

WHY AND WHEN WATCH-SPRINGS BREAK

WATCHMAKERS BELIEVE that thunder-showers cause watch-springs to break. Investigation by S. R. Williams, of Oberlin College, Ohio, reveals the interesting fact that more springs do break in summer, the season of electric storms, than in winter, when few or none occur. He believes, however, that electricity has nothing to do with the breakage, which is caused by rust, due to moisture, and promoted by high temperature. This belief is confirmed by laboratory experiments, which also show that oiling is effective in lowering that amount of breakage. "Oil your watch-springs," ought therefore to be good advice, provided there is any way of doing this without clogging the delicate mechanism. Mr. Williams reports his results in *School Science and Mathematics*, beginning his article with a mention of some other odd trade ideas that seem to have foundation, altho, as held, they are erroneous. He writes:

"Blacksmiths have an idea that if the red-hot end of an iron bar is suddenly plunged into water, while the other end is held in the hand, that the smith can notice a very rapid and perceptible increase in temperature of the portion held in his hand. In other words, they believe that the water very suddenly drives the heat from the hot end to the cooler one. Curiously enough, careful investigation of this idea was made by two departments of physics of leading universities of this country and quite independently they could not find, by sensitive instruments, the changes which the blacksmiths seem to pretty generally recognize.

"Again, there is a belief among many barbers that a thundershower dulls their razors and that special attention must be paid to sharpening them after the thunder and lightning.

"It is well to remind ourselves that a blacksmith named Arstall once conceived the idea that an iron rod would change its length, if magnetized. He spoke to Joule, a prominent physicist of England, about it, who became sufficiently interested in the suggestion to test it and found, indeed, that such was the case.

"While the explanations offered by the trades for their ideas are not always supported by scientific reasons, there are fundamental principles back of them which show why they persist in the minds of those who believe in them. For instance, in the case of the iron rod whose heated end is very suddenly plunged into cold water, in all probability the steam arises from the water where the heated rod enters it and this steam ascending envelops the hand grasping the other end and gives the sensation of a sudden

increase of temperature. At any rate the ideas are frequently worthy of further investigation as the following may well illustrate.

"Inquiry among a number of those engaged in the business of watch repairing reveals a persistent notion that the electricity present during a thunder shower is accountable for a large number of mainsprings snapping during and immediately following a thunder-shower.

"To ascribe this breakage to electricity may be ruled out at once, for the mainsprings are coiled in a metal barrel, which in turn is inside of a metal case, and the combination makes absolute protection against any electrical disturbances. Magnetic effects were looked for, but none could be discovered.

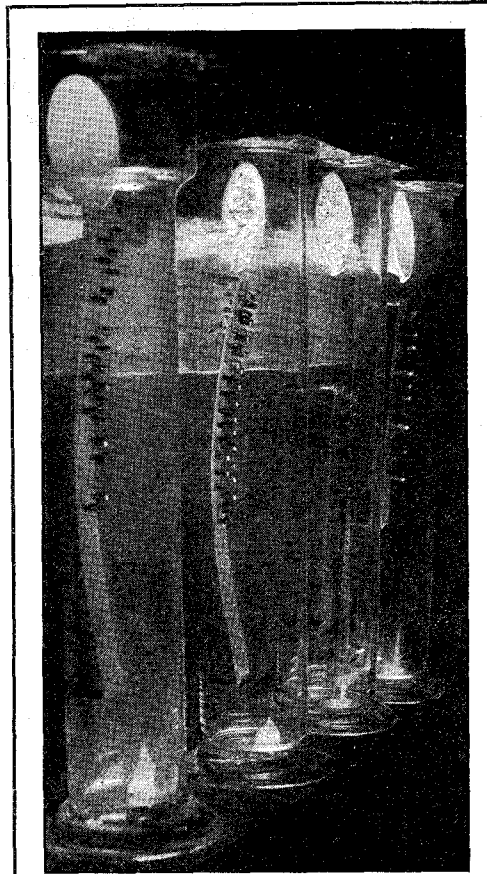
"Through the courtesy of Messrs. Herrick and Shreffler of Oberlin, Ohio, and Mr. Chas. H. Savage of Elyria, Ohio, they allowed a search of their records to be made and the number of mainsprings replaced each month was recorded over a continuous period of five years, 1915, '16, '17, '18 and '19. In curve A is shown the composite for the five years as taken from the records of Messrs. Herrick and Shreffler, while curve B shows the average number of thunder-showers per month over the same five years. Curve C shows a similar study from the records of Mr. Savage of Elyria, Ohio. There seems to be a real connection between these curves. If electricity and magnetism are not the causes, what is? Moisture is the obvious answer, and so the next study was an experimental one, in which the breakage of pieces of watch-springs under tension was observed when they were in a moist atmosphere and when they were in a dry one. The results seem very conclusive.

"A watch-spring was cut into pieces, each alternate piece being thrown in one pile and the others in another pile. These were put in a state of strain by bending them in a small loop and holding the ends together by a clamping device. One set of springs was then placed in a jar in

which a vessel of water was located and the other set of springs was placed in a similar jar but with a vessel of calcium chloride present to keep the air inside the jar dry. Both jars were sealed air-tight. They were observed for a period of time, and the number which broke in each jar was recorded. The results of a number of different tests are given in the following table:

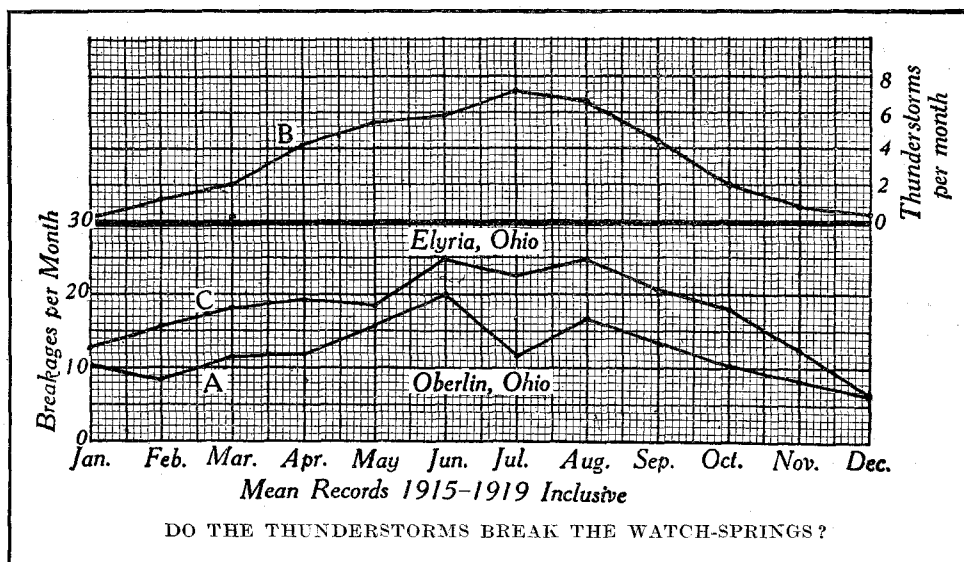
Exp. No.	Sample in each jar	Days under observation	No. broken in dry air	No. broken in moist air
1	22	7	0	11
2	28	52	0	17
3	30	41	0	10

"The moisture therefore seems to be the main cause of the seasonal breakage. Investigation of the springs under a compound microscope showed minute rust spots at the points where the springs had broken, indicating that moisture had promoted rusting there which had broken the skin effect of the spring. Once a crack starts the rust then works in, causing still greater weakness, and it breaks."



Courtesy S. R. Williams, Oberlin College.

TESTING THE WATCH-SPRINGS.



LETTERS - AND - ART

LITERATURE DRAMA MUSIC FINE-ARTS EDUCATION CULTURE

SHAKESPEARE RECREATED BY A WOMAN

A WOMAN RUSHES IN where men have feared to tread. Will Shakespeare has proven too much of a theatrical nut for his own sex to crack, but he is shown up in a four-act drama by one of England's young ladies of the pen.

in the flesh by men and women who have built up lovingly in their minds some picture of their country's greatest poet, a figure all the more bewitching, because he is one of history's secrets." What she did was this:



From "The Sphere," London.

SHAKESPEARE AND MARY FITTON

The "Dark Lady of the Sonnets" has come to the dressing-room after playing *Juliet*, and is captivated by Shakespeare's genius. In the inset is *Punch's* picture of the Bard of Avon after being told by Queen Elizabeth to get on with his work.

And she seems to have emerged with something of a triumph for her intrepidity. Shaw has attempted *Shakespeare* in a "one-act squib," as a Manchester *Guardian* reviewer puts it. "Many write Shakespeare plays for the study, in the safe knowledge that they will never be acted." Miss Clemence Dane is the woman of courage who "must have written with a fair confidence that her Shakespeare would take form upon the stage, and be judged

"'Will Shakespeare: An Invention' was produced at the Shaftesbury Theater. That it could satisfy everybody could never be hoped, but it will satisfy very many. Miss Dane attempted the impossible with high courage, and she has written a play that will live.

"The program begins with an author's note: 'This play does not claim to be true to history. It is no more than an attempt to suggest the nature of the experiences which went to the development of Shakespeare's genius.' Miss Dane has indeed snapped her fingers at history with a flourish.

"*Shakespeare* has sent a play from Stratford to London, and *Henslow* comes down to claim him for the Court. He goes, breaking *Anne Hathaway's* heart. At the Court, he meets and loves *Mary Fitton*, the dark lady, and she plays *Juliet* when a boy fails. But *Mary Fitton* has an affair with *Marlowe*, and Shakespeare pursues her to her meeting with *Marlowe* at Deptford, and it is in a fight between the two poets that *Marlowe* is stabbed by his own hand. The *Queen* hears of the scandal, banishes *Mary* from Court, and *Mary* goes out; there are other men, and she has heard of *Shakespeare's* wife. Then *Shakespeare* is left with his remorse, his burned-out embers of passion, his wolfish, devouring pessimism. The *Queen* prescribes a remedy. Let him work.

The play is thus seen to be "pure fantasy, and one must honorably accept the convention and not boggle about dates and facts." But—

"She who takes this high hand must justify her daring and face a more searching test of poetic truth than the humbler pedestrian folk who abide by the chronicle. This *Shakespeare* had stature of spirit. Mr. Philip Merivale, who played the part, made him big, but not a giant. And there was so much left out. He had no humor. True, that at the close he played to receive that gift. But *Shakespeare* did not need to supplicate half-way through his career for the boon of laughter. That surely must have been his from birth.

"Nor was this *Shakespeare* sensual, driven to frenzy alike by the fascination and the horror of physical love. He struck one as good, possessor of a moral logic, wholly modern and quite un-pagan. He was weak and given to wrestlings with conscience, like a Puritan. Was the real *Shakespeare* really so haunted as this one by the presence of his deserted life?

"Miss Dane has not accepted the idea that Shakespeare's passionate love of love and passionate loathing of love sprang both from his esthetic emotions and not from an ethical instinct. Her *Shakespeare* was concerned more with the rights and

wrongs of his love than with its beauty and its ugliness. Yet Miss Dane had only two hours and a quarter (exclusive of pauses) to reveal the most many-sided man that ever lived. She could not do all. What she did, she did well. Would that the players had done as well for her as she for them!

"The play is in verse, often inspired, always dignified. And it was gabbled for the most part, not spoken."

"Honorably accepting" this lady's convention does not come