Perpetual motion?

DEAR SIR,

Classroom note 271 (October 1972) appears to illustrate an interesting general principle. Is it not inevitable that whenever a conservative system comes to rest it begins to retrace its steps? This being so, such a system could never 'just reach' an equilibrium position—such as top dead centre in the quoted example.

Yours faithfully,

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The teacher who didn't Playfair

DEAR SIR,

When I was about 10 my maths teacher came into the classroom and said "The other mathematics masters don't believe me. But I can prove that the three angles in a triangle sum to 2 right angles, using only the congruence axioms. Watch!" And he drew a figure on the blackboard (not too complicated—I can still visualise the scene), picked out a number of congruent triangles, and, hey presto! the three angles did add to 2 right angles, as required. And the class, which had previously been subjected to a much less convincing proof (involving, I seem to remember, Playfair's axiom), could only think how stupid the other masters were not to see how clever this was.

Of course, a few years later I realised that the master had not played completely fair. But he had certainly produced a very ingenious and apparently convincing argument, and it would be very interesting to know just what it was. Is there any reader who has met with this, or has any ideas about it? So many years have passed that I can no longer remember the name of the teacher, and he must have retired long ago. The only clue I can give is that (I think) he used the theorem that two triangles are congruent if they have two sides and a right angle in common. Presumably that is where the right angles crept in.

Yours sincerely,

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Tangents through the looking glass

DEAR SIR,

The rule for constructing inverse-tangent formulae, obtained by H. V. Lowry in Mathematical note 3331 (October 1972) and employed in Note 3346 (June 1973), was given (according to Bromwich, *Infinite Series*, p. 196, no. 43) by C. L. Dodgson (Lewis Carroll) in the following form:

$$\tan^{-1}\frac{1}{p} = \tan^{-1}\frac{1}{p+q} + \tan^{-1}\frac{1}{p+r}$$

provided that $qr = 1 + p^2$.

Yours faithfully,

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