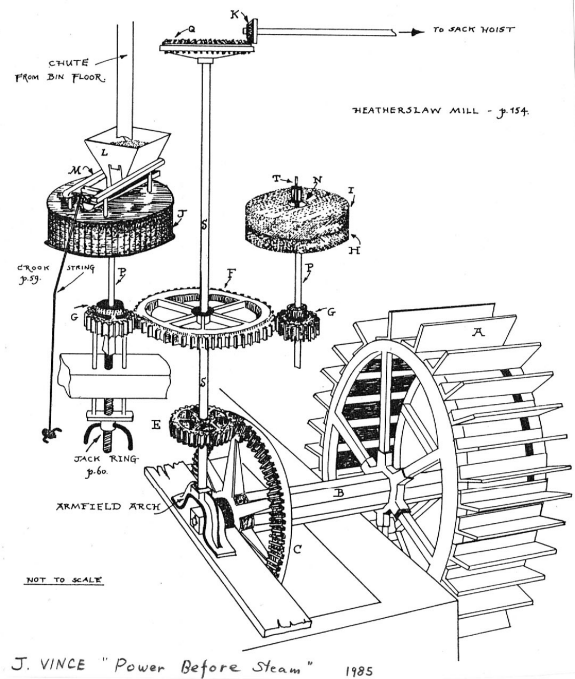


1. 水車の特徴

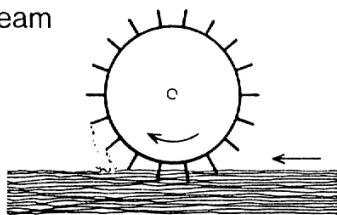
- ・ 畜力のように生命の維持を必要としてない。
- ・ 大出力が得られる。
- ・ 機械を動かす回転運動。
- ・ 水車動力を伝えるメカニズムの発達。



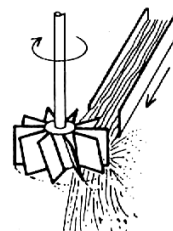
2. 水車の形式

TYPES OF WATERWHEEL

Stream



Horizontal
or
Norse mill



在来型水車の形式

水平型

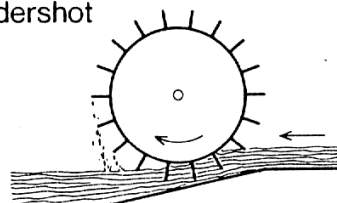
縦型（垂直型）

下掛け

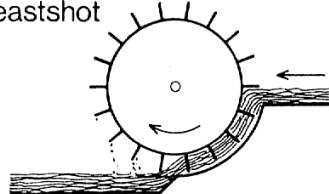
胸掛け

上掛け

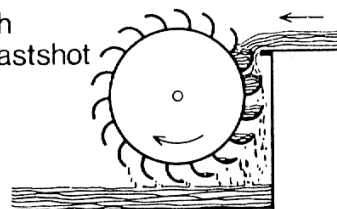
Undershot



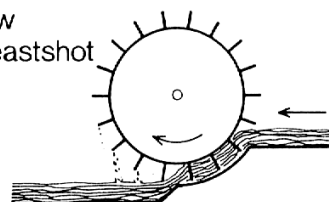
Breastshot



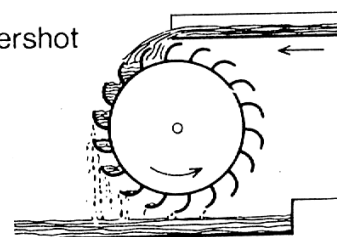
High
breastshot



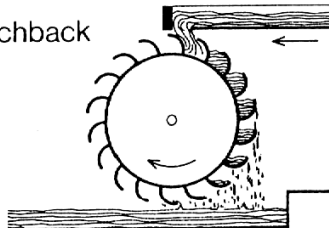
Low
breastshot



Overshot



Pitchback



NEIL COSSONS "Industrial Archaeology" 1987

3. 日本の水車

- ・揚水と米つき
- ・西洋のように大規模な工場動力源にはならなかった。

- ・明治期に近代的洋式水車を導入

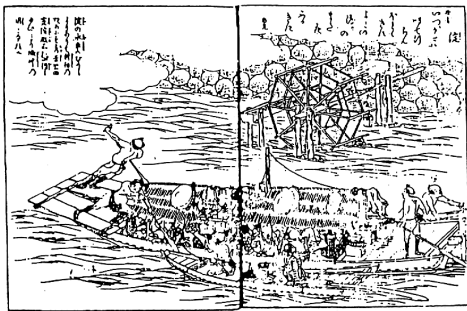
水力発電の水車

フルネイロン型

フランス型

ペルトン型

プロペラ型



淀の水車 (1583)

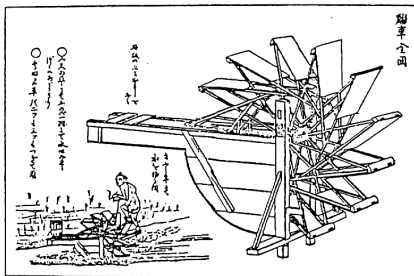


図17 踏車 (1661~1673) ②

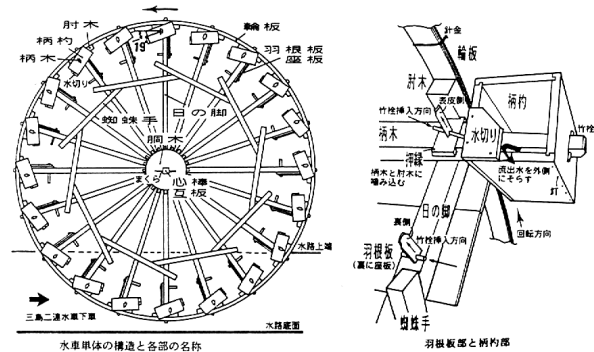


図13 揚水水車単体の構造

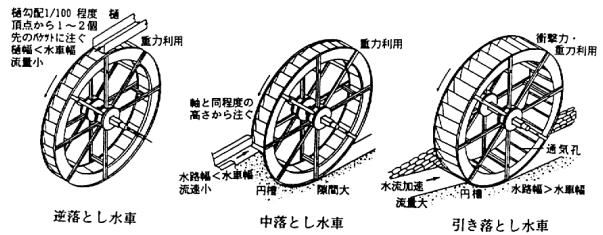


図16 八女地方の動力水車の形式

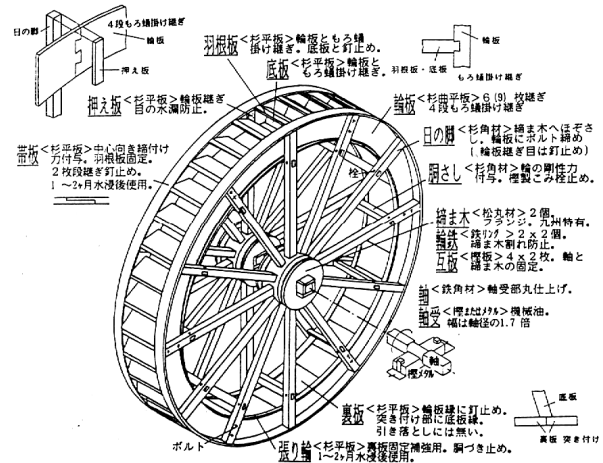


図17 逆落とし水車の構造

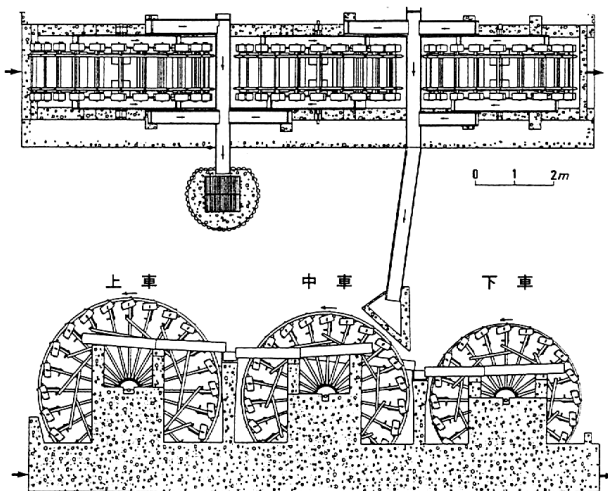


図10 菱野三連水車の構造

1. 『デ・レ・メタリカ』にみる中世の鉱山技術と水車の利用

DE LE METALLICA(1533-1550)、全12巻の書

訳書名：『金属について』

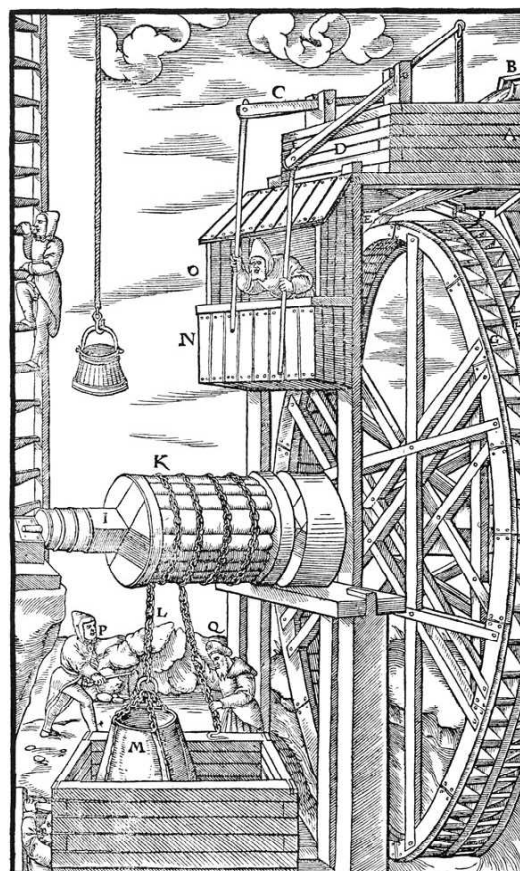
著者：ゲオルク・アグリコラ (Georg Agricola
a、本名 ゲオルク・バウアー、Georg Bauer、1
494年3月24日 - 1555年11月21日)

ドイツの鉱山学者、鉱物学者、人文学者、医
者。「鉱山学の父」として知られる。

※同時代の技術書

BOOK VI.

199

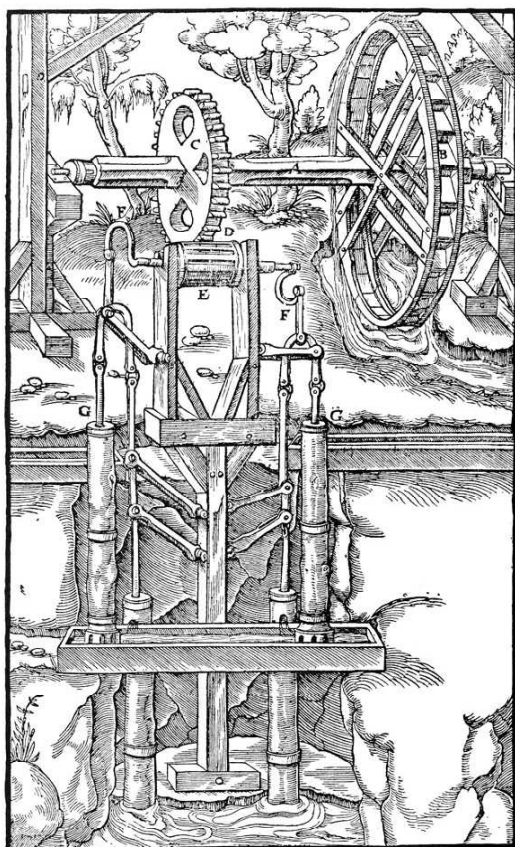


A—RESERVOIR. B—RACE. C, D—LEVERS. E, F—TROUGHES UNDER THE WATER GATES.
G, H—DOUBLE ROWS OF BUCKETS. I—AXLE. K—LARGER DRUM. L—DRAWING-CHAIN.
M—BAG. N—HANGING CAGE. O—MAN WHO DIRECTS THE MACHINE. P, Q—MEN
EMPTYING BAGS.

図1 水車による巻き上げ機

BOOK VI.

189



A—UPPER AXLE. B—WHEEL WHOSE BUCKETS THE FORCE OF THE STREAM STRIKES.
C—TOOTHED DRUM. D—SECOND AXLE. E—DRUM COMPOSED OF RUNDLES. F—CURVED
ROUND IRONS. G—ROWS OF PUMPS.

図2 水車駆動のポンプによる排水



A—BOX. ALTHOUGH THE UPPER PART IS NOT OPEN, IT IS SHOWN OPEN HERE, THAT THE
WHEEL MAY BE SEEN. B—WHEEL. C—CAM-SHAFT. D—STAMPS.

図3 水車による鉱石の粉碎

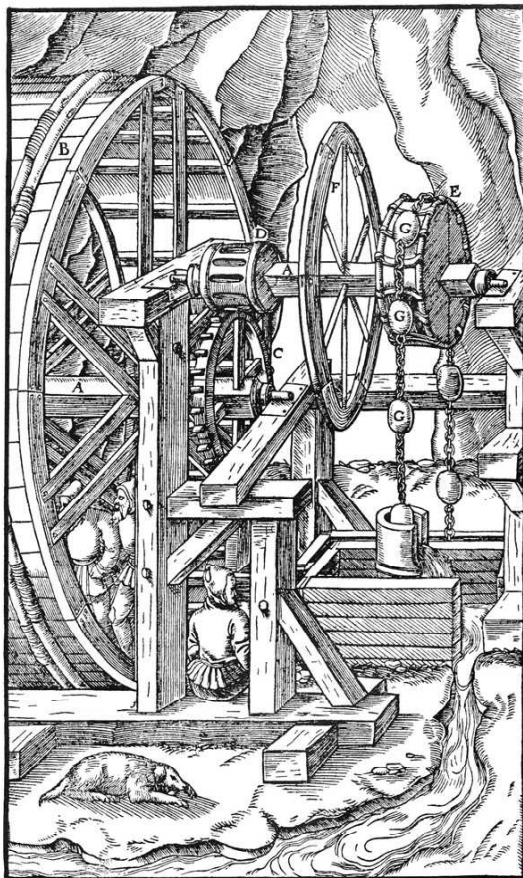


A—BOX LAID FLAT ON THE GROUND. B—ITS BOTTOM WHICH IS MADE OF IRON WIRE. C—BOX INVERTED. D—IRON RODS. E—BOX SUSPENDED FROM A BEAM, THE INSIDE BEING VISIBLE. F—BOX SUSPENDED FROM A BEAM, THE OUTSIDE BEING VISIBLE.

図4 水車による鉱石の粉碎、
手前に一輪車、
水車の右手は、篩い機

BOOK VI.

197



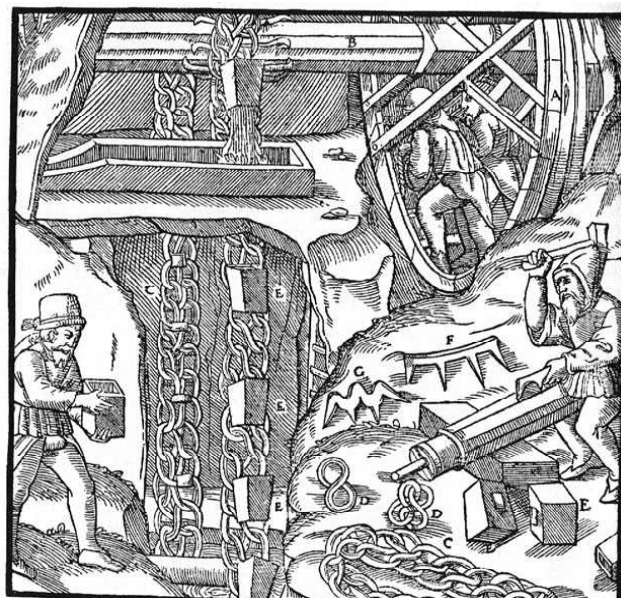
A—AXLES. B—WHEEL WHICH IS TURNED BY TREADING. C—TOOTHED WHEEL. D—DRUM MADE OF RUNDLES. E—DRUM TO WHICH ARE FIXED IRON CLAMPS. F—SECOND WHEEL. G—BALLS.

図6 人車による排水機



A—WATER-WHEEL. B—AXLE. C—STAMP. D—HOPPER IN THE UPPER MILLSTONE. E—OPENING PASSING THROUGH THE CENTRE. F—LOWER MILLSTONE. G—ITS ROUND DEPRESSION. H—ITS OUTLET. I—IRON AXLE. K—ITS CROSSPIECE. L—BEAM. M—DRUM OF RUNDLES ON THE IRON AXLE. N—TOOTHED DRUM OF MAIN AXLE. O—TUBS. P—THE SMALL PLANKS. Q—SMALL UPRIGHT AXLES. R—ENLARGED PART OF ONE. S—THEIR PADDLES. T—THEIR DRUMS WHICH ARE MADE OF RUNDLES. V—SMALL HORIZONTAL AXLE SET INTO THE END OF THE MAIN AXLE. X—ITS TOOTHED DRUMS. Y—THREE SLUICES. Z—THEIR SMALL AXLES. AA—SPOKES. BB—PADDLES.

図5 水車駆動の石臼による鉱石の
粉碎、
桶での攪拌、比重選鉱



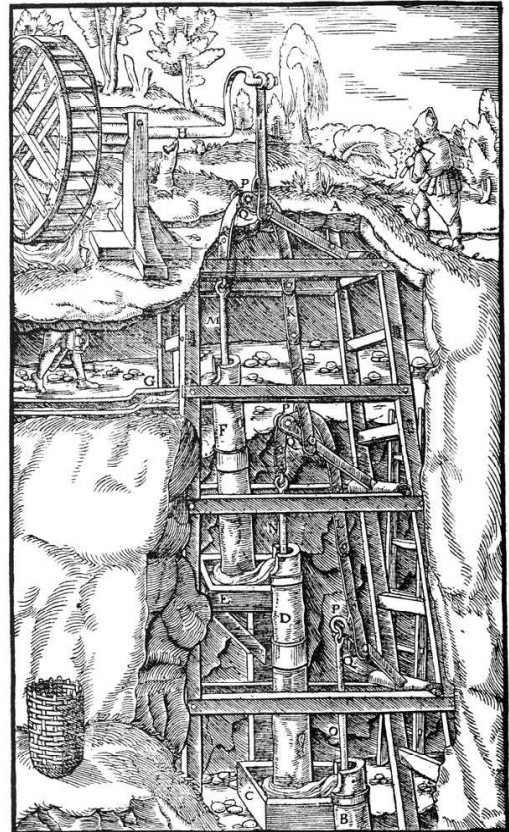
A—WHEEL WHICH IS TURNED BY TREADING. B—AXLE. C—DOUBLE CHAIN. D—LINK OF DOUBLE CHAIN. E—DIPPERS. F—SIMPLE CLAMPS. G—CLAMP WITH TRIPLE CURVES.

図7 人車による排水機
Fは、留め具（かすがい）



A—STAMP. B—STEM CUT OUT IN LOWER PART. C—SHOE. D—THE OTHER SHOE, BARBED AND GROOVED. E—QUADRANGULAR IRON BAND. F—WEDGE. G—TAPPET. H—ANGULAR CAM-SHAFT. I—CAMS. K—PAIR OF COMPASSES.

図8 水車の機構製作の様子
車軸・カム、Dはスタンプ（鋤）

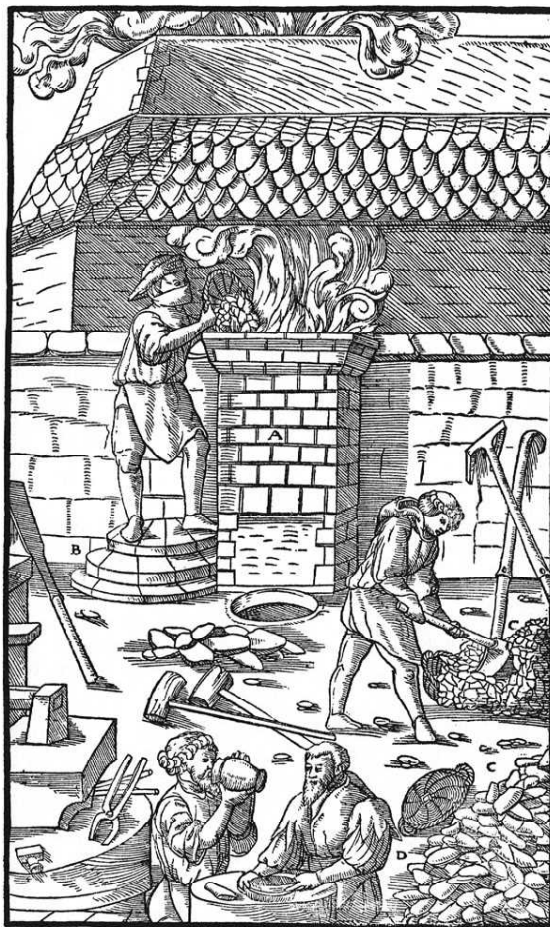


A—SHAFT. B—BOTTOM PUMP. C—FIRST TANK. D—SECOND PUMP. E—SECOND TANK. F—THIRD PUMP. G—TROUGH. H—THE IRON SET IN THE AXLE. I—FIRST PUMP ROD. K—SECOND PUMP ROD. L—THIRD PUMP ROD. M—FIRST PISTON ROD. N—SECOND PISTON ROD. O—THIRD PISTON ROD. P—LITTLE AXLES. Q—“CLAWS.”

図9 水車による3段ポンプの排水機

BOOK IX.

425



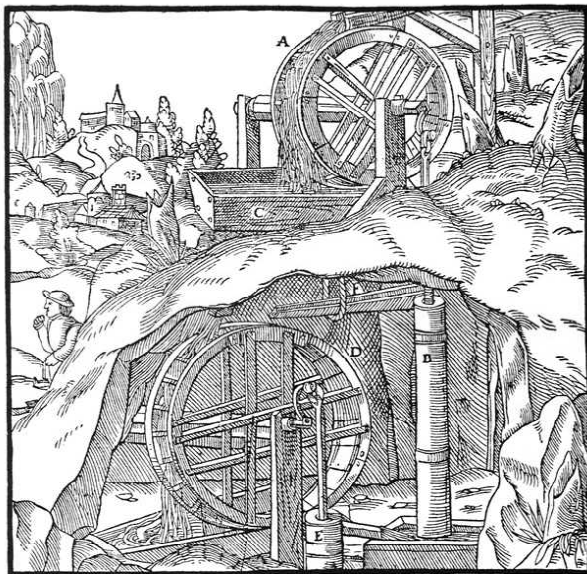
A—FURNACE. B—STAIRS. C—ORE. D—CHARCOAL.

図10 A : 高炉 B : 踏み台 C : 鉱石
D : 木炭



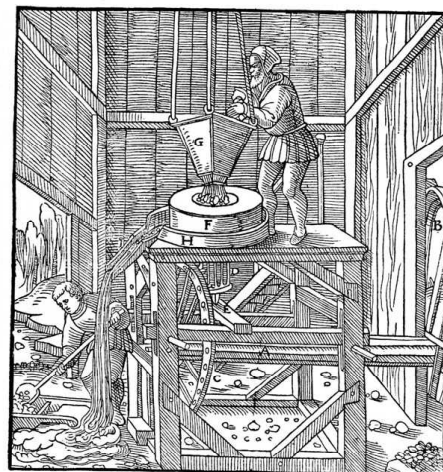
A—FORGE. B—BELLAWS. C—TONGS. D—HAMMER. E—COLD STREAM.

図11 A : 火炉（ほど） B : 鞴
C : やっこ D : ハンマー E : 冷水



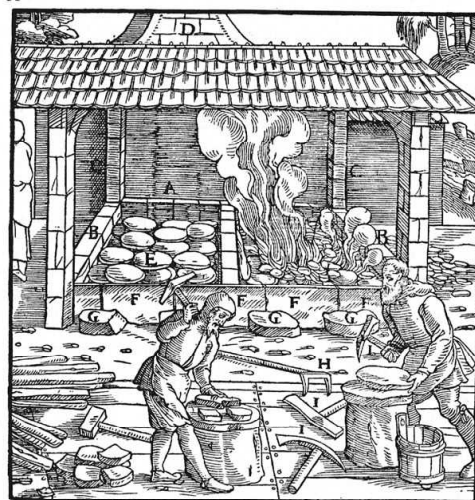
A—WATER WHEEL OF UPPER MACHINE. B—ITS PUMP. C—ITS TROUGH. D—WHEEL OF LOWER MACHINE. E—ITS PUMP. F—RACE.

図12 水車による2段ポンプの排水機



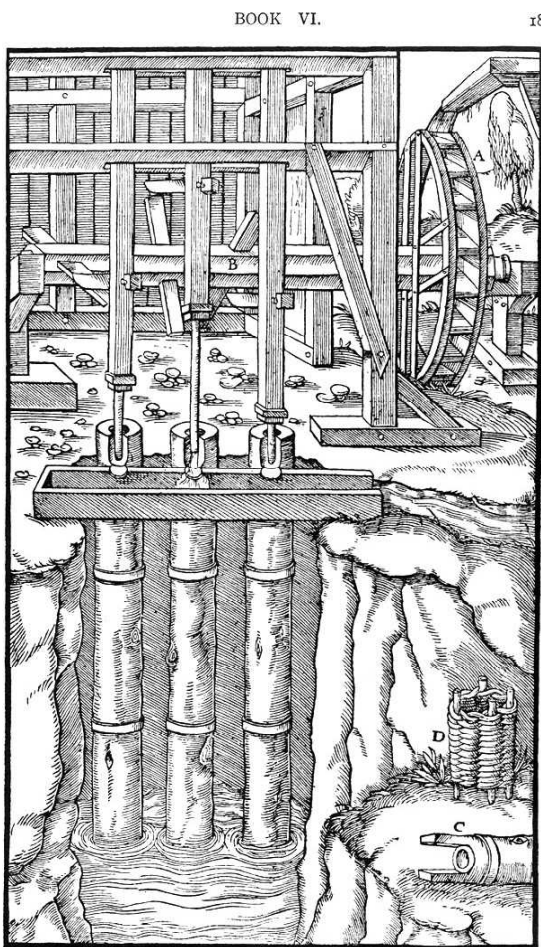
A—AXLE. B—WATER-WHEEL. C—TOOTHED DRUM. D—DRUM MADE OF RUNDLES. E—IRON AXLE. F—MILLSTONE. G—HOPPER. H—ROUND WOODEN PLATE. I—TROUGH.

図13 水車駆動の石臼による鉱石粉碎



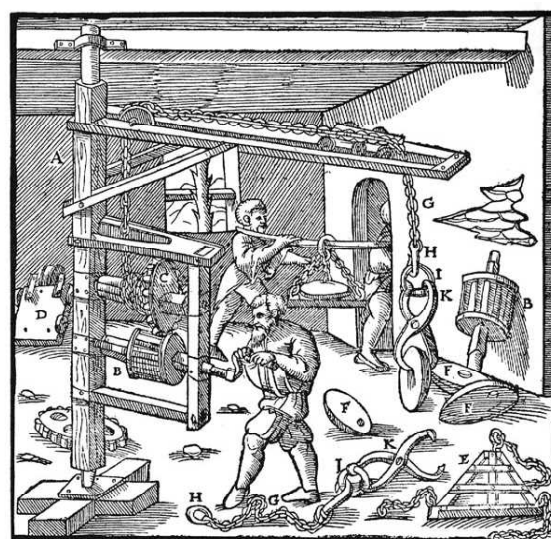
A—BACK WALL. B—WALLS AT THE SIDES. C—UPRIGHT POSTS. D—CHIMNEY. E—THE CAKES ARRANGED. F—IRON PLATES. G—ROCKS. H—RABBLE WITH TWO FRONTS. I—HAMMERS.

図14 鍛冶屋



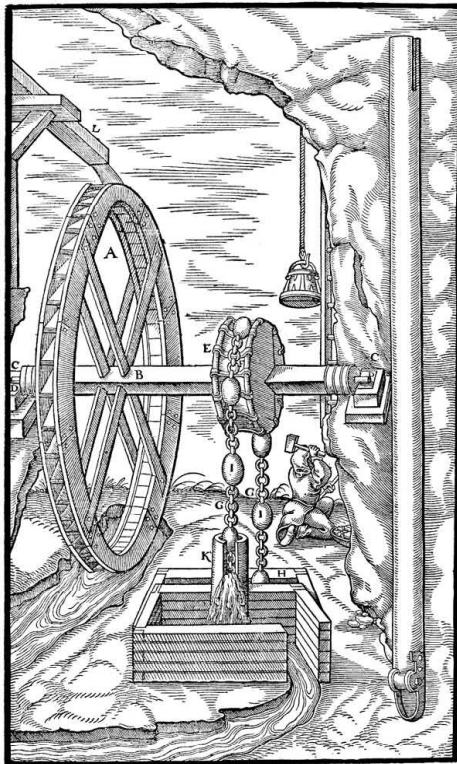
A—WATER-WHEEL. B—AXLE. C—TRUNK ON WHICH THE LOWEST PIPE STANDS. D—BASKET SURROUNDING TRUNK. (Sixth kind of pump—see p. 184.)

図14 水車による3列ポンプの排水機



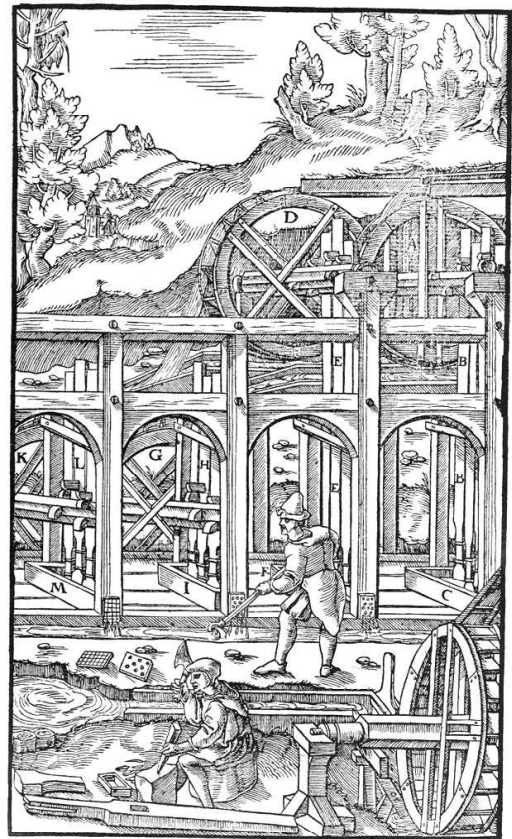
A—CRANE. B—DRUM CONSISTING OF RUNDLES. C—TOOTHED DRUM. D—TROLLEY AND ITS WHEELS. E—TRIANGULAR BOARD. F—CAKES. G—CHAIN OF THE CRANE. H—ITS HOOK. I—RING. K—THE TONGS.

図15 起重機



A—WHEEL. B—AXLE. C—JOURNALS. D—PILLOWS. E—DRUM. F—CLAMPS. G—DRAWING-CHAIN. H—TIMBERS. I—BALLS. K—PIPE. L—RACE OF STREAM.

図16 水車によるチェーン式排水機



A—FIRST MACHINE. B—ITS STAMPS. C—ITS MORTAR-BOX. D—SECOND MACHINE. E—ITS STAMPS. F—ITS MORTAR-BOX. G—THIRD MACHINE. H—ITS STAMPS. I—ITS MORTAR-BOX. K—FOURTH MACHINE. L—ITS STAMPS. M—ITS MORTAR-BOX.

図17 水車4基による鉱石粉碎機



A—MACHINE FIRST DESCRIBED. B—THIS WORKMAN, TREADING WITH HIS FEET, IS COMPRESSING THE BELLOWS. C—BELLOWS WITHOUT NOZZLES. D—HOLE BY WHICH HEAVY VAPOURS OR BLASTS ARE BLOWN OUT. E—CONDUITS. F—TUNNEL. G—SECOND MACHINE DESCRIBED. H—WOODEN WHEEL. I—ITS STEPS. K—BARS. L—HOLE IN SAME WHEEL. M—POLE. N—THIRD MACHINE DESCRIBED. O—UPRIGHT AXLE. P—ITS TOOTHED DRUM. Q—HORIZONTAL AXLE. R—ITS DRUM WHICH IS MADE OF RUNDLES.

図18 畜力鞴、畜力動輪、足踏み鞴



A—WORKMAN CARRYING BROKEN ROCK IN A BARROW. B—FIRST CHUTE. C—FIRST BOX. D—ITS HANDLES. E—ITS BAILS. F—ROPE. G—BEAM. H—POST. I—SECOND CHUTE. K—SECOND BOX. L—THIRD CHUTE. M—THIRD BOX. N—FIRST TABLE. O—FIRST SIEVE. P—FIRST TUB. Q—SECOND TABLE. R—SECOND SIEVE. S—SECOND TUB. T—THIRD TABLE. V—THIRD SIEVE. X—THIRD TUB. Y—PLUGS.

図18 選鉱作業