

DAYTON

METAL PRODUCTS

division of Hope's® Windows, Inc.

BRENDA L. STRASSER – National Sales Manager

Mobile: 716-499-6945 – Toll-Free: 800-626-VENT (8368) – Fax: 716-665-7043

Email: bstrasser@daytonmetalproducts.com

84 Hopkins Avenue – Jamestown, NY14701

DAYTON OPERATOR

GENERAL DATA

There are two distinct types of mechanical operators suitable for use with industrial sidewall windows – the torsion lever arm type and the rack and pinion type. Both consist of a worm and gear power actuating a revolving horizontal pipe shaft. In either type the power may be controlled by means of:

- (1) A chain wheel with a continuous chain extending to within 2'-0" of the floor.
- (2) A vertical pipe shaft with handwheel attached to the lower end approximately 4'-0" above floor.
- (3) A vertical pipe shaft extending to a miter gear box controlled by handwheel or detachable crank handle at miter gear box located approximately 4'-0" above floor.

The above is common to both types of operators and the following outline describes the principal difference and respective advantages.

A-TORSION LEVER ARM TYPE

1. Force is transmitted from horizontal shaft to ventilators by means of malleable iron lever arms, and steel connecting bar.
2. Provides adequate control for short runs, although lever arm design develops more torsional stress in the horizontal shaft than that of rack and pinion design. Therefore, a finer adjustment is required to obtain tight closing of ventilators farthest removed from the power.
3. The use of oil enclosed powers increases the capacity of this operator a little, also provides easier and smoother operation.
4. This type of operator is most economical for short runs of windows.

B-RACK & PINION TYPE

1. Force is transmitted from horizontal shaft to ventilators by means of a reinforced pinion set screwed to the shaft and a rack arm held in mesh with the pinion by a floating steel yoke.
2. Provides very accurate control for any length of run within table of limits. This design develops minimum torsional stress and is most efficient type of operator.
3. The use of oil enclosed type powers increases the capacity of this operator considerably also provides easier and smoother operation.
4. This type of operator is most economical for long runs of windows.

The gear ratio for the 1400 series power is 20 to 1. The gear ratio for the 1800 series powers is 30 to 1.

All oil enclosed type powers are equipped with machine cut steel worms and mounted between ball thrust bearings. Worm gears are machine cut iron.

Refer to tables of limits shown on plate drawings 1400-21, 1800-23, for lever arm type and 1400-22, 1800-21 and 1800-22 for rack and pinion type.

Right angle transmission gears are furnished only with machine cut steel miter gears and enclosed in oil tight housing.

Crank or handwheel controlled miter gear boxes are available in either dust or oil enclosed types.

Chain wheel type powers are recommended for single runs only. For multiple runs, that is parallel lines of operators located one above the other and controlled from one station, use vertical shaft control with handwheel at miter gear box. In the latter case, use one power at each horizontal shaft.

If chain wheel control is required for multiple runs, use one right angle transmission gear-box at each horizontal shaft plus one power per group. Vertical shafting is required to connect the right angle transmissions. This arrangement should only be used when building conditions make it impossible to use vertical shaft and miter gear control.

Universal joints may be used to offset vertical shafts. Degree of offset should never exceed 35 degrees.

Horizontal shafts at right angles to each other may be controlled from a single power, provided that a right angle transmission gear box is used at the junction. This arrangement should be confined to short runs. Consult Home Office whenever necessary to use this arrangement.

Generally, horizontal and vertical shafts are of 1-5/16" O.D. standard pipe coupled together with malleable iron or steel sleeve couplings. Standard practice is to attach the lever arms or rack arms to the hardware bracket located at the bottom of pivoted, top hinged and projected down and out ventilators. Arms are attached to the top of ventilators that are bottom hinged or projected up and in types only, or where clearance for arms is restricted, such as in craneways, etc.

All shaft hangers are roller bearing type and adjustable to compensate for variation in building construction. Hangers are located at each sash mullion and intervals not to exceed 8'-0" on centers along the walls should any occur between the extremities of the individual runs of operators. For hanger details see plate drawing 204-21.

STANDARD SPECIFICATION FOR TORSION, LEVER ARM OPERATOR PLATES No. 1400-21 - 1800-23

All windows as indicated on drawings and marked "mechanically operated" shall be equipped with Dayton torsion lever arm operators as manufactured by DAYTON METAL PRODUCTS.

OIL ENCLOSED POWERS

Powers shall be of the oil enclosed, worm and gear type. Worms shall be machine cut steel. Gears shall be machine cut iron. Ball thrust bearings shall be mounted at each end of the worm stems. Housing shall be grey iron carefully machined and fitted with gasket between lid and box to assure a grease tight box. All powers shall be packed with sufficient grease at the factory at time of assembly. Provide steel brackets for mounting powers to the building construction.

OPERATING LINE

Horizontal line shall consist of steel pipe shaft to which shall be attached malleable iron lever arms. Steel connecting rods, 1/4" x 1", shall be provided between the ends of lever arms and clips attached to the ventilators. Steel pipe shafts shall be not less than 1-5/16" O.D. standard pipe. Provide steel, roller-bearing type bracket hangers at window mullions and at intervals not to exceed 8'-0" on centers for the full length of each horizontal shaft.

CONTROLS

Specify only one of the following types of control.

CHAIN WHEEL CONTROL

Powers shall be fitted with chain wheels and guards. Power shall be exerted by a heavy steel, continuous chain extending from chain wheel to within 2'-0" from the floor level of the control station. Furnish single or double idlers as may be necessary for chain to clear building construction.

OIL ENCLOSED MITER GEAR AND VERTICAL SHAFT CONTROL

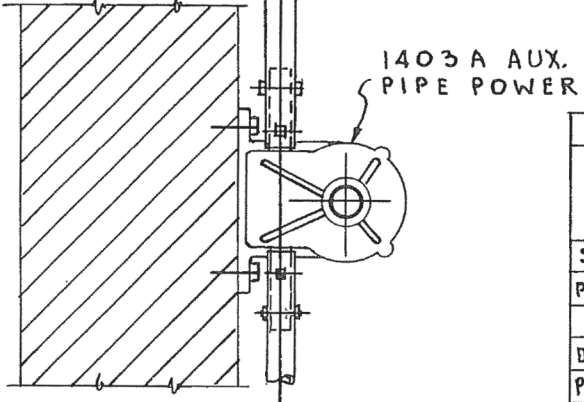
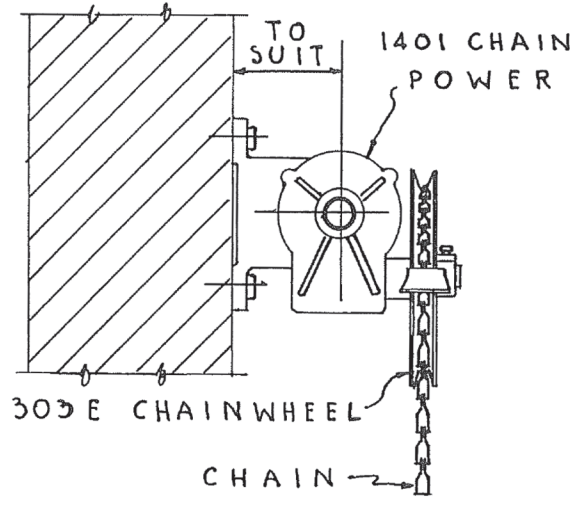
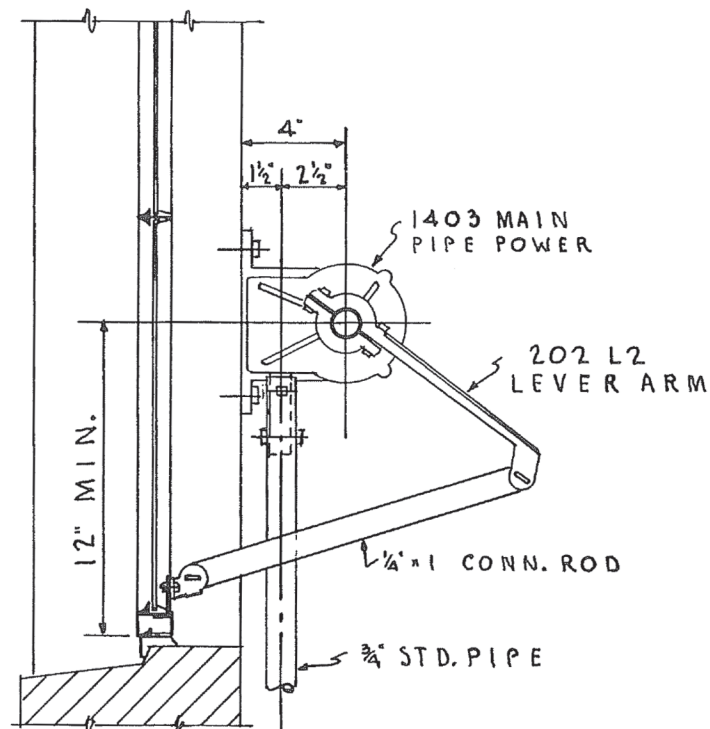
Provide oil enclosed type miter gear box and vertical shaft control as indicated on the drawings. Bevel gears shall be machine cut steel and mounted in grey iron housing of grease tight design for direct attachment to the building construction, approximately 4'-0" above the floor level. Gear boxes shall be packed with sufficient grease at the factory and shall be provided with handwheels or removable cranks as directed by the architect. Vertical shaft shall be not less than 1-5/16" O.D. standard steel pipe and shall be supported with steel roller-bearing brackets at intervals not to exceed 6'-0" on centers. Provide universal joints as required to change direction of vertical line to clear building construction. Change in direction of vertical line shall not exceed 35 degrees at any universal joint.

DIRECT HANDWHEEL CONTROL

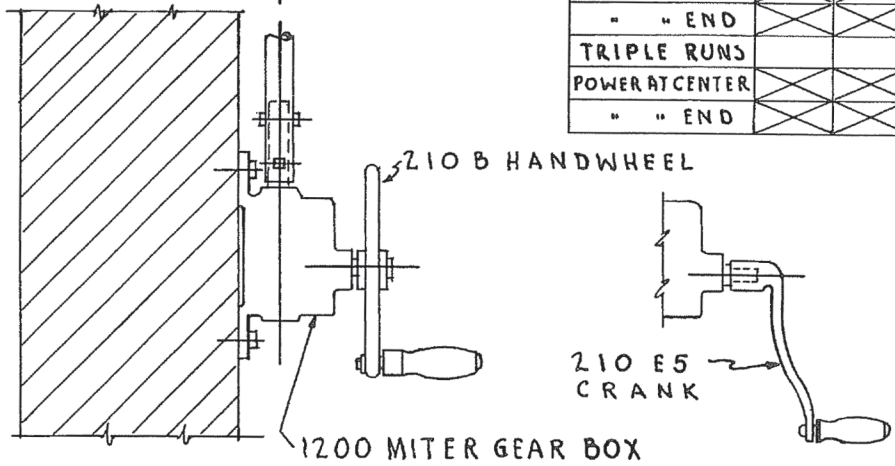
Provide direct handwheel control where the powers are within easy reach from the floor or as indicated on the drawings. Handwheel shall be attached direct to the worm stem of the power.

FACTORY FINISH

All operators to receive one coat of powder primer.



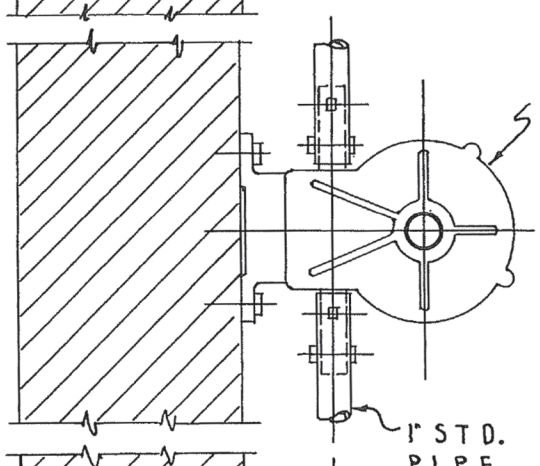
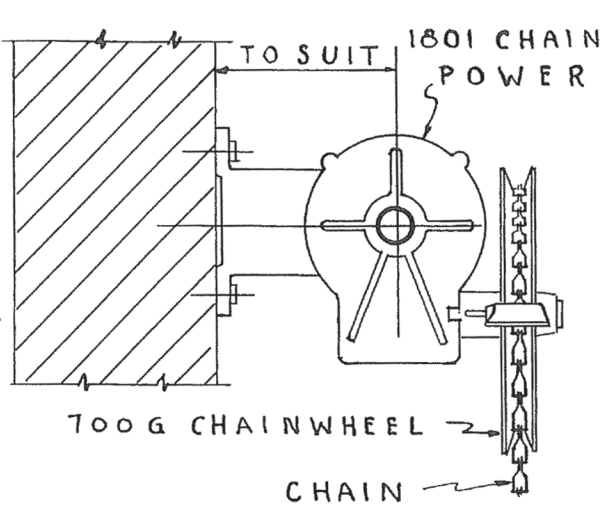
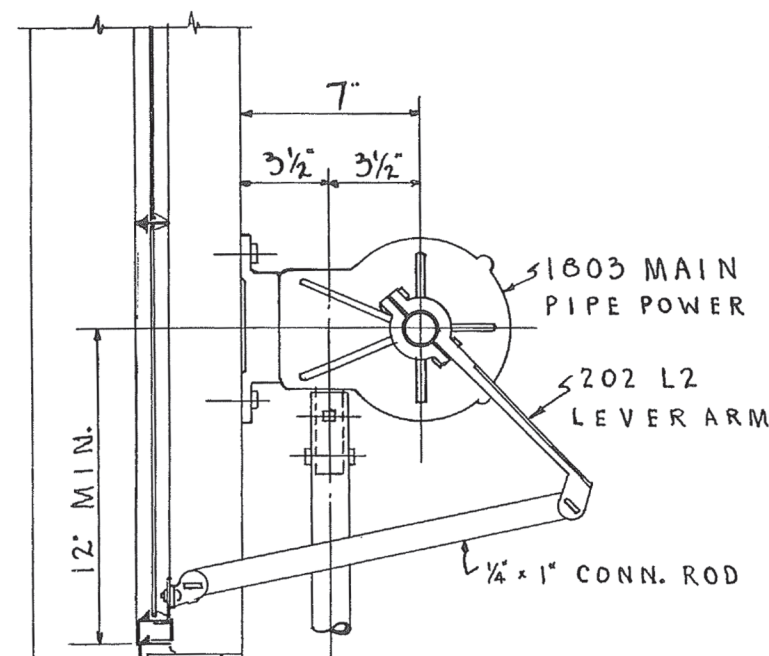
| | LEVER ARM LIGHT DUTY OIL ENCLOSED POWERS | | | | | | | |
|-----------------|--|-------|------------|-------|------------|-------|------------|-------|
| | CENTER PIVOTED | | | | PROJECTED | | | |
| | 1401 POWER | | 1403 POWER | | 1401 POWER | | 1403 POWER | |
| | FEET | VENTS | FEET | VENTS | FEET | VENTS | FEET | VENTS |
| SINGLE RUNS | | | | | | | | |
| POWER AT CENTER | 40 | 8 | 40 | 8 | 30 | 6 | 30 | 6 |
| " " END | 30 | 6 | 30 | 6 | 20 | 4 | 20 | 4 |
| DOUBLE RUNS | | | | | | | | |
| POWER AT CENTER | X | | 20 | 4 | X | | 20 | 4 |
| " " END | X | | 15 | 3 | X | | 15 | 3 |
| TRIPLE RUNS | | | | | | | | |
| POWER AT CENTER | X | | 15 | 3 | X | | 15 | 3 |
| " " END | X | | 10 | 2 | X | | 10 | 2 |



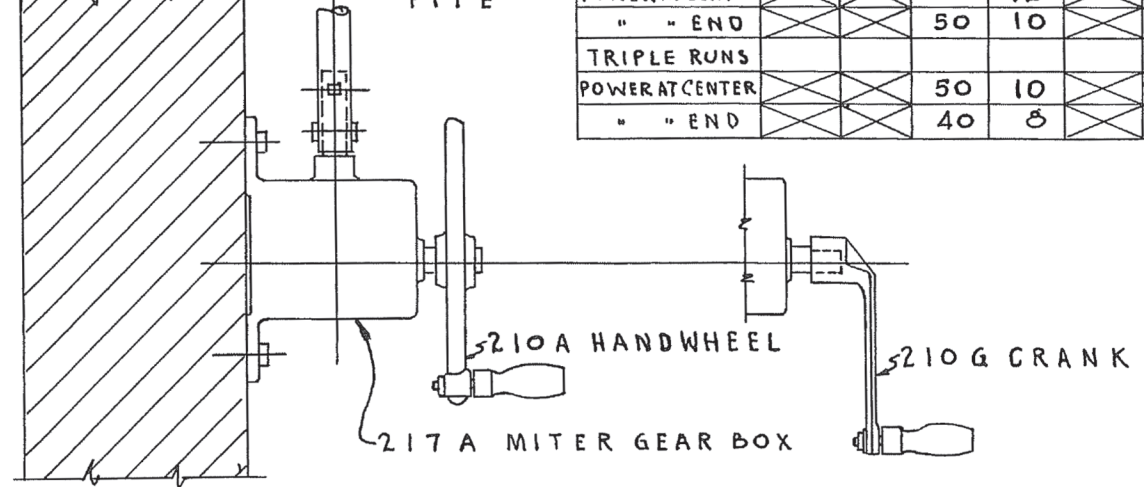
NOTE:
No. 1200 Miter Gear Box replaced by No. 217-A

VERTICAL SECTION

| | |
|----------------------------|--|
| 1400-21 | LEVER ARM SASH OPERATORS DAYTON METAL PRODUCTS |
| PIVOTED AND PROJECTED SASH | |



| | LEVER ARM OIL ENCLOSED POWERS | | | | | | | |
|-----------------|-------------------------------|-------|------------|-------|------------|-------|------------|-------|
| | CENTER PIVOTED | | | | PROJECTED | | | |
| | 1801 POWER | | 1803 POWER | | 1801 POWER | | 1803 POWER | |
| | FEET | VENTS | FEET | VENTS | FEET | VENTS | FEET | VENTS |
| SINGLE RUNS | | | | | | | | |
| POWER AT CENTER | 130 | 24 | 120 | 22 | 60 | 12 | 60 | 12 |
| " " END | 70 | 14 | 60 | 12 | 40 | 8 | 40 | 8 |
| DOUBLE RUNS | | | | | | | | |
| POWER AT CENTER | | | 60 | 12 | | | 40 | 8 |
| " " END | | | 50 | 10 | | | 30 | 6 |
| TRIPLE RUNS | | | | | | | | |
| POWER AT CENTER | | | 50 | 10 | | | 30 | 6 |
| " " END | | | 40 | 8 | | | 20 | 4 |



VERTICAL SECTION

| | |
|----------------------------|--|
| 1800-23 | LEVER ARM SASH OPERATORS DAYTON METAL PRODUCTS |
| PIVOTED AND PROJECTED SASH | |

STANDARD SPECIFICATION FOR RACK & PINION OPERATOR PLATES 1400-22 – 1800-21 – 1800-22

All windows as indicated on drawings and marked "mechanically operated" shall be equipped with Dayton rack and pinion type operators as manufactured by the DAYTON METAL PRODUCTS.

MANUALLY CONTROLLED

OIL ENCLOSED POWERS

Powers shall be of the oil enclosed, worm and gear type. Worms shall be machine cut steel. Gears shall be machine cut iron. Ball thrust bearings shall be mounted at each end of the worm stem. Housings shall be grey iron carefully machined and fitted with gasket between lid and box to assure a grease tight box. All powers shall be packed with sufficient grease at the factory at time of assembly. Provide steel brackets for mounting powers to the building construction.

OPERATING LINE

Horizontal line shall consist of steel pipe shaft to which shall be attached grey iron pinions which are meshed with steel rack arms, the ends of which are attached to the ventilators.

Steel pipe shaft shall be not less than 1-5/16" O.D. standard pipe. Provide steel, roller-bearing type bracket hangers at window mullions and at intervals not to exceed 8'0" on centers, for the full length of each horizontal shaft.

RACK ARMS

Steel rack arms shall be fabricated from 1/4" x 1" flat bars accurately cut to mesh with reinforced grey iron pinion. Arms to be held in mesh with pinion by floating steel yoke. Provide one arm for horizontally pivoted vents and two arms for all projected and top pivoted vents.

CONTROLS

Specify only one of the following types of control.

CHAIN WHEEL CONTROL

Powers shall be fitted with chain wheels and guards. Power shall be exerted by heavy steel, continuous chain extending from chain wheel to within 2'-0" from the floor level of the control station. Furnish double or single idlers as may be necessary for chain to clear building construction.

DUST PROOF MITER GEAR AND VERTICAL SHAFT CONTROL

Provide dust proof miter gear and vertical shaft control, as indicated on the drawings. Bevel gears shall be grey iron, and shall be mounted in dust proof grey iron box designed for

direct attachment to the building construction, approximately 4'-0" above the floor level of the control station. Miter gear boxes shall be provided with hand-wheels or removable cranks as directed by the architect. Vertical shaft shall be not less than 1-5/16" O.D. standard steel pipe and shall be supported with steel roller-bearing brackets at intervals not to exceed 6'-0" on centers. Provide universal joints as required to change direction of vertical line to clear building construction. Change in direction shall not exceed 35 degrees at any universal joint.

OIL ENCLOSED MITER GEAR AND VERTICAL SHAFT CONTROL

Provide oil enclosed type miter gear box and vertical shaft control as indicated on the drawings. Bevel gears shall be machine cut steel and mounted in grey iron housing of grease tight design for direct attachment to the building construction, approximately 4'-0" above the floor level. Gear boxes shall be packed with sufficient grease at the factory and shall be provided with handwheels or removable cranks as directed by the architect. Vertical shaft shall be not less than 1-5/16" O.D. standard steel pipe and shall be supported with steel roller-bearing brackets at intervals not to exceed 6'-0" on centers. Provide universal joints as required to change direction of vertical line to clear building construction. Change in direction of vertical line shall not exceed 35 degrees at any universal joint.

DIRECT HANDWHEEL CONTROL

Provide direct handwheel control where the powers are within easy reach from the floor or as indicated on the drawings. Handwheel shall be attached direct to the worm stem of the power.

FACTORY FINISH

All operators shall receive one coat of powder primer.

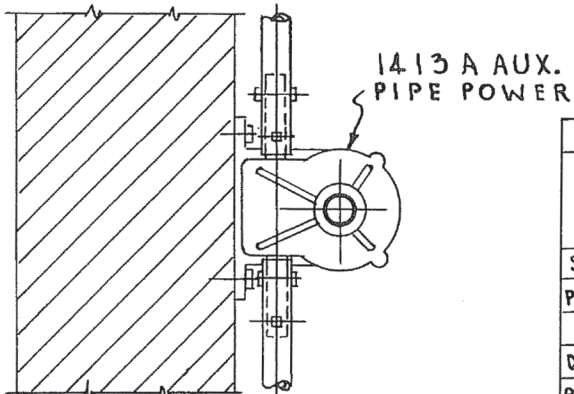
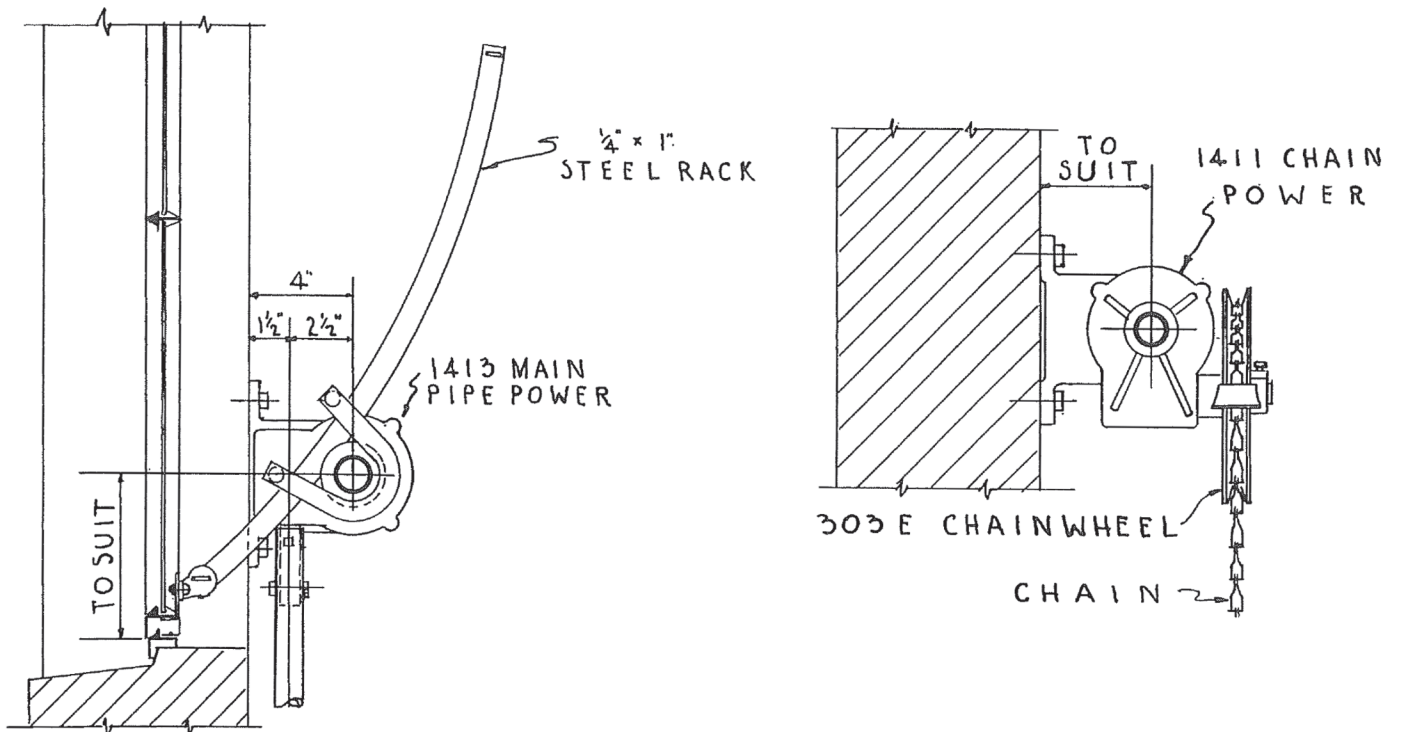
SPECIAL RACK ARM INFORMATION

We also manufacture heavy duty rack arms fabricated from

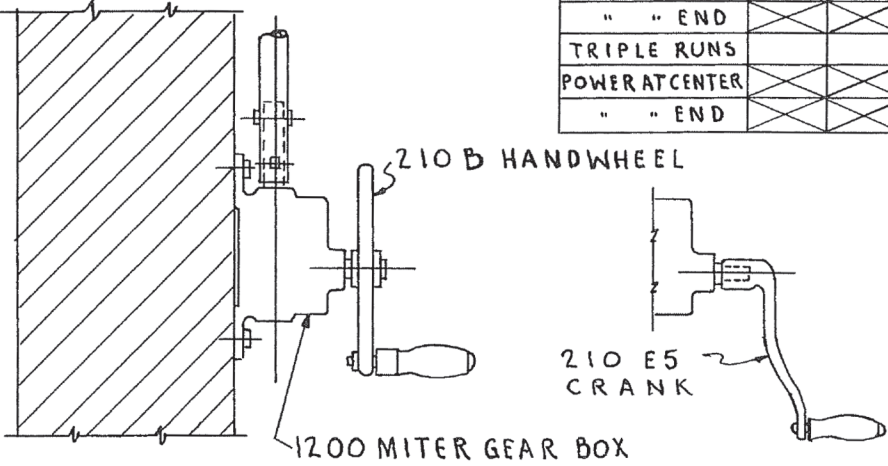
1/4" x 1-1/4", 5/16" x 1-1/4" Flat Racks

3/4" x 1-1/4" x 1/4" Tee Racks

Straight or Curved as required.



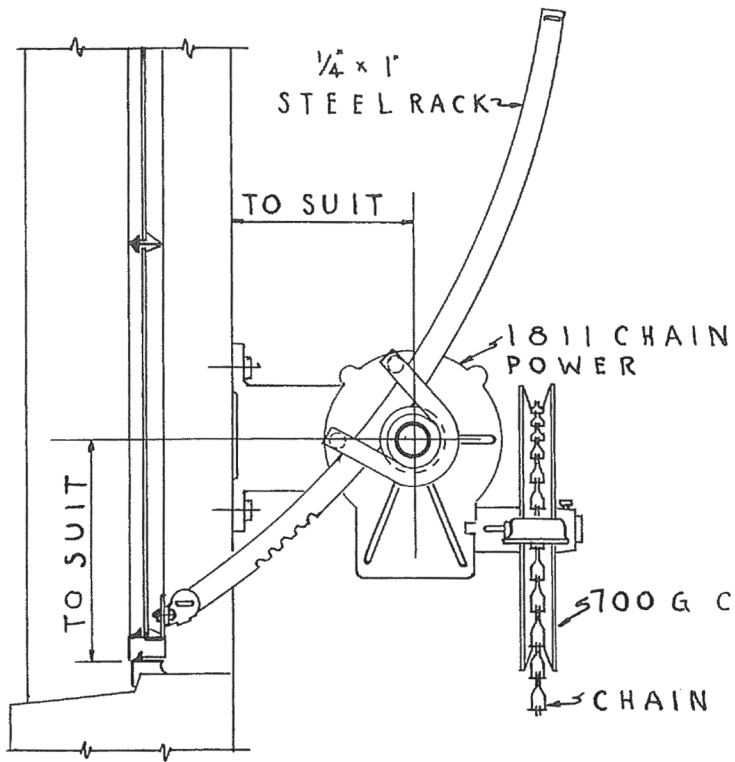
| RACK + PINION LIGHT DUTY OIL ENCLOSED POWERS | | | | | | | | |
|--|----------------|-------|------------|-------|------------|-------|------------|-------|
| | CENTER PIVOTED | | | | PROJECTED | | | |
| | 1411 POWER | | 1413 POWER | | 1411 POWER | | 1413 POWER | |
| | FEET | VENTS | FEET | VENTS | FEET | VENTS | FEET | VENTS |
| SINGLE RUNS | | | | | | | | |
| POWER AT CENTER | 60 | 12 | 60 | 12 | 50 | 10 | 50 | 10 |
| " " END | 40 | 8 | 40 | 8 | 30 | 6 | 30 | 6 |
| DOUBLE RUNS | | | | | | | | |
| POWER AT CENTER | | | 40 | 8 | | | 30 | 6 |
| " " END | | | 30 | 6 | | | 20 | 4 |
| TRIPLE RUNS | | | | | | | | |
| POWER AT CENTER | | | 30 | 6 | | | 20 | 4 |
| " " END | | | 20 | 4 | | | 10 | 2 |



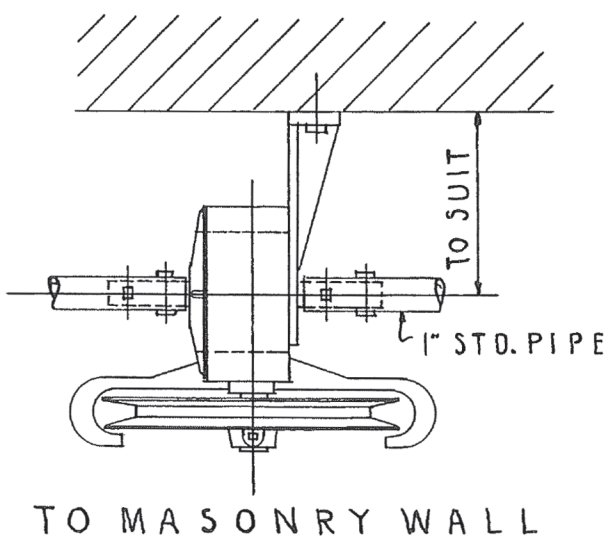
NOTE:
No. 1200 Miter Gear Box
replaced by No. 217-A

VERTICAL SECTION

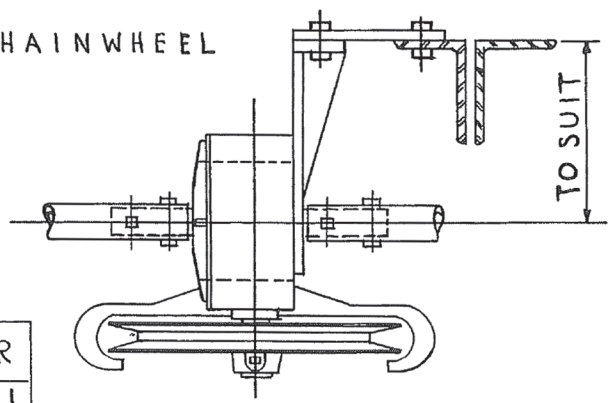
| | |
|----------------------------|--|
| 1400-22 | RACK & PINION SASH OPERATORS DAYTON METAL PRODUCTS |
| PIVOTED AND PROJECTED SASH | |



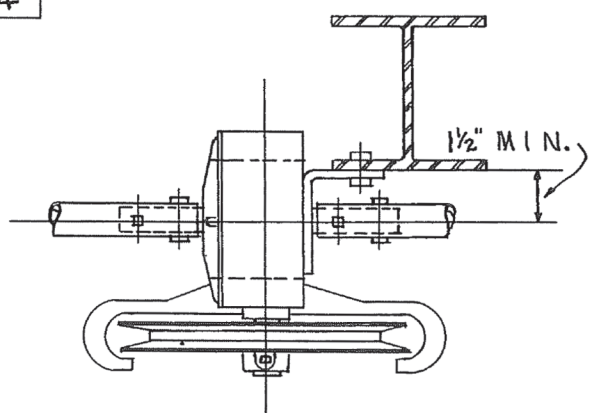
VERTICAL SECTION



TO MASONRY WALL



TO TRUSS ANGLES



TO COLUMN

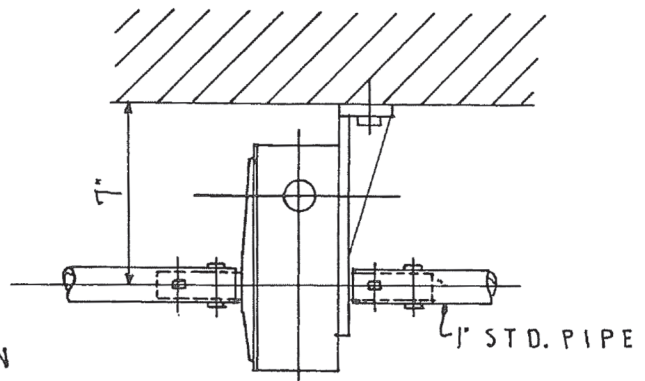
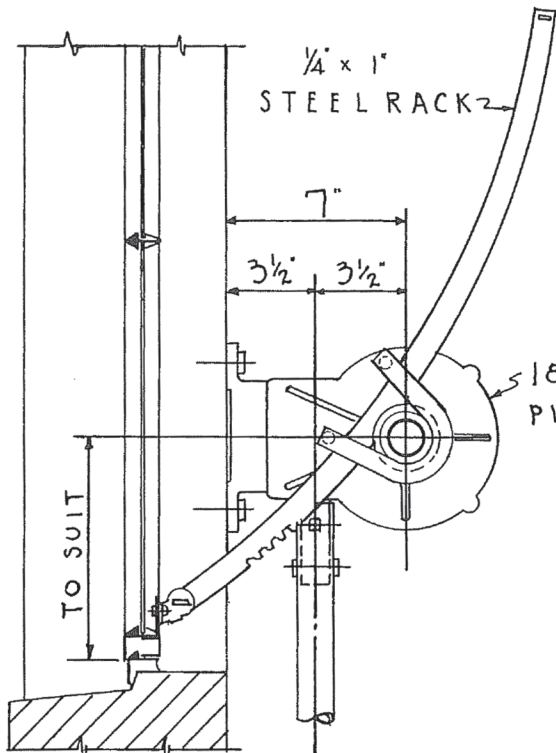
| RACK + PINION OIL ENCLOSED POWER | | | | | |
|----------------------------------|---------|-------|-----------|---------|-------|
| CENTER PIVOTED | N° 1811 | | PROJECTED | N° 1811 | |
| | FEET | VENTS | | FEET | VENTS |
| POWER AT CENTER | 200' | 40 | | 120' | 24 |
| " " END | 100' | 20 | | 70' | 14 |

1800-21

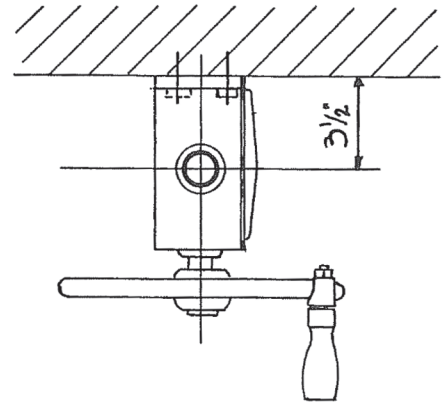
PIVOTED AND
PROJECTED SASH

RACK & PINION SASH OPERATORS

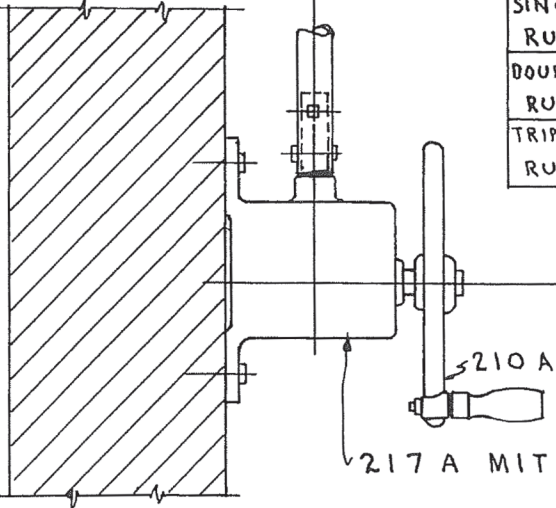
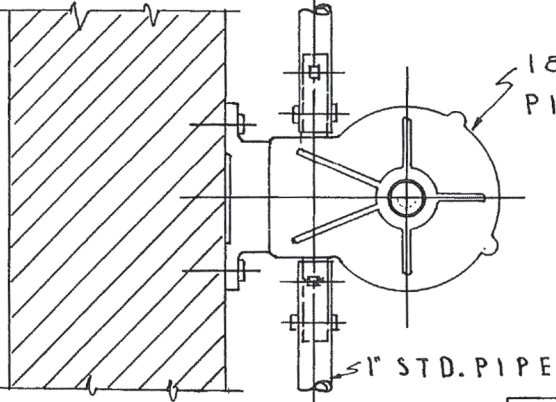
DAYTON
METAL PRODUCTS



PLAN OF POWERS



PLAN OF MITER GEAR BOX



VERTICAL SECTION

| RACK + PINION OIL ENCLOSED POWER | | | | | | |
|----------------------------------|-------------------|---------|-------|-----------|---------|-------|
| | CENTER PIVOTED | N° 1813 | | PROJECTED | N° 1813 | |
| | | FEET | VENTS | | FEET | VENTS |
| SINGLE | POWER AT CENTER | 180 | 36 | X | 100 | 20 |
| RUN | " " END | 100 | 20 | | 60 | 12 |
| DOUBLE | " " CENTER | 100 | 20 | X | 70 | 14 |
| RUN | " " END | 50 | 10 | | 40 | 8 |
| TRIPLE | " " CENTER | 60 | 12 | X | 40 | 8 |
| RUN | " " END | 30 | 6 | | 20 | 4 |

1800-22

PIVOTED AND
PROJECTED SASH

RACK & PINION SASH OPERATORS

DAYTON
METAL PRODUCTS

ELECTRICALLY CONTROLLED PLATE No. 1800-26

MOTORS

All motors shall be ample horsepower, 230/460 volt, 60 hertz, 3 phase totally enclosed, ball bearing, low slip type with high starting torque. Connections from motor to power shall be by means of roller chain drive.

Motor, limit switch, timing gears and power shall be assembled in shop, and shipped to the building site as one complete unit.

REVERSING SWITCH PANELS

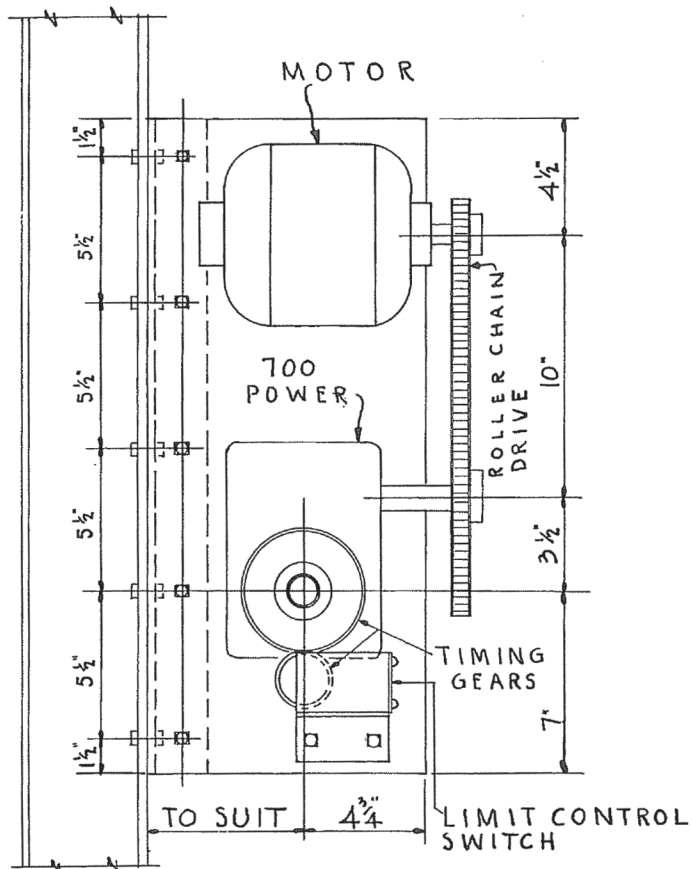
Shall be enclosed in steel boxes and so designed that the manipulation of the push buttons will stop or start the movement of the sash in opening or closing at any point.

LIMIT SWITCHES

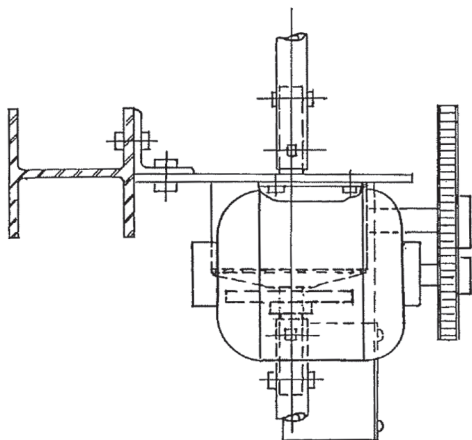
Shall be rigidly attached to each operating power to automatically cut off current when the window reaches a fully open or closed position.

PUSH BUTTON STATIONS

With "Open" "Close" "Stop" buttons of substantial construction shall be provided.



ELEVATION



PLAN

911-E MOTORIZED POWER

| RACK + PINION OPERATORS FOR CENTER PIVOTED + PROJECTED SASH | | | | |
|---|--------------|------------------|--------------|------------------|
| | PIVOTED | | PROJECTED | |
| | 1" STD. PIPE | 1" EX. HVY. PIPE | 1" STD. PIPE | 1" EX. HVY. PIPE |
| POWER AT CENTER | 200' | 300' | 160' | 250' |
| " - END | 80' | 150' | 80' | 125' |

| RACK + PINION OPERATORS FOR TOP HUNG CONTINUOUS SASH | | | | | | | |
|--|-----------|--------------|------------------|------------------|------------------|------------------|------------------|
| | SASH HGT. | VERTICAL | | | 30° OFF VERTICAL | | |
| | | 1" STD. PIPE | 1" EX. HVY. PIPE | 1 1/2" STD. PIPE | 1" STD. PIPE | 1" EX. HVY. PIPE | 1 1/4" STD. PIPE |
| POWER AT CENTER | 3'-0" | 200' | 240' | 260' | 200' | 240' | 260' |
| " " END | | 100' | 120' | 130' | 100' | 120' | 130' |
| " " CENTER | 4'-0" | 180' | 215' | 235' | 170' | 210' | 230' |
| " " END | | 90' | 105' | 120' | 85' | 105' | 115' |
| " " CENTER | 5'-0" | 160' | 190' | 210' | 140' | 180' | 200' |
| " " END | | 80' | 95' | 105' | 70' | 90' | 100' |
| " " CENTER | 6'-0" | 140' | 165' | 185' | 110' | 150' | 170' |
| " " END | | 70' | 80' | 90' | 55' | 75' | 85' |

1800-26

PIVOTED AND PROJECTED SASH
T. H. CONT. SASH

RACK & PINION MOTORIZED OPERATORS

DAYTON
METAL PRODUCTS

STANDARD SPECIFICATION EXPLOSION RELEASE OPERATORS FOR TOP PIVOTED AND PROJECT OUT WINDOWS

All sash as indicated on drawings and marked "mechanically operated" shall be equipped with Dayton explosion release operators as manufactured by DAYTON METAL PRODUCTS.

POWERS

All powers to be totally enclosed in heavy grey iron case and equipped with machine cut steel worm operating between ball thrust bearings and driving machine cut cast iron worm gear. Powers shall be packed with sufficient grease to properly lubricate the working parts for long periods without attention. Power boxes and lids shall be carefully machined and fitted with gasket to prevent grease from leaking.

POWER MOUNTING

Powers shall be mounted on steel brackets designed to suit the building construction.

CONTROLS

Where chain control powers are specified furnish galvanized hand chain to reach within two feet of the floor. Where handwheel control powers are specified furnish oil enclosed miter gear box with machine cut steel gears and 12" handwheel attached. Vertical shaft to be 1-5/16" O.D. pipe shaft and supported with roller bearing guides.

HORIZONTAL SHAFTING

All shafting shall be 1-5/16" outside diameter black steel pipe in lengths required and coupled with external malleable iron couplings.

SHAFT SUPPORTS

All shafting shall be supported by steel roller bearing hangers attached to vertical sash mullions and building construction. Shaft hanger shall be equipped with zinc plated steel rollers to assure free and easy movement of the shaft and reduce the friction to a minimum.

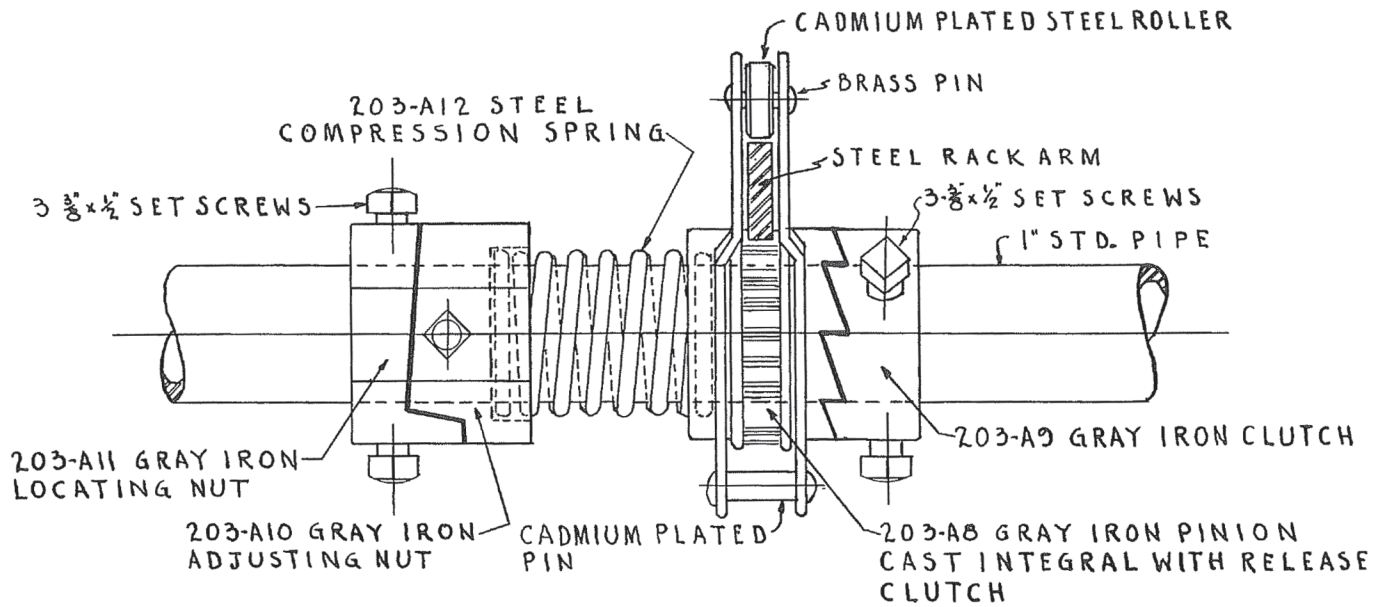
ARMS

All rack arms to be of solid steel and operating in conjunction with reinforced pinion and held in mesh with floating steel yoke. Arms to be made from 1/4" x 1" bar steel, toothed on the convex side and curved to conform with the arc of the window.

EXPLOSION RELEASE PINIONS

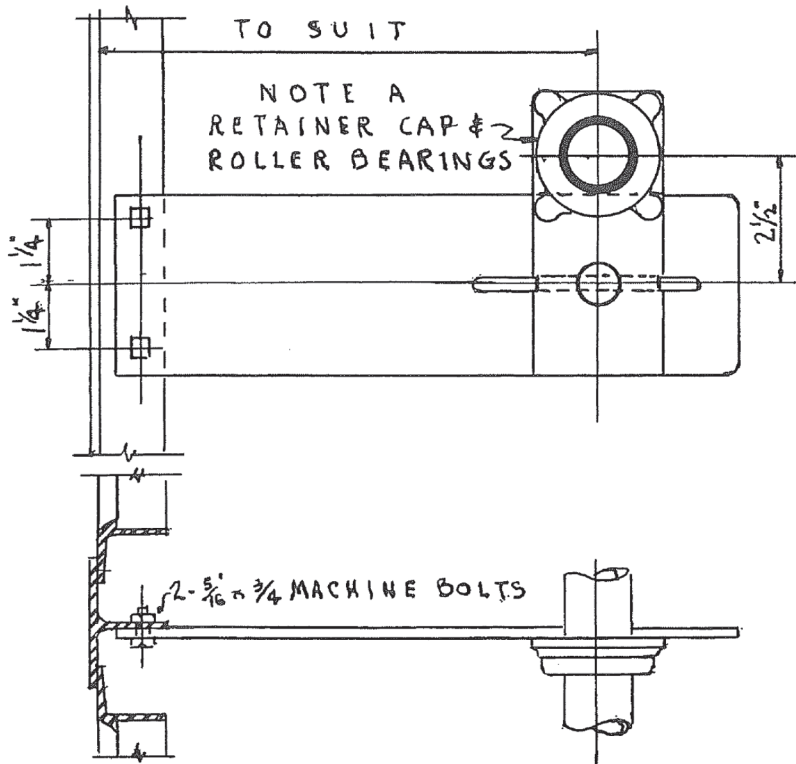
PLATE NO. 203-21

Provide explosion type pinion with teeth heavily reinforced. Pinions must turn free and also slide horizontally on the horizontal shaft. One member of the toothed automatic clutch shall be attached rigidly to the pinion, the other member of the clutch shall be attached rigidly to the horizontal shaft. Under normal conditions, the clutch teeth are held in mesh by a compression coil spring. Pinions shall be set so in the event of an explosion the pressure on the vent will put sufficient pull on the rack and pinion to overcome the pressure of the coil spring and friction teeth, allowing the racks to run outward turning the pinion as it goes. As the force of explosion is dissipated, the clutch teeth shall mesh again and the vent held in an open position until closed by operating the power. Should vents in one portion of the run be blown open while others remain closed, the open vents may be closed by operating the power without disturbing or adjusting the operator in any way.

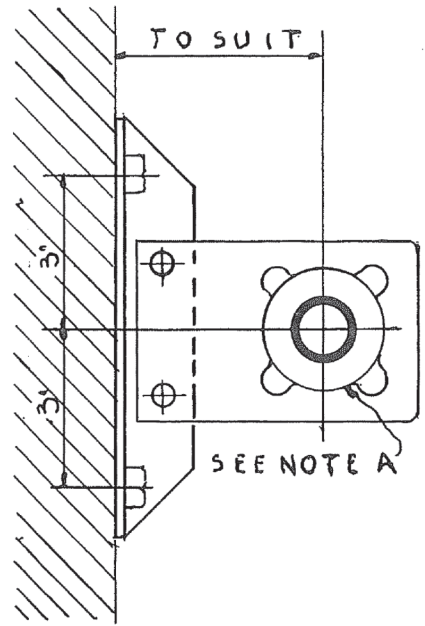


INTERIOR VIEW

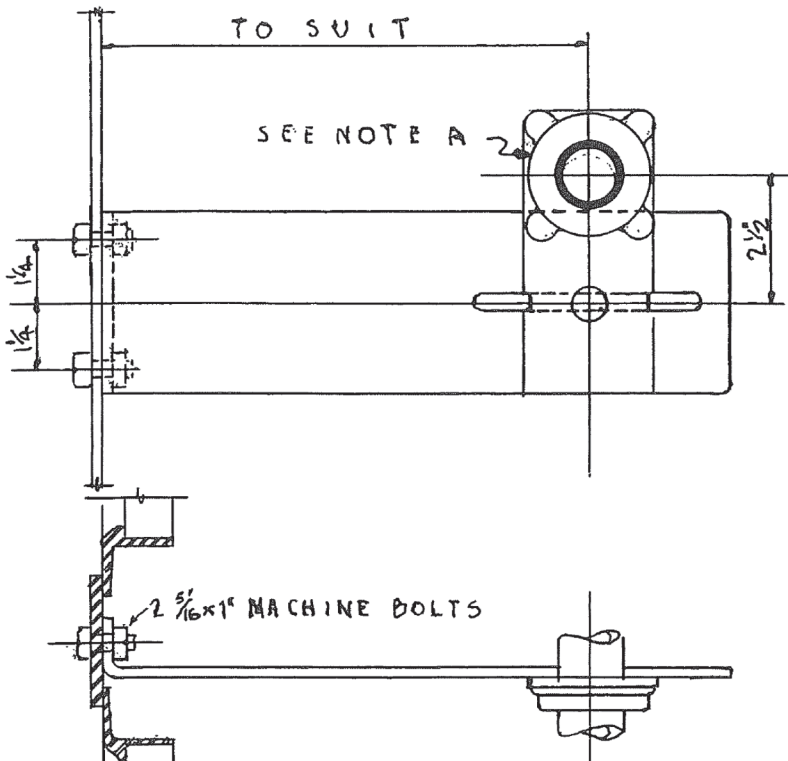
| | |
|------------------------------------|--|
| <p>203-21</p> | <p>203-E EXPLOSION RELEASE ASSEMBLY</p> |
| <p>PIVOTED AND TOP HINGED SASH</p> | <p>DAYTON METAL PRODUCTS</p> |



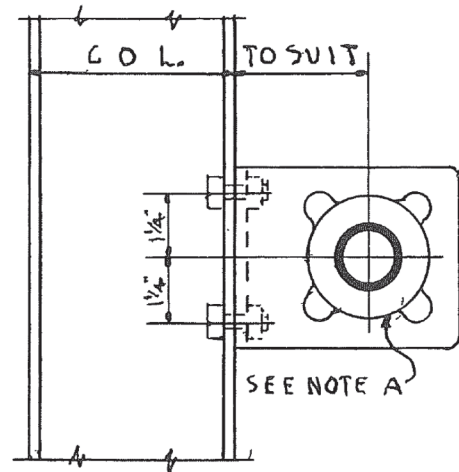
SHAFT SUPPORT TO TEE MULLION



SHAFT SUPPORT TO WALL



SHAFT SUPPORT TO PLATE MULLION



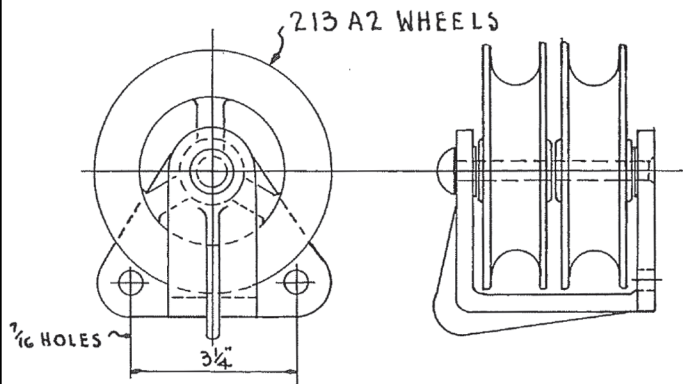
SHAFT SUPPORT TO COL.

204-21

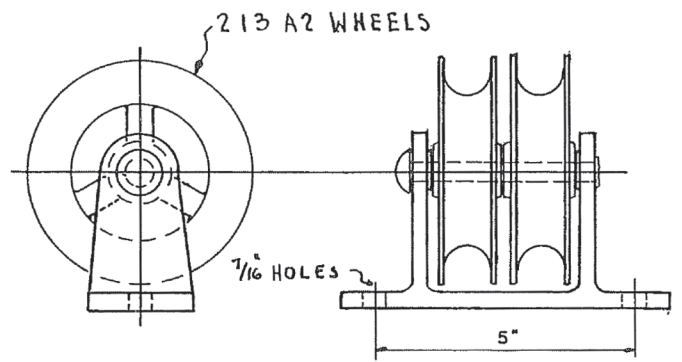
ROLLER BEARING SHAFT SUPPORT DETAILS

PIVOTED AND
PROJECTED SASH

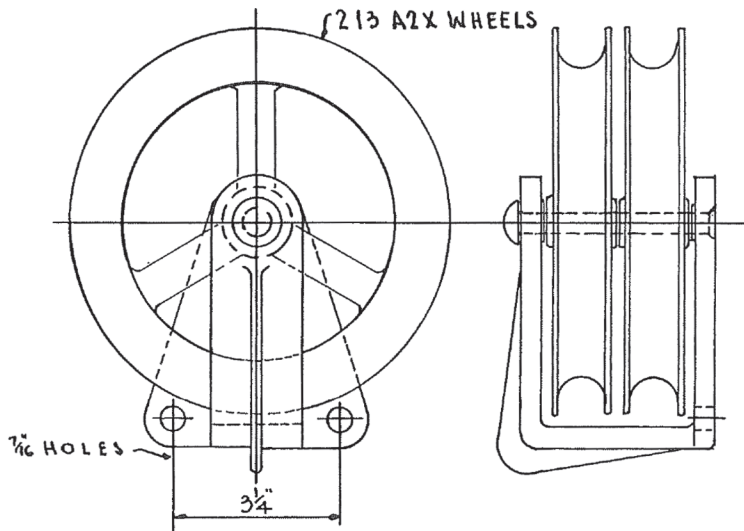
DAYTON
METAL PRODUCTS



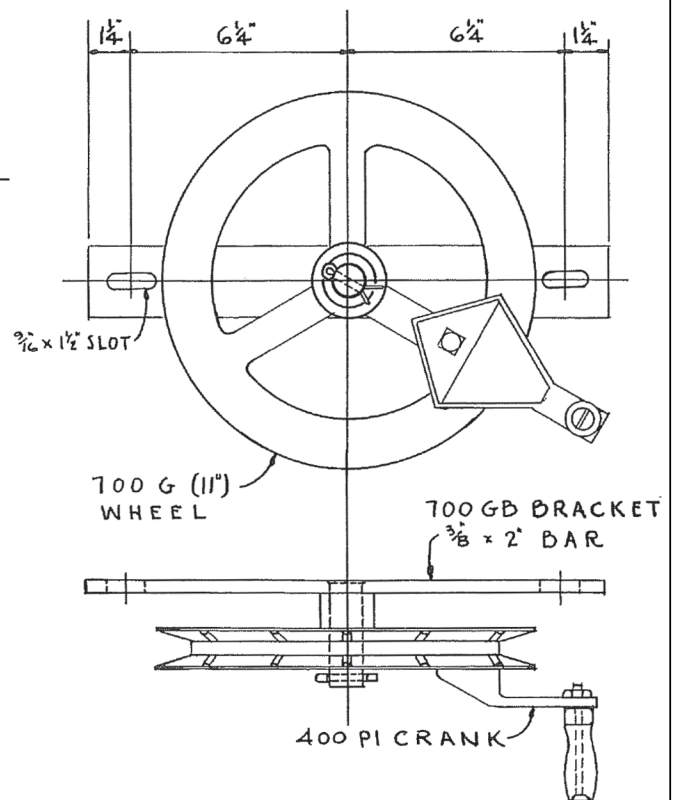
213 B CHAIN IDLER
DOUBLE OR SINGLE WHEEL



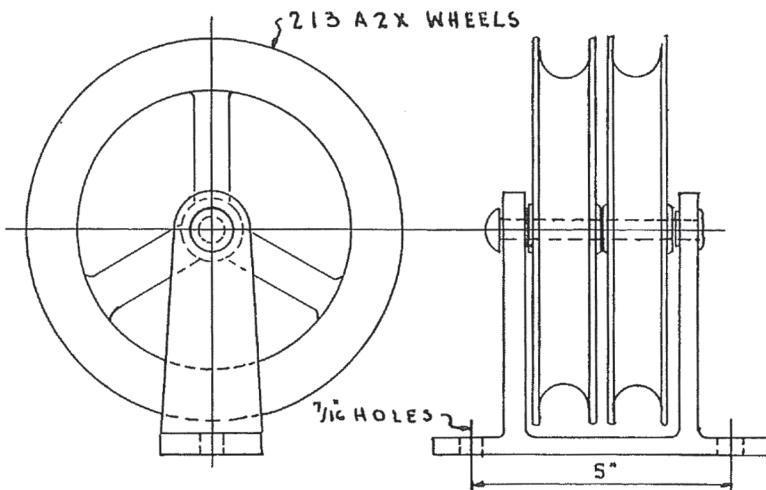
213 C CHAIN IDLER
DOUBLE OR SINGLE WHEEL



213 BX CHAIN IDLER
DOUBLE OR SINGLE WHEEL



700GS OPERATING WHEEL
FOR CHAIN CONTROL POWERS



213 CX CHAIN IDLER
DOUBLE OR SINGLE WHEEL

| | |
|---|--|
| 1100-213 | CHAIN IDLERS DAYTON METAL PRODUCTS |
| PIVOTED AND PROJECTED SASH T. H. CONT. SASH | |

POWDER PRIMER FACTORY FINISH

1. Following cleaning, gearing elements are coated with a urethane polyester powder coat that provides protection against abrasion and corrosion.
2. Powder coating shall be applied by electrostatic spray.
3. The parts are baked at a temperature of 375° F to completely cure the gray urethane polyester coating. The resulting coating provides a durable finish which is resistant to chipping, scratching and general abrasion experienced during the installation process.
4. After cooling, the components are ready for a field finish coat if desired.
5. Powder coatings are not intended for final finish coat.