

positively-driven parts of the apparatus, and the return or upward strokes of the stamps are effected by a rising movement of the said positively-driven parts, communicated to the stamps through bodies of liquid.

2. A stamping apparatus of the kind referred to in claim 1, in which there are combined with the stamps and their attachments and the positively-driven parts springs adapted to act when necessary in lieu of liquid during the return or upward strokes of the positively-driven parts and stamps of the apparatus.

3. In stamping apparatus of the kind referred to in claim 1, a stamp connected by a rod to a piston which is located within a cylinder that is arranged to have a vertical reciprocating motion imparted to it, and between the bottom of which cylinder and the bottom of the piston there is a body of liquid, the arrangement being such that the rod and attached stamp-head will be lifted by the cylinder through the medium of the liquid, and during descent of the stamp-head its velocity will, when the cylinder is driven with sufficient rapidity, be increased beyond that ordinarily due to gravity (after allowing for retardation due to friction) by reason of the frictional driving-connection which will then obtain between the positively-driven parts and the parts in mechanical connection with the stamp.

4. Stamping apparatus according to claims 1 and 2, in which the stroke of the driving-cylinder 4 is made greater than that of the stamp-head 8 and connected piston 5, and there is a communication between the lower end of the cylinder and a chamber or reservoir containing liquid, so that the downward velocity of the stamp-head can be further increased beyond the ordinary velocity, and a communication will be opened between the cylinder and chamber to allow of liquid passing from the latter to the former to insure that the space between the piston and cylinder-bottom shall at all times be full of liquid, and in this way prevent undue shock when the cylinder again moves upward, besides automatically compensating in whole or in part for the wearing of the shoe and die.

5. Stamping apparatus of the kind specified in the preceding claims, in which provision is made for opening communication between the cylinder 4 and the liquid-chamber 10 at different positions of the piston 5 in the cylinder, so as to enable the stroke of the stamp-head to be varied to suit requirement.

6. An arrangement of the kind referred to in claim 4, wherein the wall between the cylinder and liquid-chamber is formed with two or more holes 9^a, arranged at different heights; and each controlled by a valve.

7. Stamping apparatus of the kind referred to in claim 2, in which the cylinder 4 has a vertical groove in its inner surface controlled by an adjustable rod capable of being operated from the exterior of the cylinder.

8. The modified construction of the stamping apparatus referred to in the preceding claims, in which the stamp-head is lifted through the medium of the liquid between the bottom of the cylinder 4 and the piston 5 connected to the stamp-head, but is allowed to descend in relation to the said cylinder by permitting the liquid to escape from the cylinder into the chamber 10, through an opening 9*, controlled by a suitably-operated valve 31.

9. Stamping apparatus constructed, arranged, and operating substantially as hereinbefore described with reference to and shown in Figures 1 and 2, or modified according to Figures 4 and 5 or according to Figure

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DONALD BARNES MORISON.

MINE-MANAGERS' EXAMINATION PAPERS.

QUESTIONS USED IN EXAMINATION OF FIRST-CLASS MINING MANAGERS.

("The Mining Act, 1891.")

FIRST DAY.—TIME: 9 A.M. TO 12 NOON.

[Candidates must attempt to answer every question. All calculations to be shown in detail.]

SUBJECT A.—*On the Sinking of Shafts and Construction of Main Drives.*

1. In fixing the position of a vertical shaft to work a quartz lode that was lying at an angle of 63 degrees from the horizon to the eastward, what distance from the lode would you require to commence the shaft to strike the lode at 300ft. in depth? Show by calculation how you arrive at the result.

2. If a quartz lode was cut in a vertical shaft at a depth of 90ft., lying at an angle of 78 degrees to the westward, how far would you have to drive from the bottom of the shaft at a depth of 400ft. to cut the lode? Show how you arrive at the result by calculation.

3. Describe fully what provision you would make in commencing to sink a shaft. How would you fix the top of the shaft? In sinking through an alluvial drift, how would you commence to timber it if framed sets of timber were used? What provision would you make to keep the shaft from twisting as it is being sunk?

4. Show by sketch how you would widen a shaft at the change of lifts if the shaft was not large enough, and how you would fix bearers to carry the pumps at the change of lifts.

5. In opening out a chamber from the bottom of a shaft 300ft. in depth in alluvial drift of a loose character, describe fully how you would proceed.

6. In constructing a vertical uprise for a height of 50ft. through loose ground requiring to be close-timbered, describe fully how you would construct it.