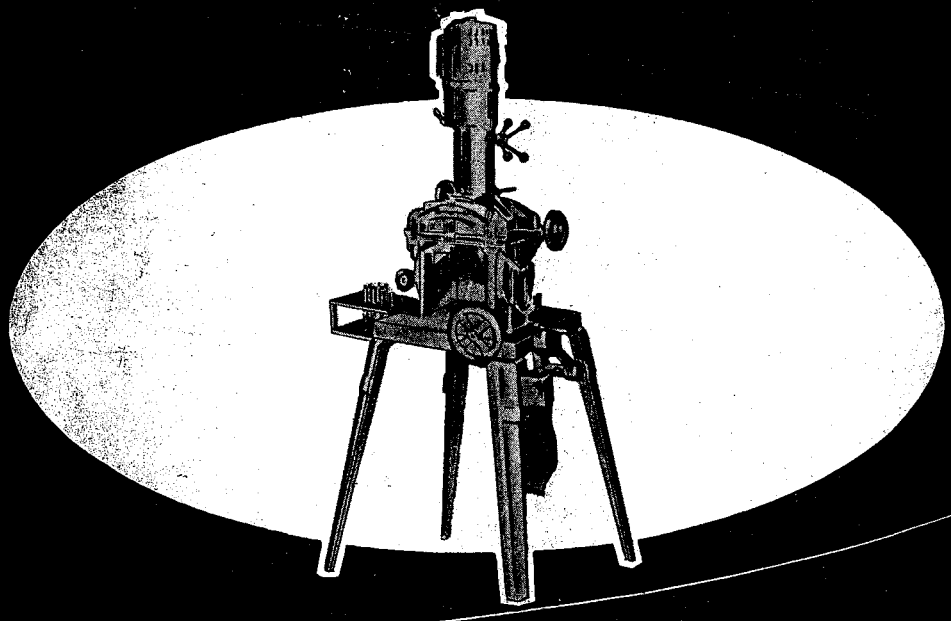
Brunswick

GOLD CROWN



Operation and Service Manual

BRUNSWICK CORPORATION
623 SOUTH WABASH AVENUE
CHICAGO 5, ILLINOIS

Index

Introduction

This manual will introduce you to the operation of **BRUNSWICK'S** exclusive Gil-Mac Bowling Ball Drill. This device has been developed so as to allow the operator to drill bowling balls in the most efficient, economical manner.

All parts are guaranteed against defective workmanship for ninety days. The three-quarter horse power motor carries a one year guarantee with the supplier. The special carbide tipped drills are guaranteed for ten years, as long as they are sharpened in accordance to the following conditions:

Whenever drills require sharpening, you must notify Mr. McCormick of the J-Dapter Company, address 1020 Home Avenue, Akron 10, Ohio. Mr. McCormick will immediately ship direct to you the sharp size drills you need and bill you fifty dollars per drill. As soon as the new sharp drills have been received, return your dull drills to Mr. McCormick. Upon their receipt, you will receive an additional billing of one dollar and fifty cents per drill, **less** fifty dollars previously charged. You will recall that these drills are leased to you at a charge of sixty-five dollars per year.

Installation Instructions

FOR THE BRUNSWICK (GIL-MAC) PRECISION CONTROL BALL DRILLER

1. Lay machine on side and attach legs at four corners with screws furnished. Place leg with two holes (for switch box) at corner between cam lever and span wheel. Draw screws tight.

2. Insert ball lifting pad No. 32.

3. Attach blower bag No. 1.

4. Attach switch box No. 34.

5. Lubrication:

   The oil reservoir of this machine has been filled with oil and test run in operating positions without leakage.

   At no time should there be over 1 quart of oil in the housing and original oil filling should last 4 to 5 years.

   Any additional refilling should be done with S. A. E. No. 30 non-detergent motor oil. Check oil level in No. 7 about once per month.

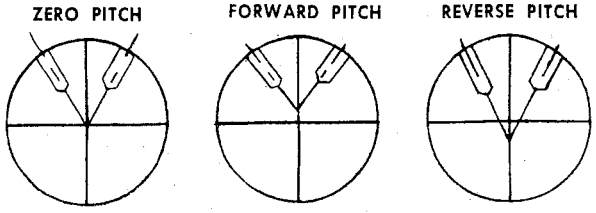
   Worms, worm gears, activating screws and nuts and quill should be given a light application of grease about once per month.

   No other lubrication is necessary.

6. Electrical:

   This machine is hooked up to run on 110 volts, A. C. — 60 cycles single phase, or 220 volts, A. C. single phase. If 220 volts, single phase, is used, the conversion should be made by an authorized electrician only.

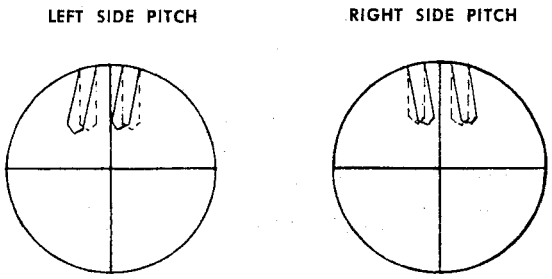
Definition of Terms



PITCH — The angle or slant of holes away from the center of the ball, either front, back, or side to side is called "pitch." The holes are bored with pitch to help the bowler in holding the ball, or conversely, to aid the bowler in getting his thumb and fingers out of the ball without bending.

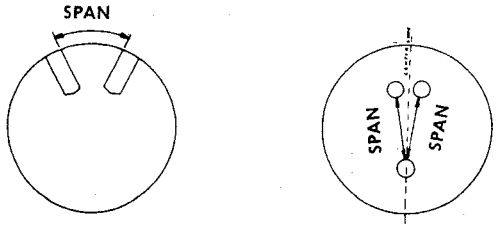
FORWARD PITCH — The angle or slant of the holes toward the vertical center line of the ball.

REVERSE PITCH — The angle or slant of the holes away from the vertical center line of the ball.

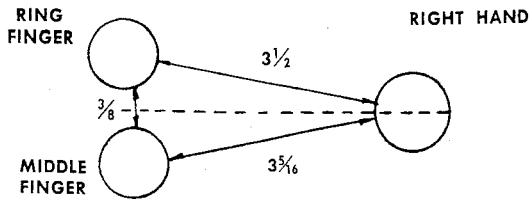


SIDE PITCH — The angle or slant from parallel of the vertical center line and perpendicular to the horizontal center line.

NOTE: All span measurements after drilling should be made before beveling a ball. All drilled holes have a + or — 1/32 tolerance.

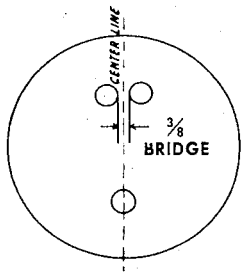


SPAN — The distance from the sharp edge of the thumb hole to the sharp edge of the finger hole is called the span.

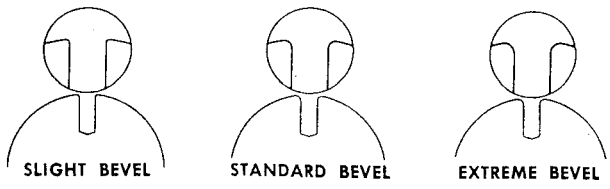


OFFSET — In boring a three-hole ball, the span from the thumb to ring finger is greater than the span from the thumb to the middle finger. This difference is called "offset."

NOTE: For left handed ball all dimensions on finger holes should be in reverse of those given.



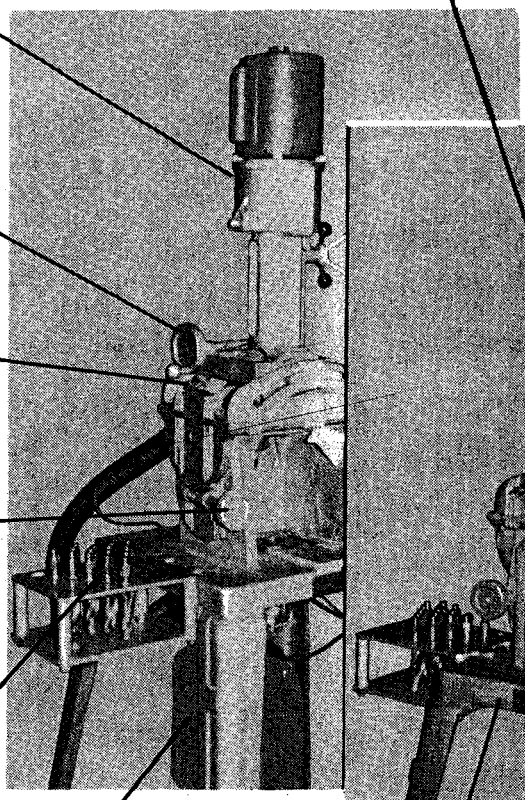
SPREAD OR BRIDGE — The "bridge" is the distance between the middle and ring finger.



BEVEL — After holes are bored, it is necessary to take off the sharp edge of the hole. This is termed "bevel" and a standard bevel is supplied. However, slight bevel or extreme bevel can be specified where the bowler so desires.

Identification

BRUNSWICK GIL-MAC PRECISION CONTROL BALL DRILLER



HYDRAULIC FEED CONTROL VALVE AND HANDLE

MOTOR

DRILL HEAD ASSY.

DEPTH INDICATOR

STREET ELBOW

HAND FEED ASSY.

SIDE PITCH ASSY.

FEED GEAR RACK

PITCH SCALE INDICATOR—FORWARD AND REVERSE; PITCH SCALE—FORWARD AND REVERSE

PITCH SCALE INDICATOR—SIDE; PITCH SCALE—SIDE

SIDE MOVEMENT LOCK ASSY.

FORWARD AND REVERSE PITCH ASSY.

SPREAD ACTUATOR ASSY.

SPREAD SCALE INDICATOR; SPREAD SCALE

CARBIDE TIPPED DRILLS AND HOLDER

SPAN SCALE; SPAN SCALE INDICATOR

VACUUM ASSY.

LEG

BALL LIFTER ASSY.

SWITCH

BASE

BALL CENTERING INDICATOR

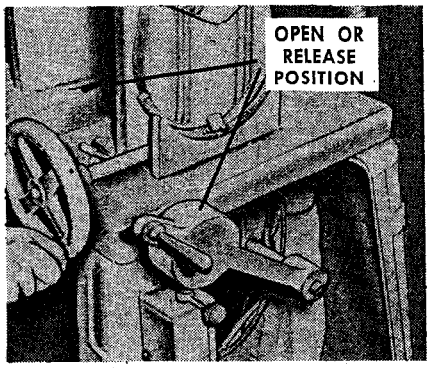
DIAL-A-FIT

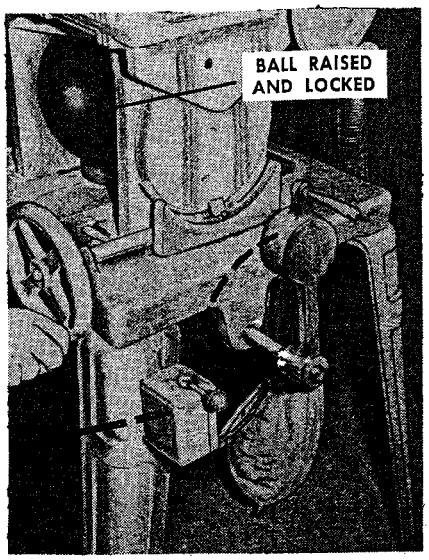
SPAN ACTUATOR ASSY.

General Use of Machine

1. BALL LIFTER ASSEMBLY

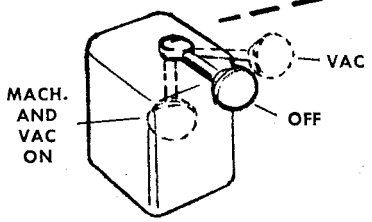
The ball lifter raises ball to "lock" position for drilling. Once the ball is centered and locked in position, never unlock the ball until completely drilled.





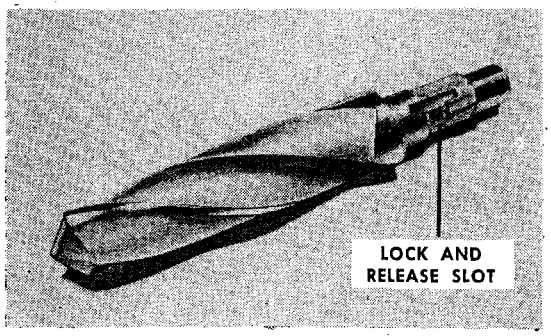
2. SWITCH

The three switch positions shown are front, center, and back. Front position is machine and vacuum "on," center position is "off," and back position is vacuum only.



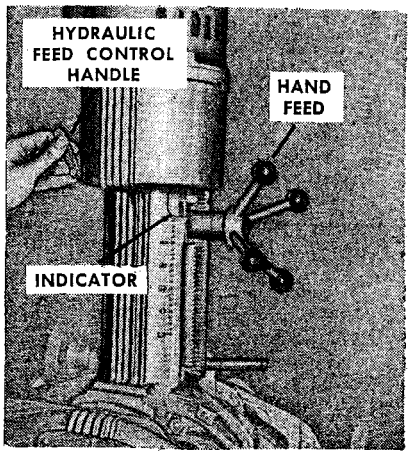
3. DRILLS

Insert carbide tip drills in drill head. One-quarter turn right locks drill in place, one-quarter turn back releases drill.



4. FEED CONTROL

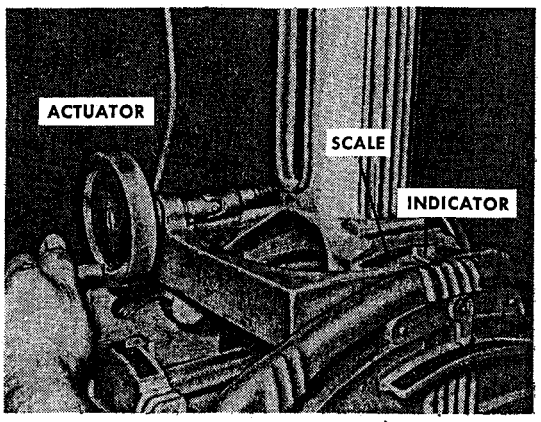
Press handle, Hydraulic Feed Control, down for drilling and when drill is in contact with bowling ball, press Feed Control Handle all the way down, this handle controls the speed of the movement of the drill. Valve handle should be pressed up for returning of drill and not just released. Feed Control Handle neutral point is when handle is midway on feed position.



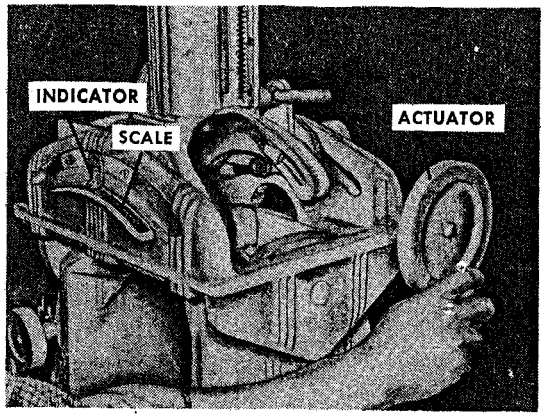
General Use of Machine

AND IDENTIFICATION OF VITAL PARTS

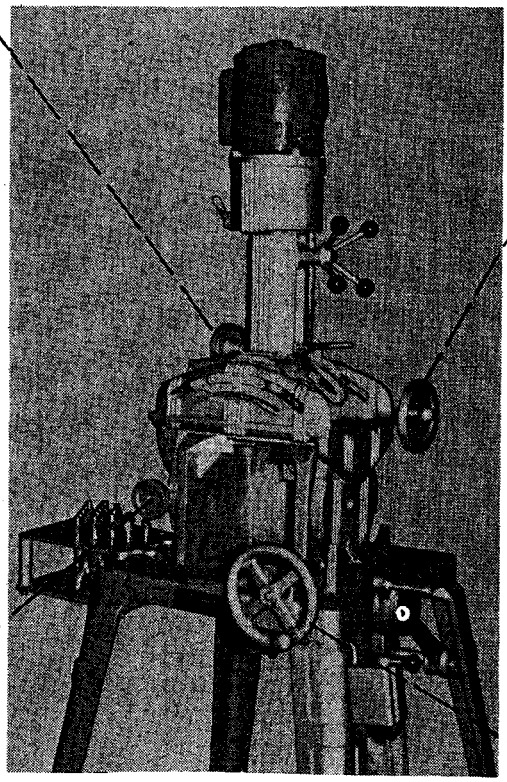
5. DRILL HEAD MOVEMENTS

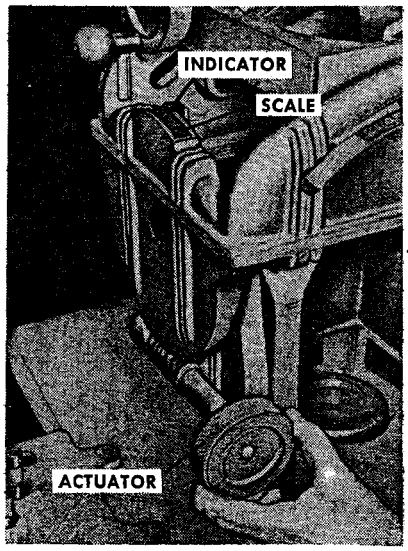


SIDE PITCH ASSEMBLY
Moves drill head to give any side to side pitch required.



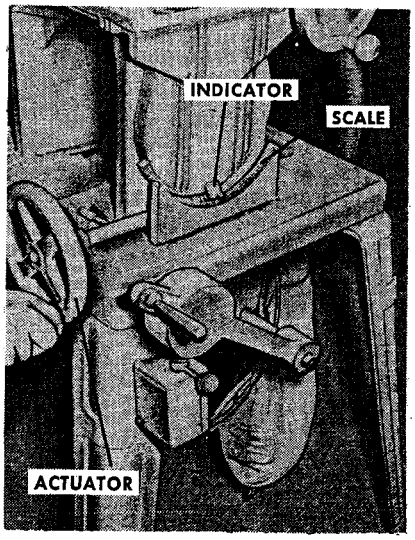
SPREAD ACTUATOR
Moves drill head to compensate for spread or bridge for finger holes.





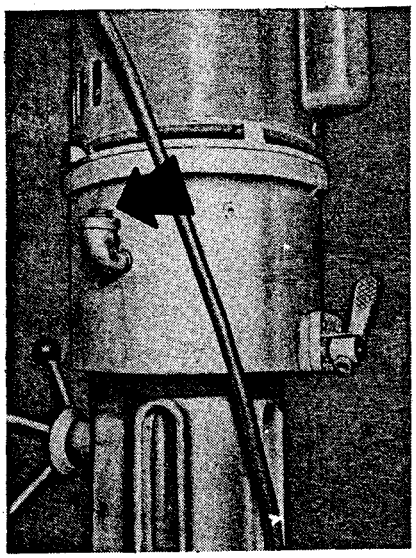
FORWARD AND REVERSE PITCH
Moves drill head to any forward and reverse pitch required.

All settings are determined right or left, when operator is facing machine.



SPAN ACTUATOR
Moves drill head into position for drilling thumb and finger holes.

General Maintenance



1. **MOTOR — THREE-QUARTER H.P. 110 VOLT**

   Equipped with overload protection.

2. **LUBRICATION**

   Maintain oil level in drill head elbow. Use No. 30 S. A. E. Non-Detergent Oil.

3. **DRILLING**

   Drill with reasonable care or as you would with any drill press. Allow for chip clearance. Wipe drills clean after each use.

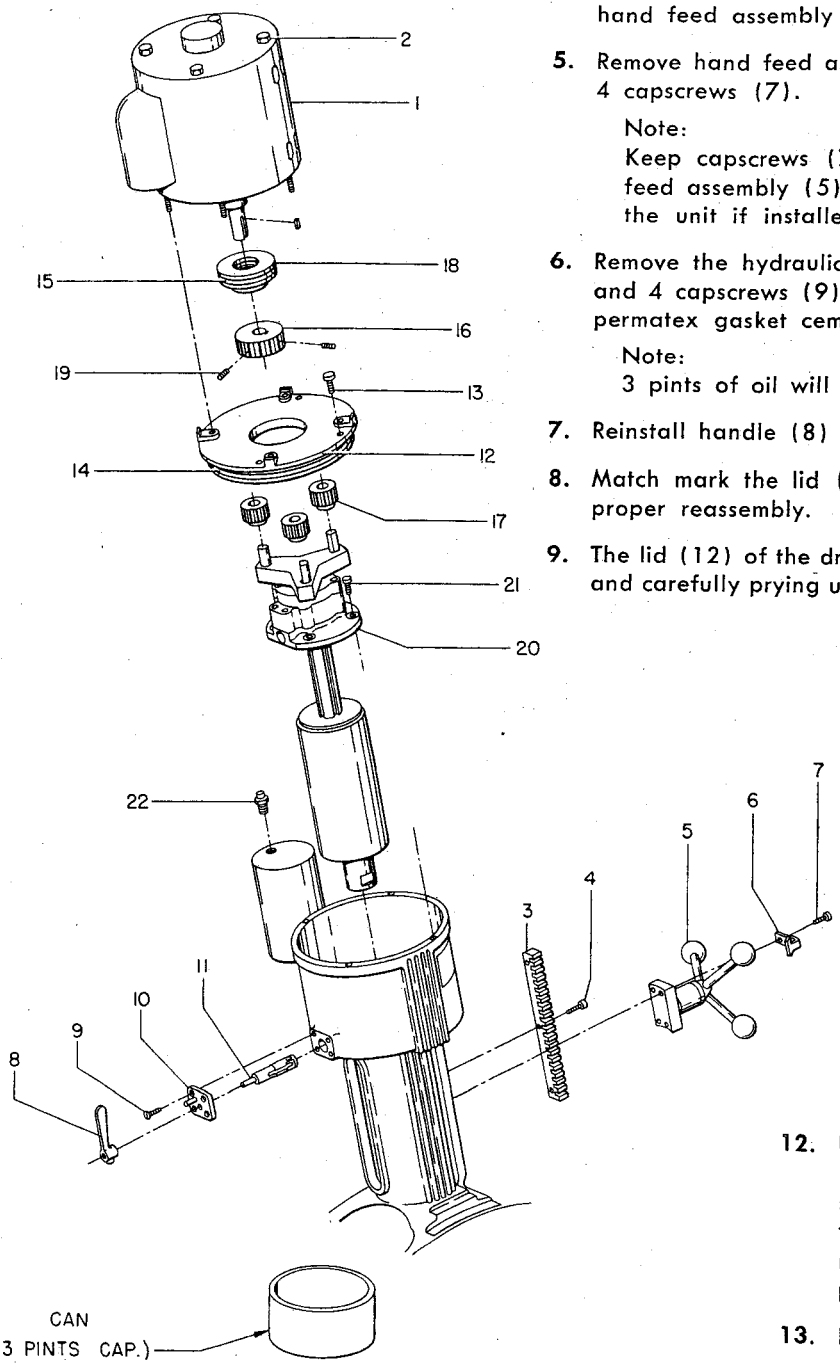
4. **UNLOCKING**

   If ball lifter accidentally has become unlocked and the ball has not been moved, return to "Lock" position, and the ball will automatically re-align itself. If ball has been moved, it will be necessary to float the ball and re-align with drill and hand feed with power off. Release lock and let ball relocate on drill. Then, check position of ball against ball centering indicator. Then, lock and proceed to drill.

5. **VACUUM**

   Vacuum machine after each ball drilling for safety and general good housekeeping.

DISASSEMBLY OF THE DRILL HEAD UNIT



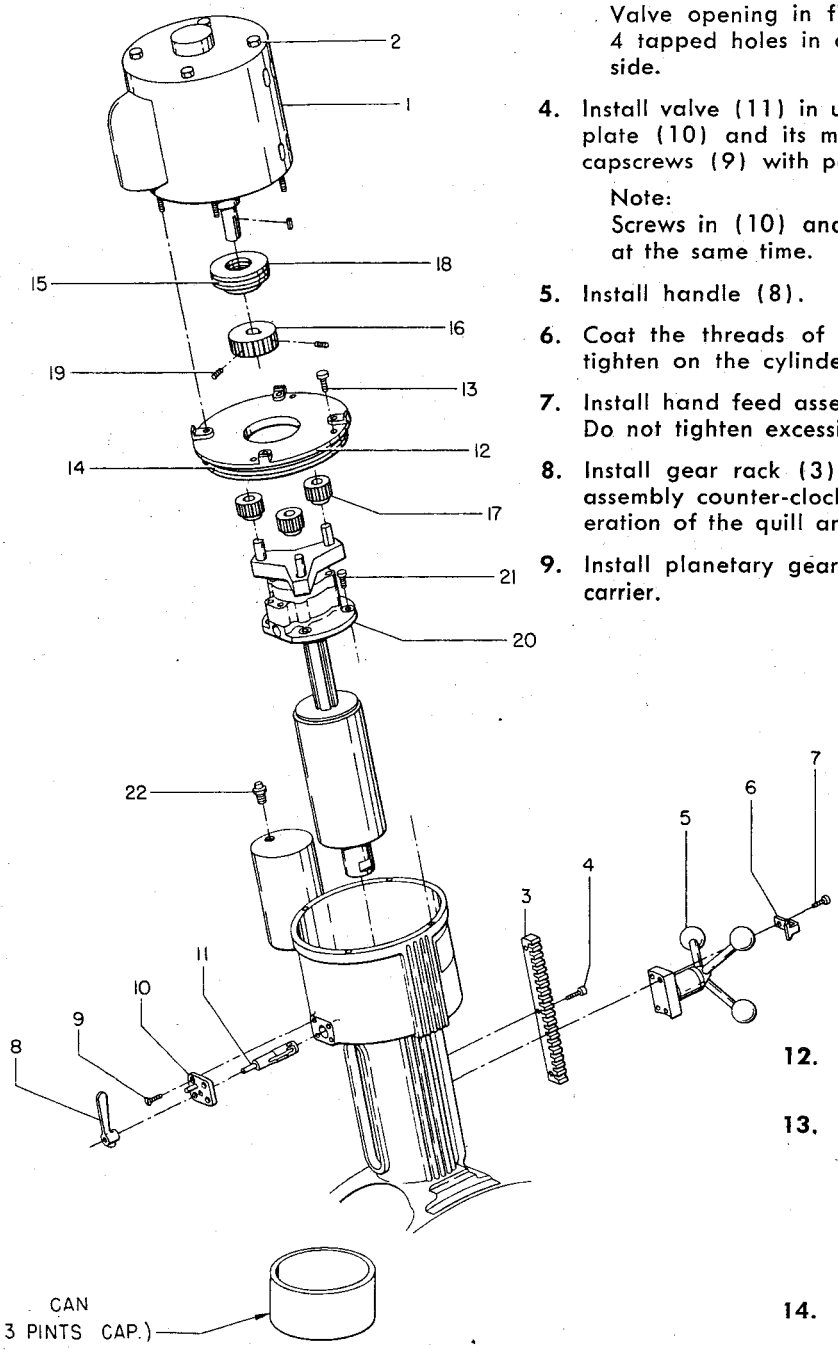
1. Remove electrical plug from wall receptacle.
2. Locate the drill head assembly in the right pitch position. (Drill head tilted to the left.)
3. Remove electric motor (1) by removing 4 long bolts (2) and pull motor straight out and set on floor. Remove aluminum seal plug (18) from motor hub.
4. Detach gear rack (3) by removing 3 cap screws (4) and turning the hand feed assembly clockwise sliding the gear rack down and out.
5. Remove hand feed assembly (5) and depth indicator (6) by removing 4 capscrews (7).

   Note:
   Keep capscrews (7) in same holes as disassembled with the hand feed assembly (5). They are of a specific length and may damage the unit if installed improperly.
6. Remove the hydraulic feed control valve by first removing handle (8) and 4 capscrews (9). Then pry off the plate (10) that is sealed with permatex gasket cement.

   Note:
   3 pints of oil will drain during removal of the feed control valve.
7. Reinstall handle (8) on valve (11) and pull the valve out of the unit.
8. Match mark the lid (12) by scratching with a suitable tool to assure proper reassembly.
9. The lid (12) of the drill head is removed by detaching 4 capscrews (13) and carefully prying up the lid until the o-ring (14) is free of the casting.
10. Remove sun gear (16), 3 fiber planetary gears (17), thrust bearing (18) and 2 washers (19).
11. The cylinder package (20) is removed as a unit by removing 4 capscrews (21) and pulling up on the planetary gear carrier, (the splined drive shaft will extend) and pull the cylinder out of the casting.

    Note:
    It may be necessary to pound up on the drill socket to break the permatex seal. Use a suitable soft face tool to prevent damage.
12. Unscrew drill holder from bottom end of cylinder package. This may be done by holding drive shaft in a padded vise and using a wrench on flats of drill holder. Tap wrench with a light hammer to loosen. Insert drill holder in new cylinder package.
13. Remove bleeder valve (22).

ASSEMBLY OF THE DRILL HEAD UNIT



1. Wash all parts in mineral spirits or kerosene and inspect parts for wear. Clean all permatex from sealing surfaces.
2. Apply permatex #1 to underside of bolt flange and counterbore in casting. Coat outside of quill with a light application of grease to assure smooth assembly.
3. Insert cylinder package (20) into unit and push straight in until flange seats in counterbore.

   Note:
   Valve opening in flange must line up with opening in casting and 4 tapped holes in quill must line up with the long slot on the right side.
4. Install valve (11) in unit, apply permatex #1 to the sealing surface of plate (10) and its mounting surface on the casting. Coat threads of capscrews (9) with permatex #1 and install plate (10).

   Note:
   Screws in (10) and (20) both must be drawn down and tightened at the same time.
5. Install handle (8).
6. Coat the threads of capscrews (21) with permatex #1, install and tighten on the cylinder package (20).
7. Install hand feed assembly (5) and indicator (6) with capscrews (7). Do not tighten excessively.
8. Install gear rack (3), by sliding into position turning the hand feed assembly counter-clockwise, and capscrews (4). Check for smooth operation of the quill and hand feed assembly.
9. Install planetary gears (17) with the washer face down on the gear carrier.
10. Install new motor seal plug (18). Tap squarely into place in motor hub. Install sun gear (16) on motor shaft. Important: ¾" of motor shaft extends beyond gear. Set screws (19) must be very tight.
11. Install new o-ring (14) on lid (12). Place lid (12) in position with the match marks lined up. Install and alternately tighten capscrews (13) until lid is seated.
12. Install 3 pints of Sunvis 931 Hydraulic (or equivalent) oil thru opening in the lid (12).
13. With the electric cord toward the back of the unit, install motor and long bolts (2).

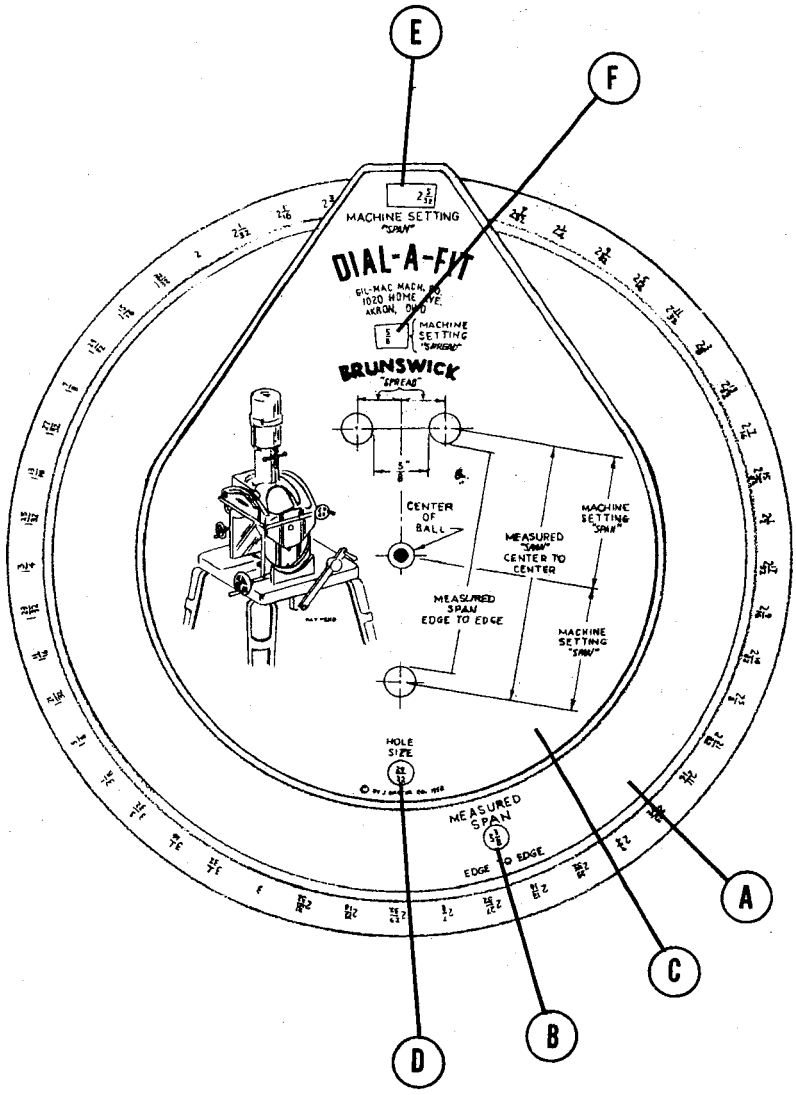
    Note:
    Teeth of sun gear must align with all 3 planetary gears (17) at once to drop into place. Do not try to use force, feel your way.
14. Wash the bleeder valve (22) with mineral spirits or kerosene until the ball check is free; dry and install on reservoir.

Dial-A-Fit

DIRECTIONS FOR THE USE OF THE DIAL-A-FIT CALCULATOR

The DIAL-A-FIT Calculator is so simple in its operation that a few minutes practice is sufficient to use the machine expertly in simplifying calculations required for bowling ball drilling operations. It should be noted by the operator that "measured" dimensions are measurements from edge to edge of the holes, whereas "machine setting" dimensions are from the center of the bowling ball to the center of the holes.

Assume the operator is supplied with the following measured dimensions for a conventional right hand grip: Thumb 1", Middle finger 15/16, and Ring finger 7/8. Span between thumb and middle finger 3½; span between thumb and ring finger 3¾. The machine setting dimensions would be found in the following manner: Rotate the second disc (A) until the measured span for the middle finger (3½) is located in the window (B). Holding window (B) at this position, rotate the pointer disc (C) until the thumb hole size (1) appears in the window (D). The machine setting span of 2¼ for the middle finger can be read in the window (E). This means that the operator moves the span indicator 2¼ inches from zero on the span scale.



DIAL-A-FIT

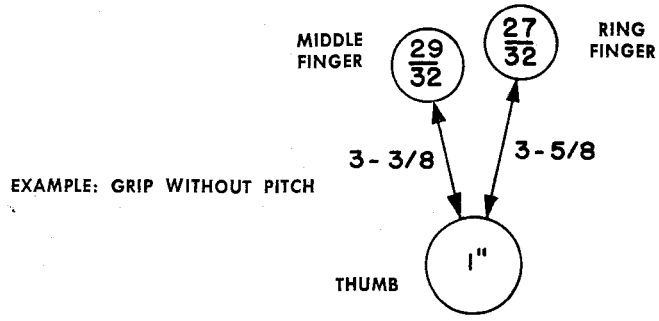
Holding window (B) on the 3½, rotate pointer disc (C) until the middle finger hole size 15/16 appears in the window (D); the machine setting span for the middle finger is 2 21/32 (E).

The machine setting spread (or bridge) can be read in the rectangular window (F) 21/32. Set the side pitch indicator to the same dimension 21/32 as spread indicator to the left of 0.

To determine the machine setting span for the ring finger, hold window (B) on the 3½ and rotate pointer disc (C) to ring finger hole size 7/8 in window (D).

The machine setting span 2 3/16 at window (E) plus ¼ added length of the ring finger span.

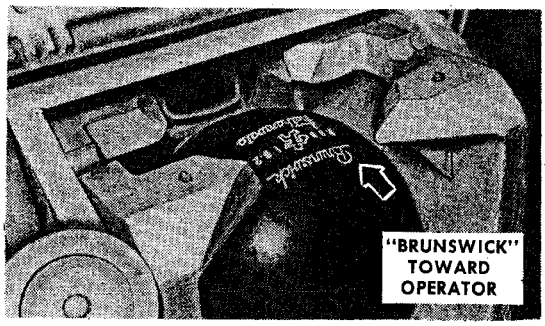
Drilling Procedure



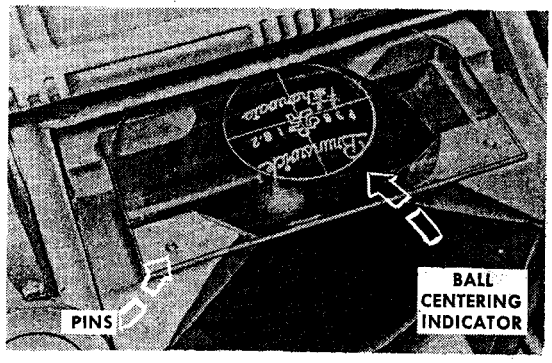
Instructions are for a (3) finger grip without pitch, using Dial-A-Fit Calculator with the Brunswick (Gil-Mac) Precision Control Ball Driller.

PRELIMINARY SET-UP

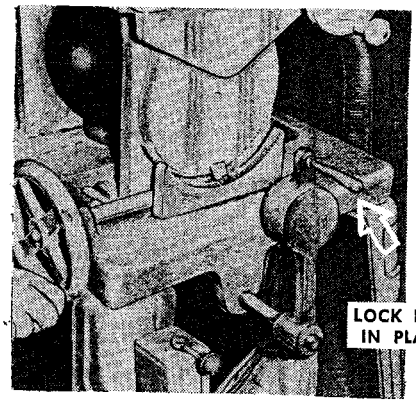
1. Using span actuator, tip machine head back to clear top of opening. Place ball in cradle with "Brunswick" positioned as illustrated.



2. Place ball centering indicator on pins as shown. Raise ball with ball lift handle and proceed to line up ball. Center cross lines on center of "Little Man" and line up serial numbers with horizontal line.

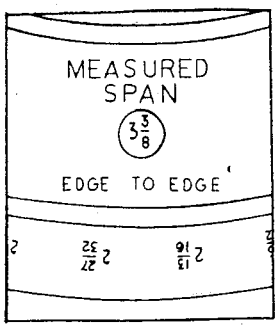


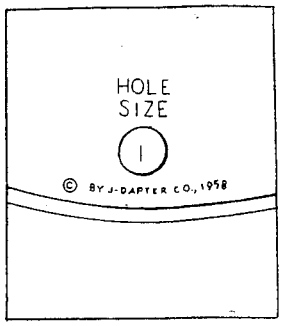
3. Raise ball lift handle up to "lock" position. Remove ball centering indicator and zero all scales.

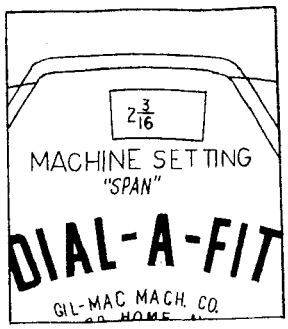


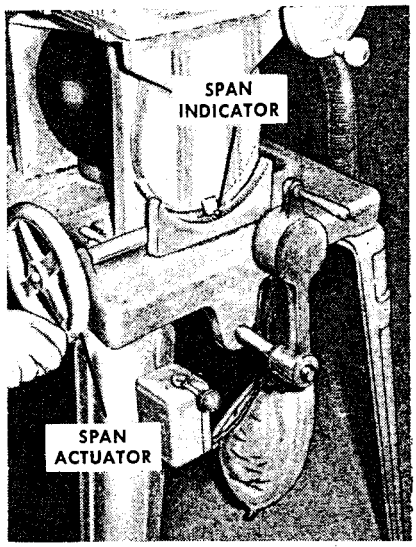
Drilling Procedure

DRILLING THE THUMB HOLE





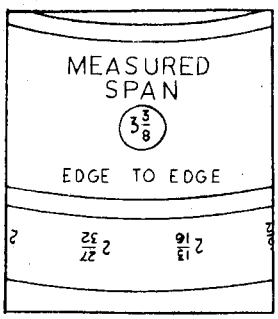


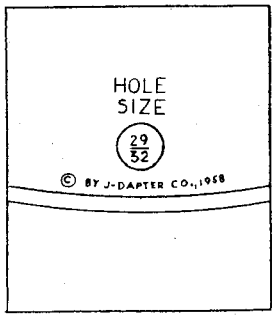


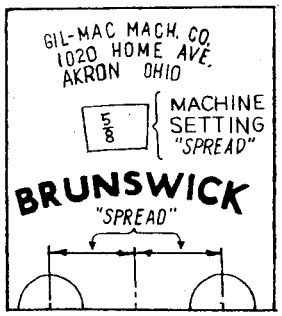
1. Place 1" drill in machine and find Dial-A-Fit dimensions for drilling as shown above. Rotate the second disc to middle finger span 3⅜". Rotate third disc to thumb hole size 1". This will give you the span scale setting.

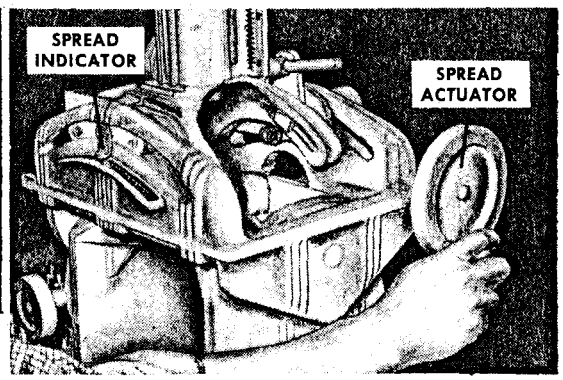
2. With span scale indicator on zero, move indicator away from operator to setting shown in span window, 2³⁄₁₆"; then, lock in place. Re-check to see that other scales are on zero and locked. Drill the thumb hole 2½" deep or as otherwise specified. Return span indicator back to zero and remove drill.

DRILLING MIDDLE FINGER HOLE







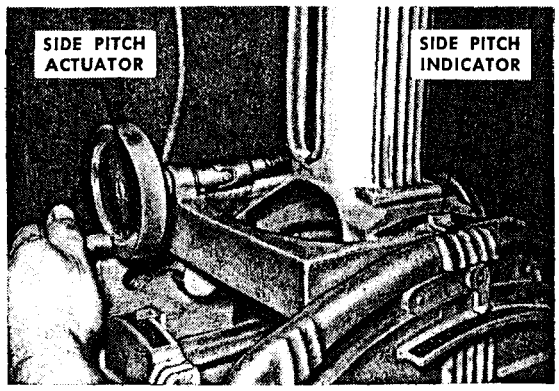


1. Place middle finger drill 29⁄32" in machine. Leave Dial-A-Fit measured span window at 3⅜". Rotate hole size window to middle finger size, 29⁄32". Set spread scale indicator to dimension shown in spread window, ⅝". **Set this dimension to the left of zero.**

2. Then, set side pitch indicator to the same dimension, ⅝", as spread indicator above, **to the left of zero,** then lock both actuators.

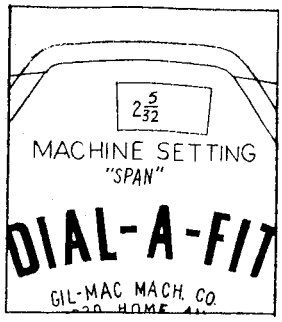
3. Be sure, when moving head, that side pitch and spread indicators are moved to same readings.

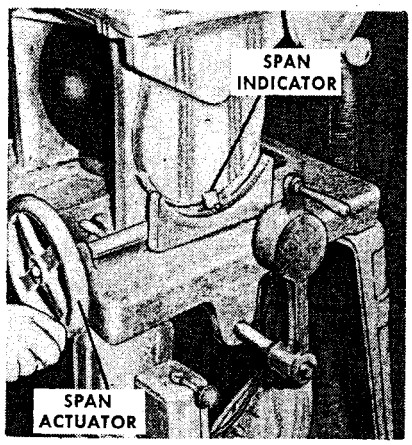
   This movement will give you straight and parallel holes to vertical center line, then move pitch indicator on head to desired pitch.



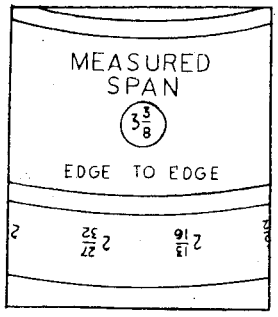
Drilling Procedure

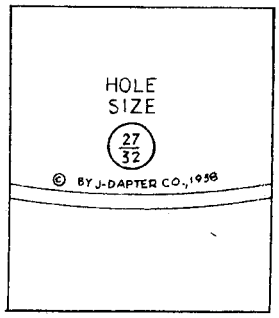
4. Then, set span scale indicator to dimension shown in span window, 2 5/32". Move indicator toward operator from zero. Lock actuator and drill middle finger hole 2½" deep unless otherwise specified. Remove drill and return all scales to zero.

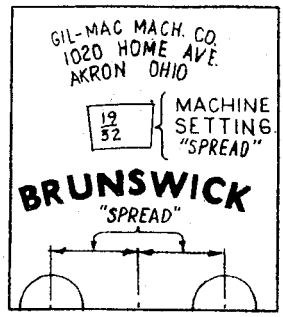


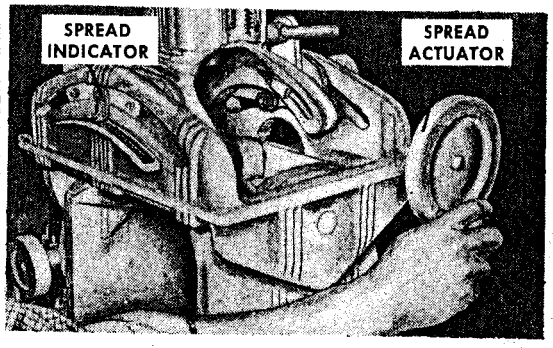


DRILLING RING FINGER HOLE







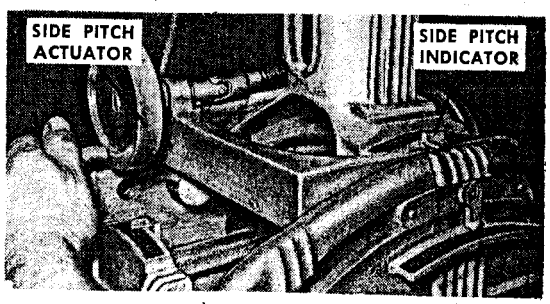


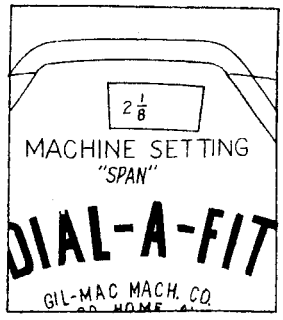
1. Place ring finger drill 27/32" in machine. Leave Dial-A-Fit measured span window at 3⅜". Rotate hole size window to 27/32" drill size, set spread scale indicator to spread window dimension 19/32", **to the right of zero,** using actuator at upper right of machine.

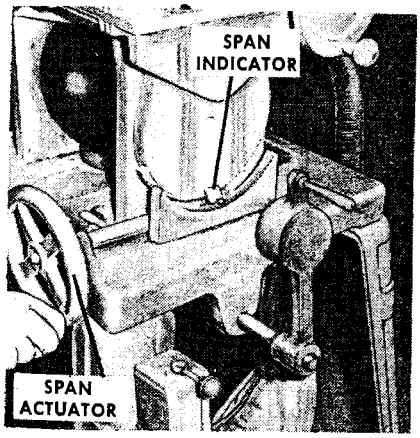
2. Then, set side pitch indicator to same reading as spread scale above. Lock both actuators.

3. Set Span indicator to dimension (found in the machine setting span window) of the ring finger 2⅛" toward operator, plus the standard ¼" added length of the ring finger span (or as specified by customer). Lock actuator and drill ring finger 2½" deep or as specified.

4. Unlock ball and remove. Remove and clean drill. Return all indicators to zero, then vacuum machine.

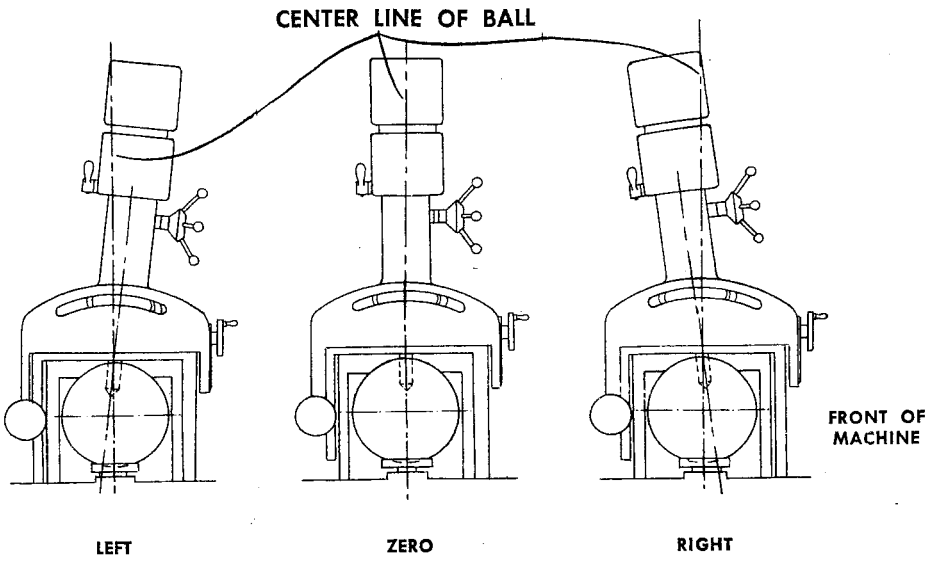






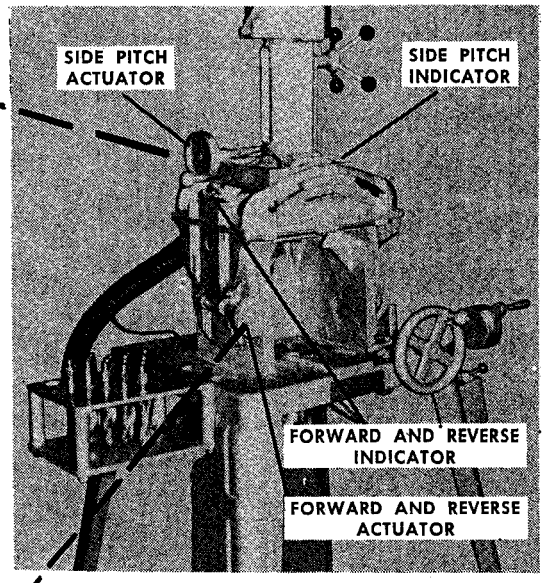
Drilling Procedure

PITCH



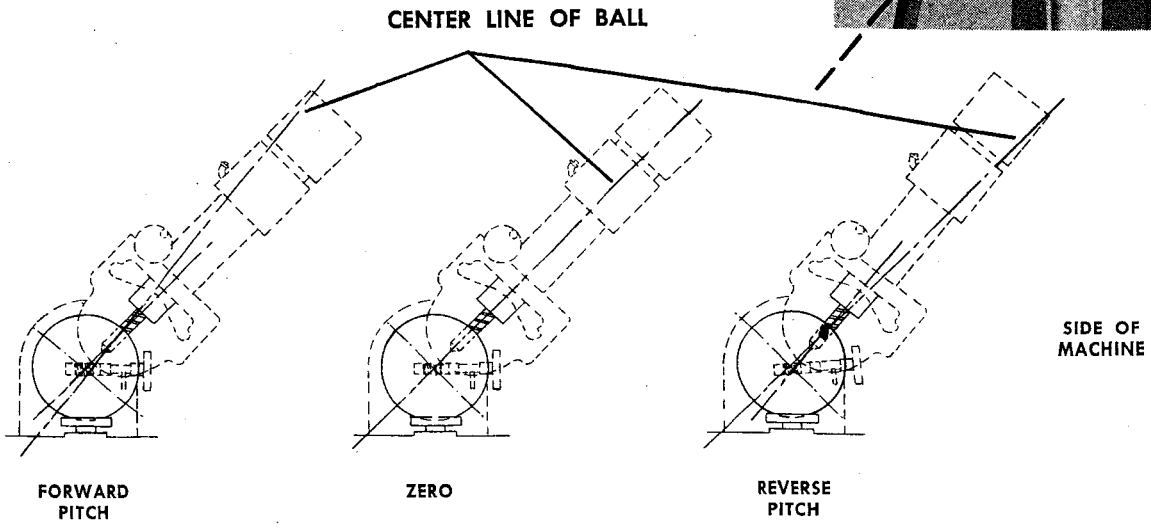
DRILLING THE THUMB HOLE WITH PITCH

Set span indicator on correct dimension and spread indicator on zero, as for regular no pitch hole. Then, set the correct pitch dimension on either side to side or forward and reverse as required.



DRILLING FINGER HOLES WITH PITCH

With finger hole span and spread dimensions set on machine, a regular no pitch hole, the side to side indicator is set on same dimension as spread scale. Then, add the required pitch using either indicator needed, side to side or forward and reverse.



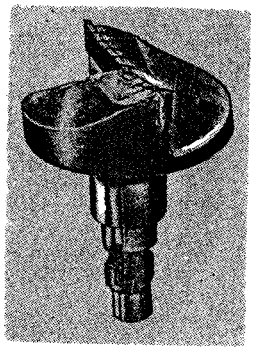
Service Parts

BRUNSWICK PLUG TRIMMER FOR GIL-MAC MACHINE

In order to properly trim a plugged hole with Code No. 116-60-41 Plug Trimmer the following steps are recommended:

1. Set all machine scale readings on ZERO.
2. Masking tape around plug on ball.
3. By utilizing the Plastic Ball Centering indicator, center the plugged hole as close as possible to center line on indicator. Be careful not to lock ball as indicator may be broken because clearance is not full enough for tight fit as on new ball. Lock Ball.
4. Feed Plug Trimmer by hand until the cutting edge touches the masking tape.
5. Remove ball and make layout for drilling holes in ball.
6. Put ball back in machine and drill to specified layout.
7. Remove ball, bevel hole and then polish bowling ball.

E. GIL-MAC PLUG TRIMMER



Service Parts

BRUNSWICK GIL-MAC PRECISION CONTROL BALL DRILLER

REF. NO.	CODE NO.	DESCRIPTION
1	131-1-1	Ball Centering Indicator — 33
2	131-1-2	Dial-A-Fit Calculator (Cardboard)
3	131-1-3	Bag — 1
4	131-1-4	Blower — 2
5	131-1-5	Forward and Reverse Pitch Assembly — 16
6	131-1-6	Worm Gear Segment — 15
7	131-1-7	Vacuum Hose — 3
8	131-1-8	Blower Nozzle — 4
9	131-1-9	Pitch Scale — Forward and Reverse — 12
10	131-1-10	Pitch Scale Indicator — Forward and Reverse — 11
11	131-1-11	Side Pitch Assembly — 6
12	131-1-12	Street Elbow — 7
13	131-1-13	Spread Scale Indicator — 13
14	131-1-14	Spread Scale — 14
15	131-1-15	Ball Lifter — 32
16	131-1-16	Motor — 8
17	131-1-17	Drill Head Assembly — 10
18	131-1-18	Valve Handle — 9
19	131-1-19	Hydraulic Feed Control Valve — 22
20	131-1-20	Pitch Scale Indicator — Side — 21
21	131-1-21	Pitch Scale — Side — 20
22	131-1-22	Pitch Carriage — 26
23	131-1-23	Base — 17
24	131-1-24	Leg — 18
25	131-1-25	Lock — 35
26	131-1-26	Span Actuator Assembly — 28
27	131-1-27	Switch — 34
28	131-1-28	Ball Lifter Cam — 31
29	131-1-29	Ball Lifter Shaft — 30
30	131-1-30	Ball Lift Handle — 29
31	131-1-31	Span Scale Indicator — 39
32	131-1-32	Span Scale — 38
33	131-1-33	Span Carriage — 36
34	131-1-34	Pivot Pin — 37
35	131-1-35	Spread Actuator Assembly — 27
36	131-1-36	Side Movement Lock Assembly — 5
37	131-1-37	Yoke Assembly — 19
38	131-1-38	Feed Gear Rack — 25
39	131-1-39	Hand Feed Assembly — 24
40	131-1-40	Depth Indicator — 23
41	131-1-41	Dial-A-Fit (Plastic)
42	131-1-55	Gil Mac Plug Trimmer
43	131-1-60	Gil Mac Finger Lift Tool

NOTE: WHEN ORDERING PARTS, PLEASE INCLUDE DESCRIPTION NUMBER

Service Parts

BRUNSWICK GIL-MAC PRECISION CONTROL BALL DRILLER