at all times.

In FIGS. 8-11 is shown a cabinet 20a which can be mounted on a door 22a in a security system including most of the apparatus described in connection with FIG. 7. Corresponding parts having like functions are identically numbered. Cabinet 20a has a removable rear cover 25a. On the front wall 29a of the cabinet is a rectangular tubular arm 200 extending outwardly. This arm serves as a bracket to support the cabinet on door 22a. The door



has a rectangular notch 202 at its upper end to receive the arm 200. The arm is formed with a depending flange 204 which abuts the front of the door. This flange has corner holes 206 to receive anchoring screws 208. Depending eyes 210 are formed at the bottom end of the front of the cabinet to receive anchoring screws 212. An optical tube 214 is formed on arm 200 at its forward end. This tube has a downwardly inclined barrel 216 in which is a lens 218. In the optical path P' of the lens is an angularly disposed mirror 220 inside the barrel which deflects the scanned line of sight into the barrel 28a of video scanner 26 inside of cabinet 20a. Antenna 58 and cable 59 extend laterally of the cabinet. Microphone 55 and loudspeaker 56 are mounted behind openings 224 in the front wall 29a. These openings communicate with a passage 225 in the door protected by a perforated plate 226. Sound waves pass freely through this plate and passage 225 to and from the microphone and loudspeaker respectively.

The door 22a will be equipped with the power interlock switch and the solenoid controlled lock in the same manner as described in connection with FIGS. 1 and 7. The components of cabinet 20a will be connected in system 100 in the same manner as shown in FIG. 7. Motors 48, 50, relays 140, 144 and filters 130, 131 will be removed since cabinet 20a does not require them. Cabinet 20a is fixed in position. The optical field scanning lens 218 is so located that it encompasses the entire field F desired to be scanned in front of the door 22a by the video scanner 26.

Operation of the system employing cabinet 20a is the same as already described in connection with FIG. 7, with the exception of the motor drive for the cabinet.

In a security system employing cabinet 20 or 20a the same measure of security is afforded to the occupant P1 in the house or apartment 24. Complete and effective interview and surveillance of a visitor is had under control of occupant P1, with supervision and monitoring of the interview at the guard station if the occupant P1 deems it necessary.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise construction herein disclosed and that various changes and modifications may

be made within the scope of the invention as defined in the appended claim.

What is claimed is:

1. A security system for protecting the interior of a place of residence having an entrance door, comprising a plurality of windows in the door disposed in vertically spaced array; protective plates covering the windows, respectively; means pivotally supporting said plates on the door to clear each of the windows; a cabinet containing a video scanning device; gear means movably supporting the cabinet to move in a vertical path at the door; motor means in the cabinet engaged with said gear means to drive the video scanning device in said vertical path past the windows while the cabinet pivots each protective plate in turn to clear its associated window for exposing said video scanning device at the cleared window; a video signal transmitter in said cabinet connected to said video scanning device to send a picture of a scanned field in front of each cleared window in turn to a remote location in the interior of said place of residence; radio receiver means in said cabinet; radio transmitter means at said remote location for sending radio signals to said radio receiver; power supply means connected to said motor means for energizing the same to drive the video scanning device up and down; and switch means connected in circuit with said power supply and said radio receiver means for turning on the motor means selectively in response to receipt of a signal from said radio transmitter means, whereby the field in front of each cleared window is scanned in turn.

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