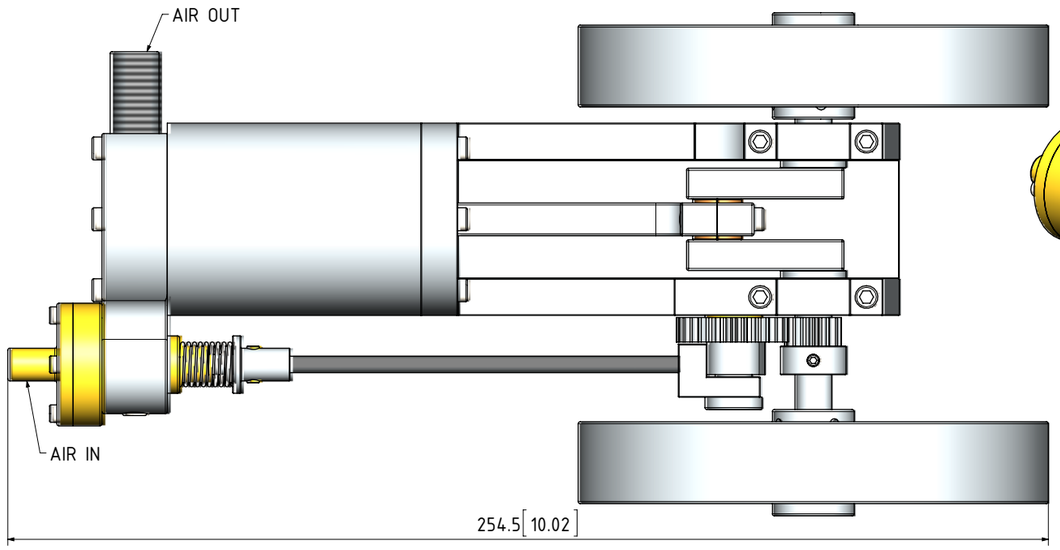
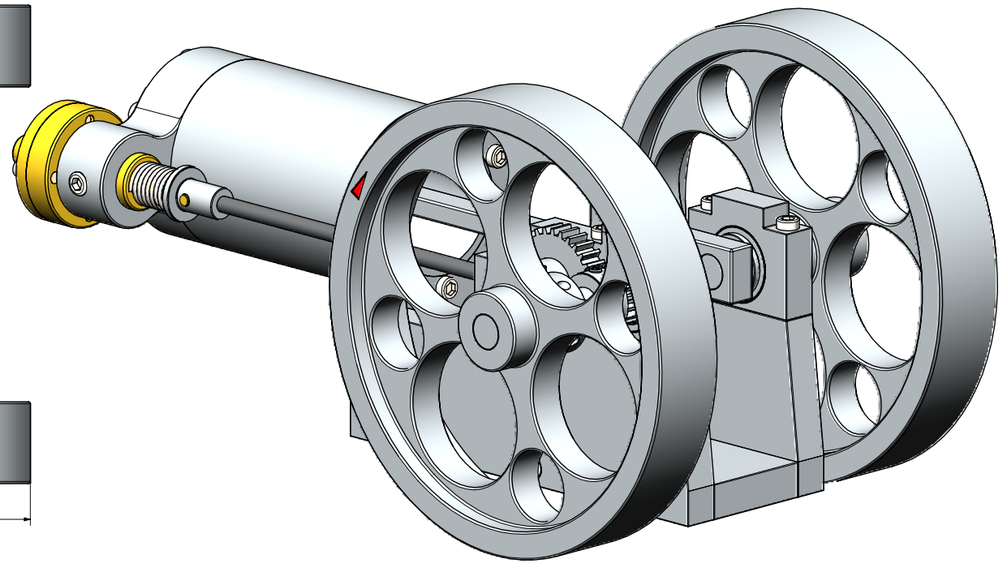
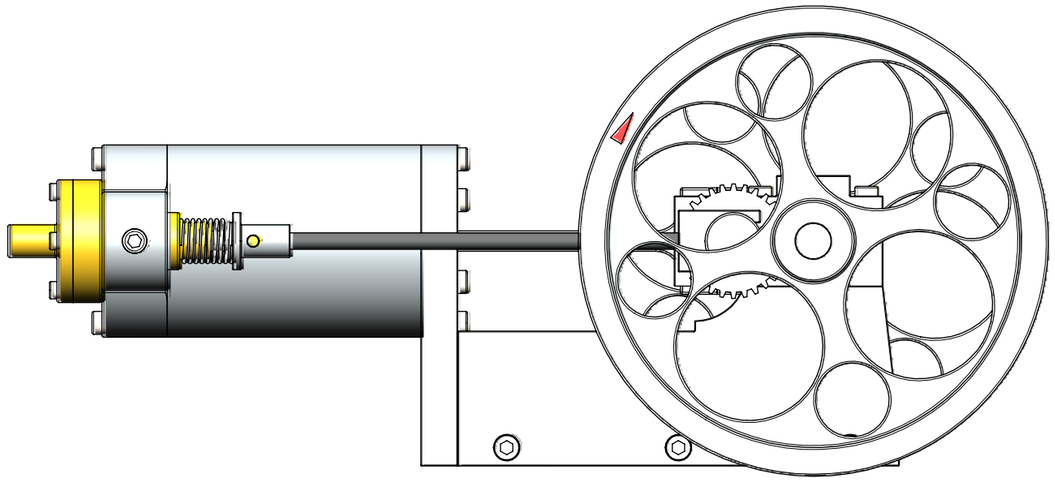
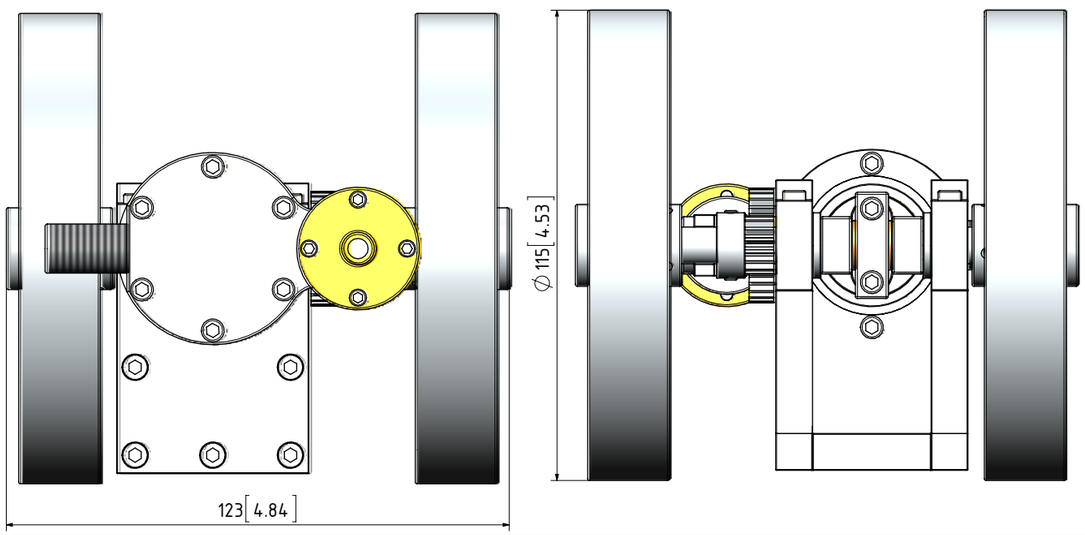




QTY.	PART NUMBER
1	1CHCPAE-1-01-BASE PLATE
1	1CHCPAE-1-02-RH-BEARING BLOCK
1	1CHCPAE-1-03-LH-BEARING BLOCK
2	1CHCPAE-1-04-ROLLER BEARING
1	1CHCPAE-1-05-CYLINDER
1	1CHCPAE-1-06-CYLINDER FRONT COVER
1	1CHCPAE-1-07-AIR INLET HOUSING
1	1CHCPAE-1-08-EXHAUST VALVE SPRING HOUSING
1	1CHCPAE-2-01-CRANKSHAFT
1	1CHCPAE-2-02-FLYWHEEL
1	1CHCPAE-2-02-FLYWHEEL
1	1CHCPAE-2-03-PISTON
1	1CHCPAE-2-04-CON-ROD
1	1CHCPAE-2-05-INLET VALVE
1	1CHCPAE-2-06-INLET VALVE DRIVE GEAR WHEEL
1	1CHCPAE-2-07-DRIVEN GEAR+CAM
1	1CHCPAE-2-08-INLET VALVE PUSH ROD+FORK
1	1CHCPAE-2-09-EXHAUST VALVE
1	1CHCPAE-2-10-INLET VALVE SPRING
1	1CHCPAE-2-11-EXHAUST VALVE SPRING
10	1CHCPAE-M3x4 A-K GRUB SCREW
4	1CHCPAE-M3x10 A-K CYL HEAD SCREW
1	1CHCPAE-M3x12 A-K GRUB SCREW
6	1CHCPAE-M4x16 A-K CYL HEAD SCREW
11	1CHCPAE-M4x18 A-K C-SINK SCREW
2	1CHCPAE-M4x18 A-K CYL HEAD SCREW
6	1CHCPAE-M4x22 A-K CYL HEAD SCREW
4	1CHCPAE-M4x30 A-K CYL HEAD SCREW
1	1CHCPAE-M6x5 A-K GRUB SCREW





MATERIAL ABBREVIATIONS:
ALU = ALUMINIUM
BRS = BRASS
BRZ = BRONZE OR GUNMETAL (BRZ/GM)
CI = CAST IRON
CU = COPPER
GRA = GRAPHITE
MS = MILD STEEL/BRIGHT MILD STEEL
S/S = SILVER STEEL OR STAINLESS STEEL
SPS = SPRING STEEL
PEEK= POLYETHER ETHER KETONE
SYN = SYNTHETIC MATERIAL SUCH AS VETON, NYLON, TEFLON OR RUBBER IN GENERAL SYNTHETIC MATERIALS SOULD BE ABLE TO WITHSTAND THE HEAT AND PRESSURE(S) APPLIED TO THEM.
nnn/nnn MEANS THAT EITHER MATERIAL CAN BE USED

OTHER ABBREVIATIONS
DP = DEEP
DAA= DRILL AFTER ASSEMBLY
D&TAA= DRILL AND TAP AFTER ASSEMBLY
CF = CLOSE FIT (SIZE FOR SIZE)
PF = PRESS FIT
PFAA= PRESS FIT AFTER ASSEMBLY
PCD = PITCH CIRCLE DIAMETER
RM = REAM
HEX = HEXACON, 6SIDED
CP = COMPRESSED
KNL = KNURLED
CSK = COUNTERSINK
PL = PLACES
DWL= DOWEL
(T)HESOP=(TAPPED)HOLES EQUALLY SPACED ON PCD
(T)HESOC=(TAPPED)HOLES EQUALLY SPACED ON CIRCUMFERENCE
[SA-xxx]= SUB ASSEMBLY-xxx

1. SOME OF THE COMPONENTS, SHOWN ON THIS SET OF DRAWINGS, MAY DIFFER FROM THE ORIGINAL SET OF DRAWINGS DUE TO THE FACT THEY WERE NOT SHOWN/DRAWN ON THE ORIGINALS
2. THE TIMING OF THE INLET VALVE OPENING AND/OR CLOSING SHOULD BE EXPERIMENTALLY OBTAINED.
3. THE TIMING CAN BE ADJUSTED BY ROTATING THE SMALL GEARWHEEL CLOCKWISE OR ANTICLOCKWISE IN RELATION TO THE CRANK PIN
3. THE PRESSURE FORCES OF THE SPRINGS TO BE DETERMENT BY EXPERIMENT

NOTES:
0. ALL DRAWINGS ARE IN METRIC MEASUREMENTS
1. ALL ENGINEERING PRACTICES SHALL BE APPLIED WITH REGARDS TO HOLE AND SHAFT TOLERANCES.
2. WHERE SCREWS OR BOLTS ARE USED THE CLEARANCE HOLES SHALL BE APPROXIMATELY 5% TO 8% LARGER THAN THE MATCHING TAPPED HOLE.
3. PREFERABLY ALL TAPPED HOLES AND MATCHING SCREWS AND/OR BOLTS TO BE METRIC FINE (MF)
4. MATERIALS SPECIFIED ON THE DRAWINGS ARE INDICATIVE ONLY. THE BUILDER CAN MAKE HIS/HER OWN MATERIAL CHOICE.
5. ALL CONNECTIONS/JOINTS WHICH HAVE STEAM PRESSURE APPLIED TO IT SHALL BE SILVER/HARD SOLDERED.
6. COMPRESSION SPRINGS ARE DRAWN IN COMPRESSED STATE (CP), UNCOMPRESSED STATE IS APPROX 40% TO 60% LONGER THEN COMPRESSED STATE.
7. WHERE PREFERRED SCREW OR RIVETED CONNECTIONS CAN BE OMITTED AND PARTS CAN BE BONDED TOGETHER BY USING EITHER HIGH STRENGTH GLUE, EPOXY RESIN, OR SOLDER.
8. PARTS WHICH ARE DIRECTLY EXPOSED TO STEAM AND/OR WATER SHOULD BE CONSTRUCTED USING NON-FERROUS OR NON CORROSIVE MATERIAL SUCH AS BRASS, BRONZE, GUNMETAL, STAINLESS STEEL, COPPER OR MONEL.
9. THE ORDER IN WHICH THE PARTS/COMPONENTS ARE MANUFACTURED AND THE MODEL IS ASSEMBLED IS ENTIRELY LEFT TO THE BUILDER/MODEL MAKER.
10. A COLOUR SCHEME FOR THIS PROJECT IS ENTIRELY LEFT UP TO THE MODEL MAKER.
11. THE MANNER IN WHICH THE PARTS/COMPONENTS ARE MANUFACTURED IS ENTIRELY LEFT UP TO THE BUILDER.
12. USE LOCTITE, ON SCREW OR PRESS FIT CONNECTIONS OR SURFACES, WERE DEEMED NECESSARY TO PREVENT PARTS FROM LOOSENING.
13. WASHER SHALL BE USED WHERE DEEMED NECESSARY.
XX. ERRORS AND/OR OMISSIONS MAY OCCUR IN THE DRAWINGS, DO NOT HESITATE TO CONTACT ME SO THAT THE ERRORS/OMISSIONS CAN BE RECTIFIED.

NOTES: THIS STEAM ENGINE IS BASED ON DRAWINGS GIVEN TO ME. THE AUTHOR OF THE ORIGINAL DESIGN/DRAWINGS IS CHUCK FELLOWS. DATE UNKOWN. ORIGINAL DRAWINGS WERE INCOMPLETE.

TITLE
1 CYLINDER HORIZONTAL COMPRESSED AIR "HIT AND MISS" ENGINE

DRAWING CONTENTS
GENERAL ARRANGEMENT, ISOMETRIC VIEW, NOTES & BOM

JDW DRAUGHTING SERVICES
J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000
E-MAIL: dewaal@xtra.co.nz.

PROJECT No 01-25-00
PROJECTION JDWDS
DATE NOVEMBER-2017
SHEET: 01 OF 03
MODEL SCALE: 1:1
DWG SCALE: 1:1 @A3 OR AS SHOWN

A3 No: 1CHCPAE-01

NOTES: THIS STEAM ENGINE IS BASED ON DRAWINGS GIVEN TO ME. THE AUTHOR OF THE ORIGINAL DESIGN/DRAWINGS IS CHUCK FELLOWS. DATE UNKOWN. ORIGINAL DRAWINGS WERE INCOMPLETE.

TITLE
1 CYLINDER HORIZONTAL COMPRESSED AIR "HIT AND MISS" ENGINE

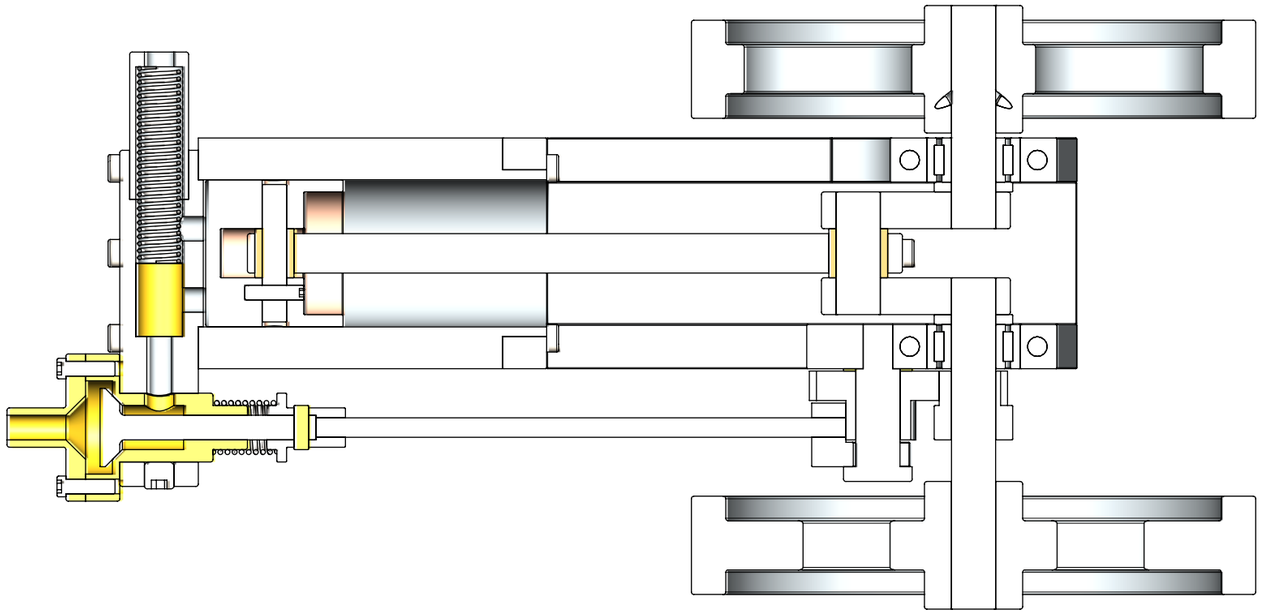
DRAWING CONTENTS
PARTS AND ASSEMBLIES

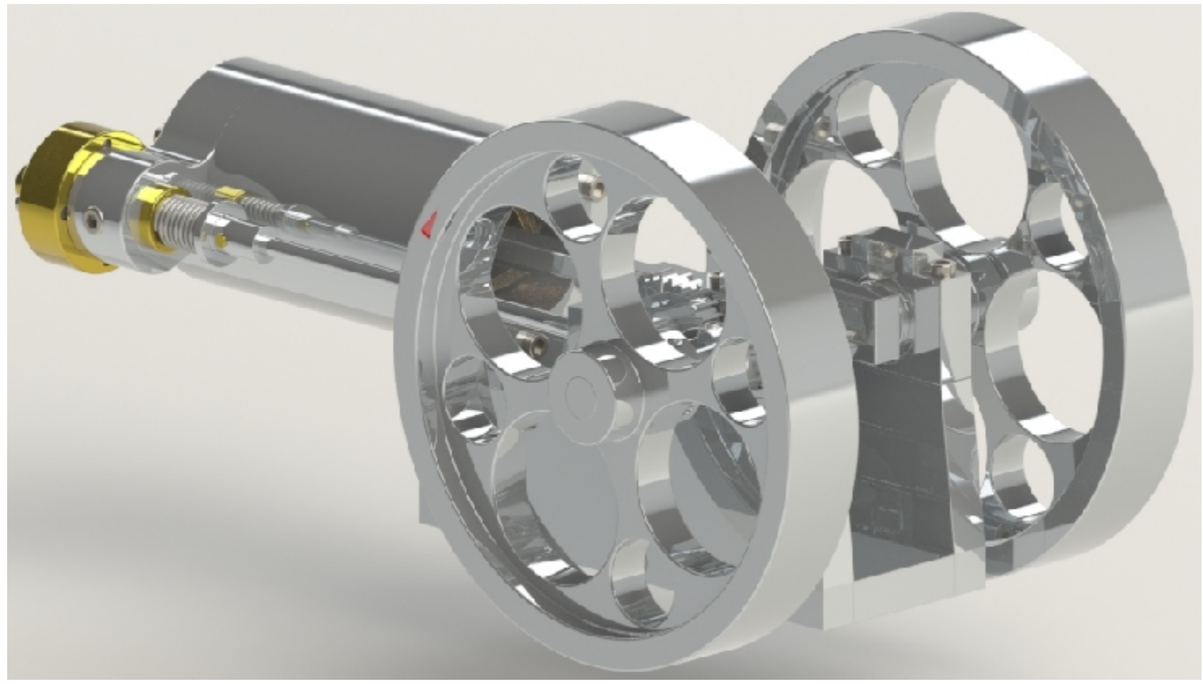
PROJECT No 01-25-00
JDW DRAUGHTING SERVICES
J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000
E-MAIL: dewaal@xtra.co.nz.

PROJECTION JDWDS
DATE NOVEMBER-2017
SHEET: 02 OF 03

MODEL SCALE: 1:1
DWG SCALE: 1:1 @A3 OR AS SHOWN

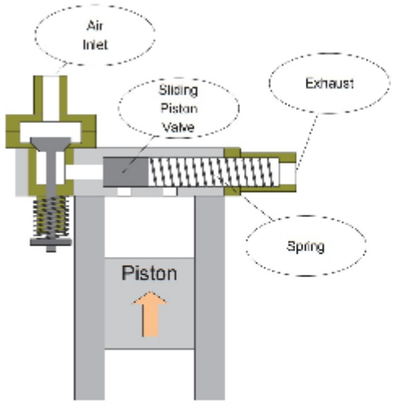
A3 No: 1CHCPAE-02



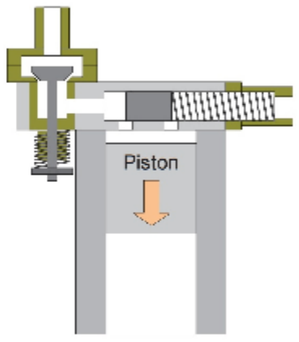


How the valves work

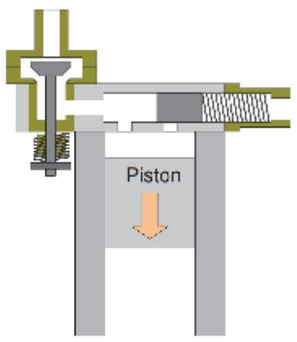
This engine uses a unique slave exhaust valve. It is a spring loaded, sliding piston which is activated by the pressure of incoming compressed air when the inlet valve is opened by the cam operated push rod. This design lends itself to compressed air engines of any number of cycles. It's particularly useful on hit n miss operated engines, since the exhaust valve will remain open as long as the inlet valve is closed. This allows the engine to turn over multiple times with no back pressure due to compression.



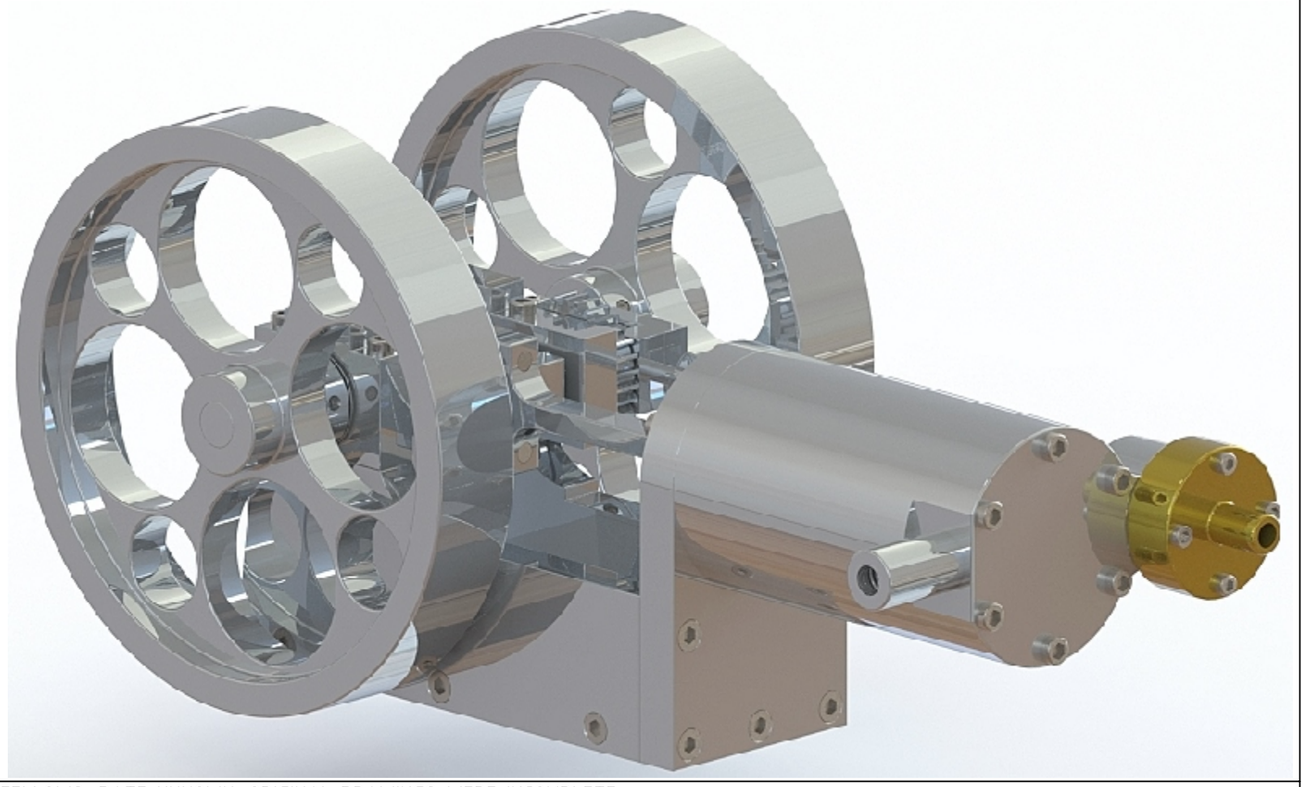
Here, the inlet valve is closed. The spring keeps the slave exhaust valve pushed to the left, exposing the cylinder to he exhaust port. This allows the free passage of air into and out of the cylinder with no back pressure.



As the inlet valve begins to open, high pressure air enters the head and begins pushing the slave exhaust valve to the right. This opens the input port and lets the high pressure air into the cylinder. The exhaust port is still partially open, which allows some of the high pressure air to go directly to the exhaust, giving the engine its distinctive pop when it "fires".



As the inlet valve continues to open, the slave exhaust valve is pushed all the way to the right, comletely closing off the exhaust port and forcing all the high pressure air into the cylinder. This is the power stroke and will continue to push the piston down until the inlet valve is closed. At that time, the spring again pushes the slave exhaust valve to the left, letting the high pressure air in the cylinder exhaust to the outside.



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TITLE
1 CYLINDER HORIZONTAL COMPRESSED AIR "HIT AND MISS" ENGINE

DRAWING CONTENTS
RENDERED PICTURES AND OPERATION EXPLANATIONS

PROJECT No 01-25-00
JDW DRAUGHTING SERVICES
J.A.M. DE WAAL. 12 BRIGHTWELL STREET PAPAKURA 2110. NEW ZEALAND. PHONE: 0064 09 2988815. MOB: 0211791000
E-MAIL: dewaal@xtra.co.nz.

PROJECTION JDWDS
DATE NOVEMBER-2017
SHEET: 03 OF 03

MODEL SCALE: 1:1
DWG SCALE: 1:1 @A3 OR AS SHOWN

A3 No: 1CHCPAE-03