OPCON

AUTOMATIC DOOR OPERATOR CONVERSIONS

IN-FLOOR SWING DOOR OPERATORS

...WHERE DOOR AUTOMATION IS OUT OF SIGHT™

Historic Preservation-Custom Doors

Solutions for:

- Arched and slanted headers
- Low soffit conditions
- Overhead obstructions
- Where an overhead operator detracts

Converting many major manufacturers' automatic door operators to underground operation. Full-speed and ADA compliant.

All-Glass Frameless Doors

Solutions for:

- Patch fitting storefronts
- Keeping structural integrity intact
- Maintaining all-glass sight line
- ADA compliant systems

ANSI A156.19 (ADA-Low energy)
ANSI A156.10 (Full-speed)

OPCON MANUFACTURING SYSTEMS, INC.

P.O. BOX 308 CARLSBAD, CA 92018
Phone 760-720-3902 Fax 760-720-9653
www.opconusa.com sales@opconusa.com

OPCON

AUTOMATIC DOOR OPERATOR CONVERSIONS

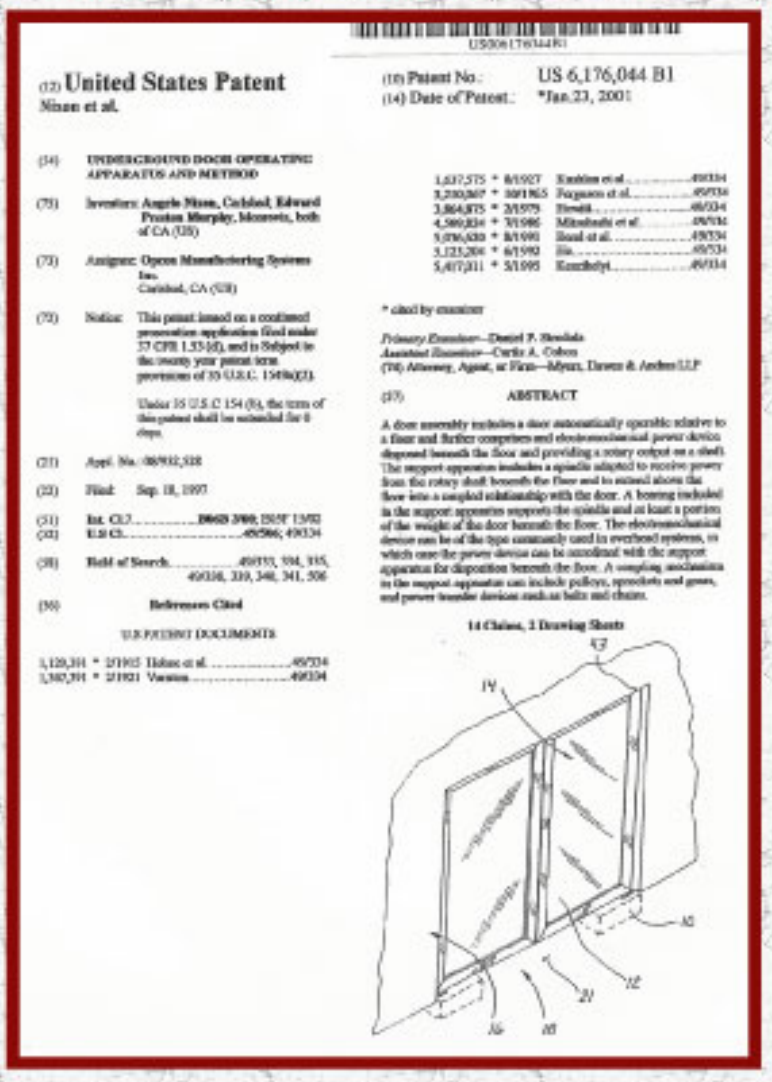
IN-FLOOR SWING DOOR OPERATORS

...WHERE DOOR AUTOMATION IS OUT OF SIGHT™

Features

- Patent number: US 6,176,044 B1
- Proudly made in the USA
- Converting many major automatic swing door operator products
- Working with AAADM certified installers
- Full-speed & ADA compliant systems
- Water-proof installation under threshold, under stone, under floors
- Small profile and floor blockout
- Adapts to most hardware applications: panic devices, electric strikes, sensors, etc.

Visit our website at www.opconusa.com to view drawings, specifications, manuals, our photo gallery and other important details.



US006176044B1

(12) **United States Patent**
Nixon et al.

(10) Patent No.: US 6,176,044 B1
(14) Date of Patent: *Jan. 23, 2001

(54) **UNDERGROUND DOOR OPERATING APPARATUS AND METHOD**

(75) Inventors: **Angelo Nixon**, Carlsbad; **Edward Preston Murphy**, Monrovia, both of CA (US)

(73) Assignee: **Opcon Manufacturing Systems Inc.**, Carlsbad, CA (US)

(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Under 35 U.S.C 154 (b), the term of this patent shall be extended for 0 days.

(21) Appl. No.: 08/932,518

(22) Filed: Sep. 18, 1997

(51) Int. Cl.7 ..... E05F 13/02
(52) U.S Cl. 49/506; 49/334

(58) Field of Search 49/353, 334, 335, 49/336, 339, 340, 341, 506

(56) **References Cited**

U.S PATENT DOCUMENTS

1,120,331 *	2/1915	Hahne et al.	49/334
1,367,391 *	2/1921	Vanston	49/334
1,637,575 *	8/1927	Knutzen et al.	49/334
3,230,667 *	10/1965	Ferguson et al.	49/334
3,864,875 *	2/1975	Hewitt	49/334
4,589,224 *	7/1986	Mitsubishi et al.	49/334
5,036,630 *	8/1991	Ikeda et al.	49/334
5,123,204 *	6/1992	Ito	49/334
5,417,011 *	5/1995	Kornhofer	49/334

* cited by examiner

Primary Examiner—Daniel P. Stodola
Assistant Examiner—Curtis A. Cohen
(74) Attorney, Agent, or Firm—Myers, Dawes & Andras LLP

(57) **ABSTRACT**

A door assembly includes a door automatically operable relative to a floor and further comprises and electromechanical power device disposed beneath the floor and providing a rotary output on a shaft. The support apparatus includes a spindle adapted to receive power from the rotary shaft beneath the floor and to extend above the floor into a coupled relationship with the door. A housing included in the support apparatus supports the spindle and at least a portion of the weight of the door beneath the floor. The electromechanical device can be of the type commonly used in overhead systems, in which case the power device can be coordinated with the support apparatus for disposition beneath the floor. A coupling mechanism in the support apparatus can include pulleys, sprockets and gears, and power transfer devices such as belts and chains.

14 Claims, 2 Drawing Sheets

OPCON MANUFACTURING SYSTEMS, INC.
P.O. BOX 308 CARLSBAD, CA 92018
Phone 760-720-3902 Fax 760-720-9653
www.opconusa.com sales@opconusa.com