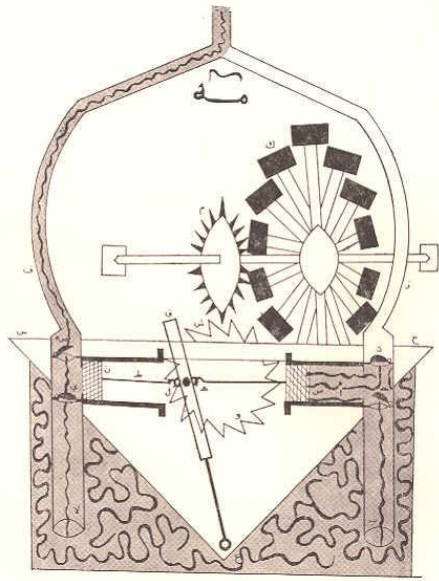


# Al-Jazari

## Impact of The Twin Cylinder

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CE 309 Fluid Mechanics

Eric Nies

6/12/2009



# Al-Jazari

## Impact of The Twin Cylinder

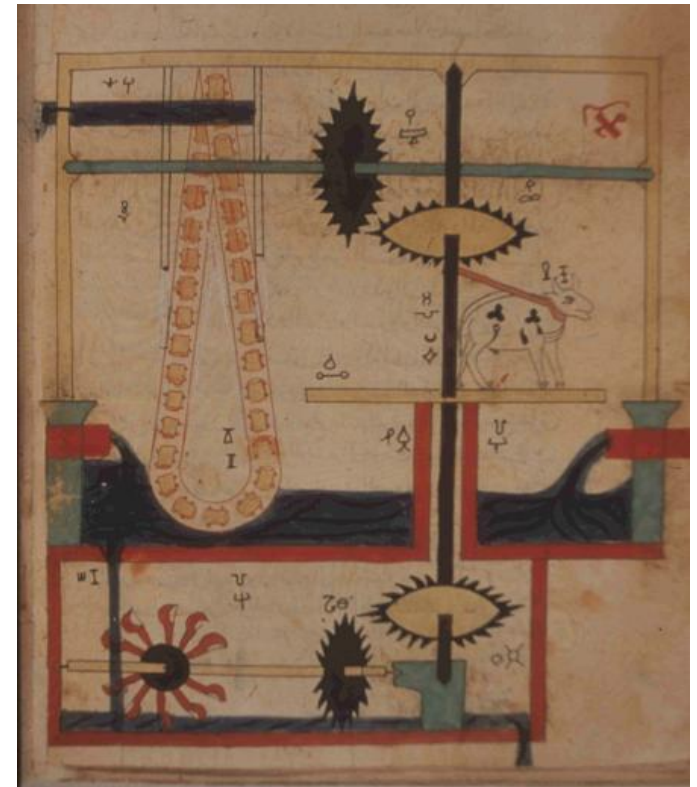
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- Al-Jazari and his impact on the Eastern world
  - His inventions were the first of their kind in Iraq and Syria.
  - Learn about a few of his other inventions
  - Focus on the Twin cylinder reciprocating piston
  - Relate this concept to modern days

# Al-Jazari

## Impact of The Twin Cylinder

- History
  - Lived in 12<sup>th</sup> and 13<sup>th</sup> centuries in Iraq
  - Born into a long line of Craftsman-making him more practical than theoretical
  - Worked for the King for many years-quickly became chief engineer
  - Main Method of solving problems-trial and error



[www.wikipedia.com](http://www.wikipedia.com)

# Al-Jazari

## Impact of The Twin Cylinder

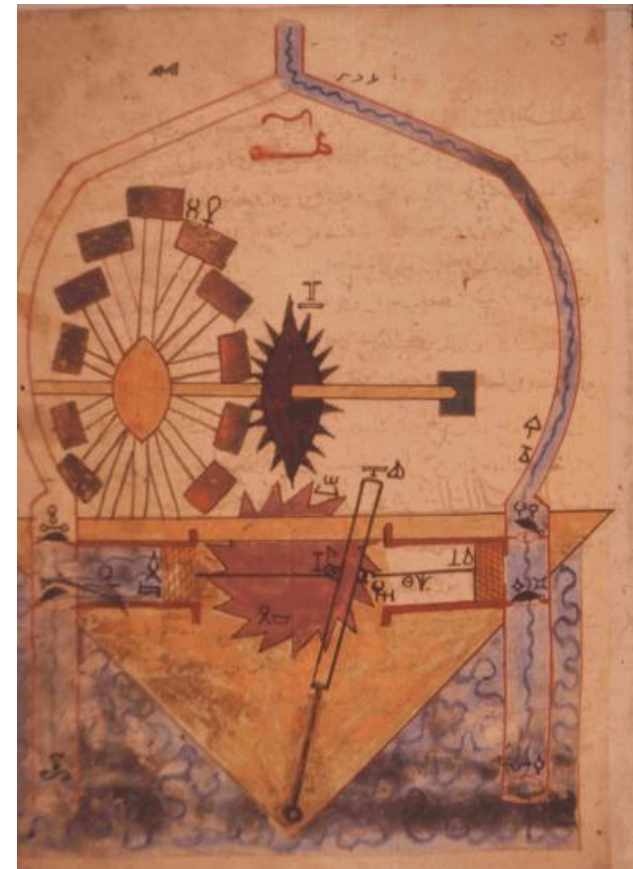
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- Inventions-he was more interested in the structure behind the devices rather than the calculations
  - Water Clock/Candle Clock
  - Water Raising Machines
  - Automatic Hand Washers/Towel Dispensers
  - Automatic Doors/Gates

# Al-Jazari

## Impact of The Twin Cylinder

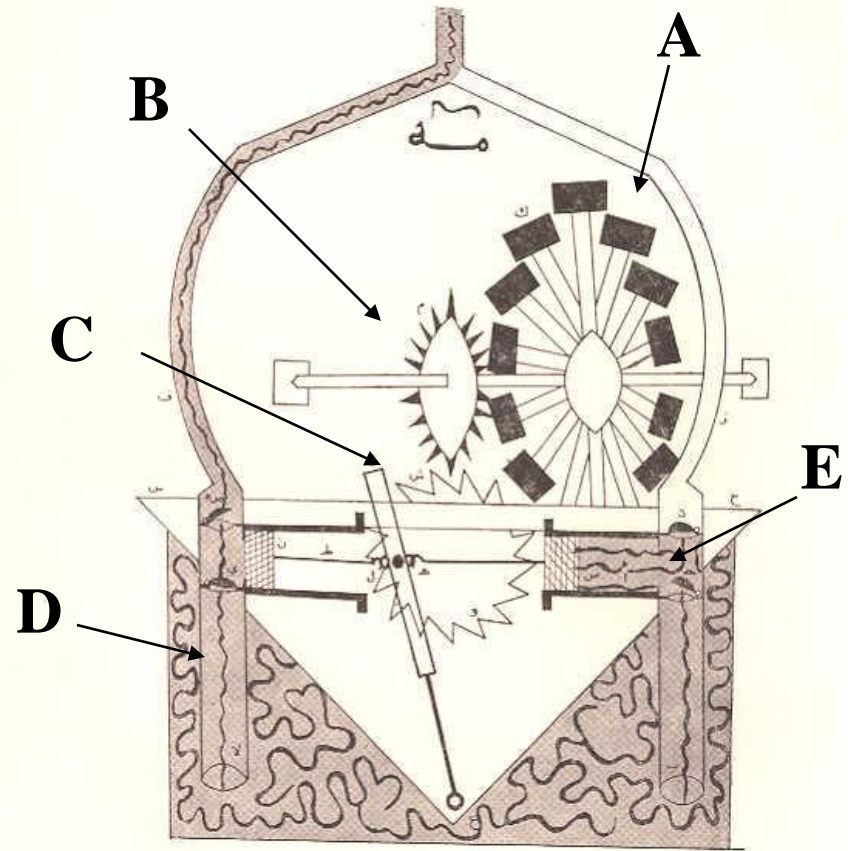
- “Book Of Knowledge Of Ingenious Mechanical Devices”
  - Book written by Al-Jazari recording in great detail the schematics and specifications of his inventions. The most comprehensive document at the time!
  - It Included the Twin Cylinder Reciprocating Piston- Water Raising Device For Irrigation of Fields



# Al-Jazari

## Impact of The Twin Cylinder

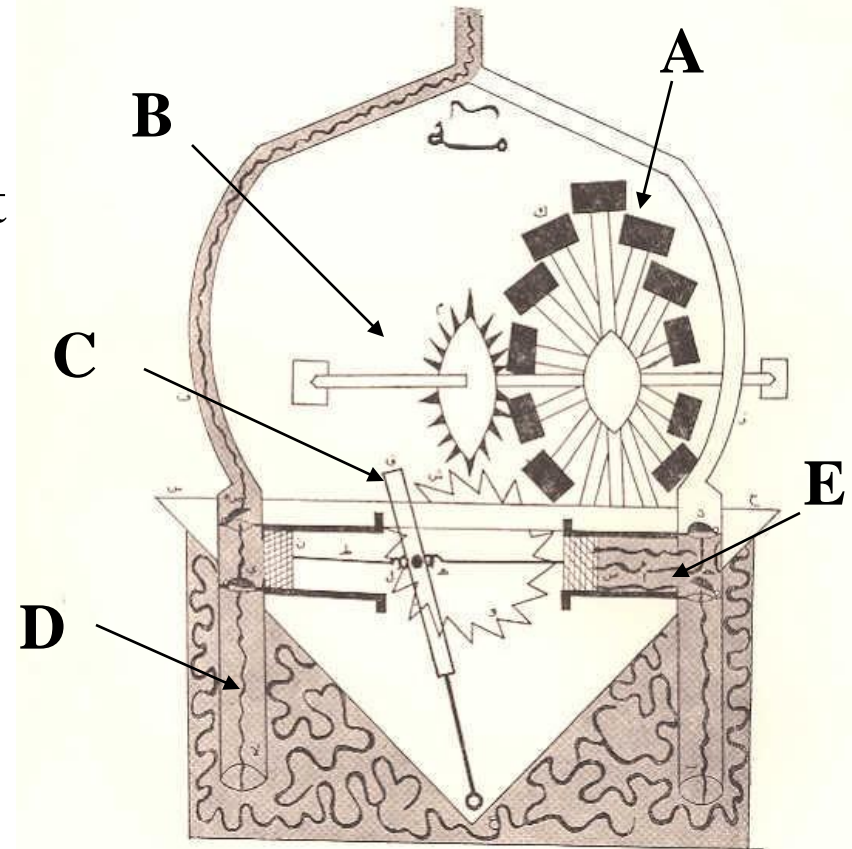
- How It Works!
  - A- Water wheel was turned by river- which turned a driveshaft and gear
  - B- This gear translated the vertical rotation to horizontal rotation by a right-angle gear interface
  - C- This second gear had a pin attached to it, which oscillated a slot rod as it rotated.



# Al-Jazari

## Impact of The Twin Cylinder

- How It Works!
  - **D-** Water was raised by pistons connected to the slot rod due to the partial vacuum created in the pipes
  - **E-** Finally two ‘one-way’ valves allowed water to be drawn up into the cylinder and expelled out through the pipes.



# Al-Jazari

## Impact of The Twin Cylinder

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- Uniqueness of the Twin Cylinder
  - First Known Use of the Partial Vacuum.
  - First Application of Double Action Principle
    - This means having two things in motion at once due to a single source
  - Conversion of Rotary Motion into Reciprocating Motion Via Crank Shaft and Connecting Rod.

# Al-Jazari

## Impact of The Twin Cylinder

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- Uses of Al-Jazari's Inventions
  - Mostly For entertainment purposes
    - Used many automata such as moving peacocks, an automatic band to play for the king, and self playing instruments



# Al-Jazari

## Impact of The Twin Cylinder

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- Uses of Al-Jazari's Inventions
  - Also for everyday luxuries and comfort
    - Automatic toilets, hand washers, and towel dispensers
  - Irrigation of fields.
    - The Twin Cylinder was used all over Iraq to keep the fields watered, and had the most impact on the wealth and survival of the economy at that time

# Al-Jazari

## Impact of The Twin Cylinder

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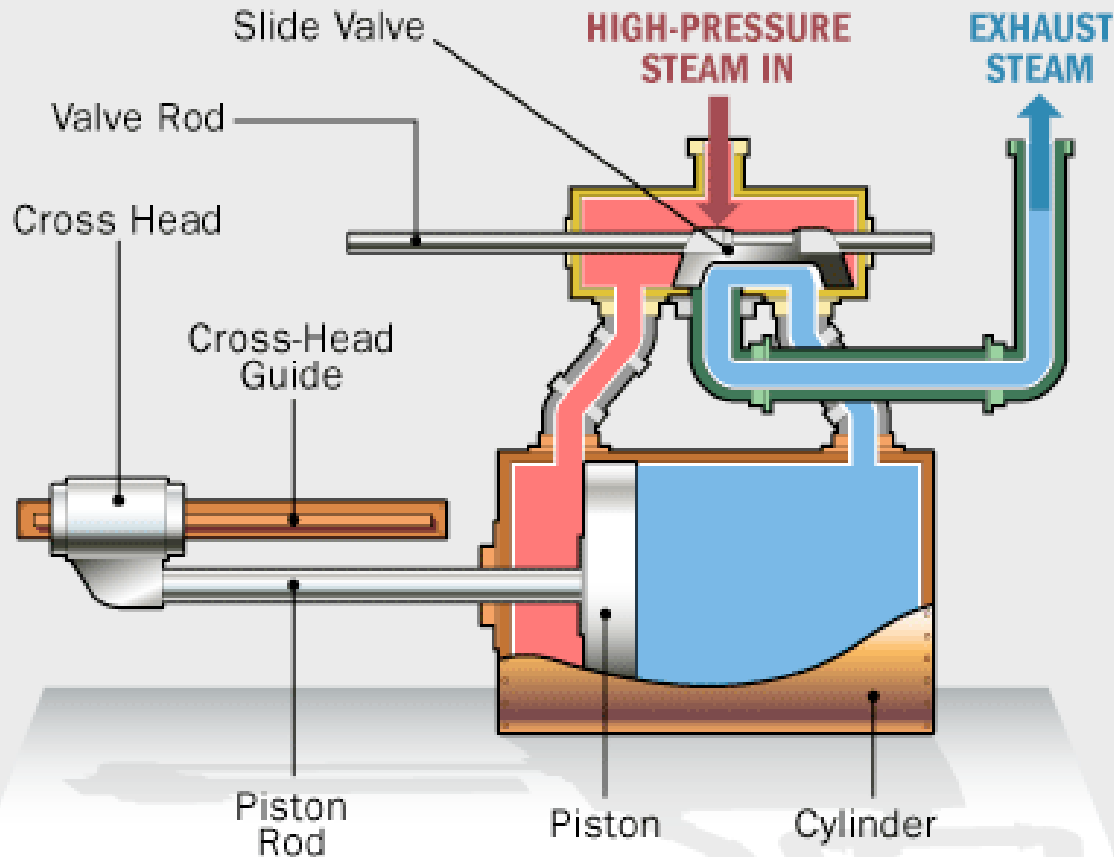
- In America, The Double action principle was widely used in the industrial revolution
- Steam Engine
  - Uses High Pressure High Heat steam to Reciprocate the piston through ‘one-way’ valves
  - Through a system of slot rods and gears the reciprocating motion is translated into rotary motion
  - Almost Al-Jazari’s principle in reverse.

# Al-Jazari

## Impact of The Twin Cylinder

How Steam Engines Work

LD ©2008 HowStuffWorks





# Al-Jazari

## Impact of The Twin Cylinder

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- A look Back
  - Book Of Knowledge Of Ingenious Mechanical Devices
  - Many Inventions for Everyday Things
  - Twin Cylinder Double Acting Reciprocating Piston
  - First Known Use of the Suction Pipe

# Al-Jazari

## Impact of the Twin Cylinder

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### □ References

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